United States Patent

[11] 3,599,381

[72] Inventor **Karl Gartner**
Gundelfingen, Donau, Germany

[21] Appl. No. **881,545**
[22] Filed **Dec. 2, 1969**
[45] Patented **Aug. 17, 1971**

[73] Assignee **Josef Gartner & Co.**
Gundelfingen am Danube, Germany

[32] Priority **Dec. 2, 1968**
[33] **Germany**
[31] **P 18 12 212.8**

[54] **METAL WINDOW OR DOOR CASING**
10 Claims, 10 Drawing Figs.

[52] **U.S. Cl.** **52/217,** 52/122, 52/302
[51] **Int. Cl.** **E06b 1/60**
[50] **Field of Search** 52/217, 213, 122, 403, 302

[56] **References Cited**

UNITED STATES PATENTS

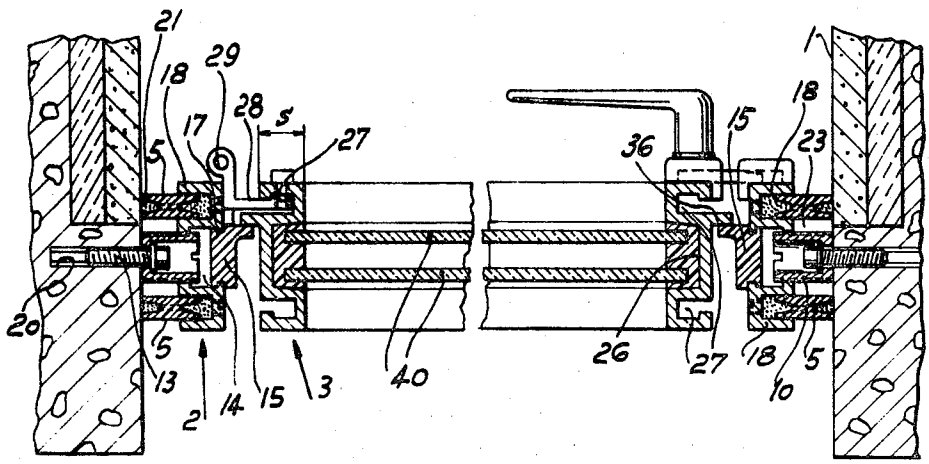
1,754,762	4/1930	Nelson	52/217
2,595,506	5/1952	Backman	52/217
2,743,795	5/1956	Taubman	52/217
2,766,858	10/1956	Johnson	52/122
3,412,510	11/1968	Harcubu	52/127

FOREIGN PATENTS

37,214	1969	Finland	52/122
391,258	1965	Switzerland	52/403

Primary Examiner—Frank L. Abbott
Assistant Examiner—H. C. Sutherland
Attorney—Woodhams, Blanchard and Flynn

ABSTRACT: A metal frame for a door or window having bushes screwable outwardly to support the frame in an opening and a seal on each side of the support bushes, each seal comprising an elastic sealing strip disposed in a groove in the frame which can be forced outwards to engage the masonry with two spaced sealing lips by the introduction of a sealing compound into the corresponding groove through openings in the frame, the sealing strip having channels through which the sealing compound can flow to fill the space between the sealing lips.

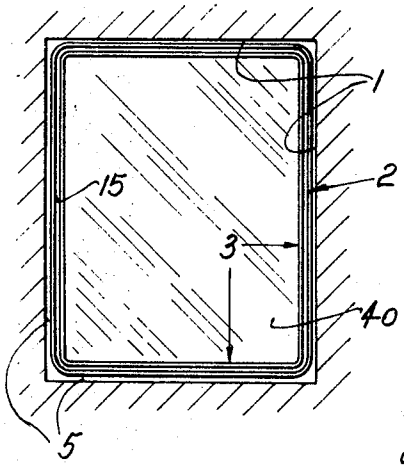


PATENTED AUG 17 1971

3,599,381

SHEET 1 OF 3

Fig. 1.



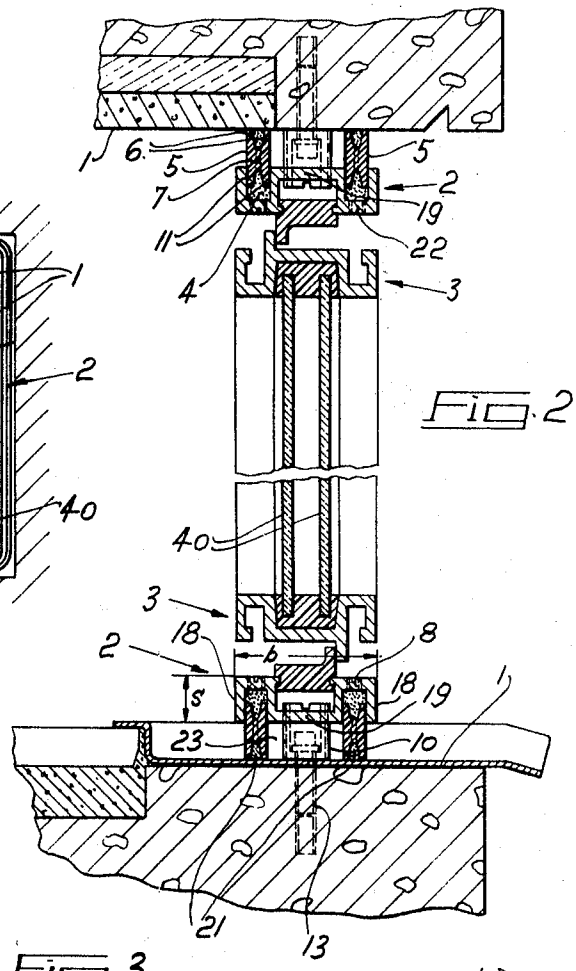
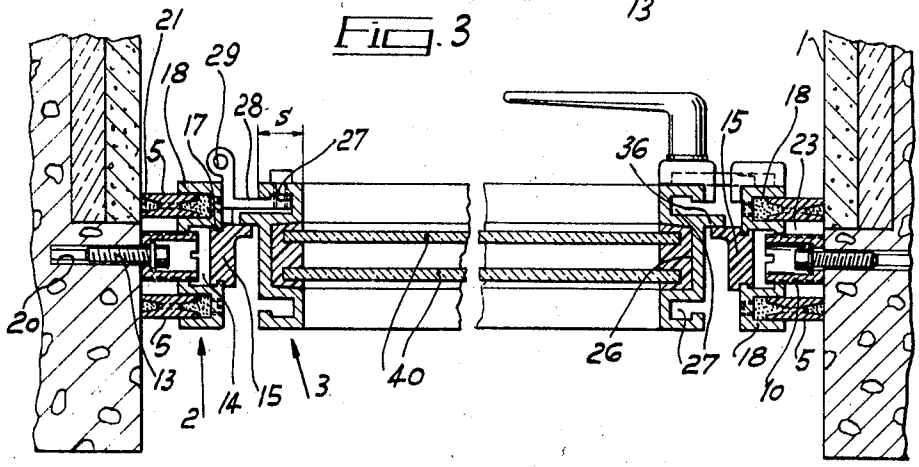


Fig. 2

Fig. 3



INVENTOR
KARL GARTNER

BY
Woodhams, Blanchard & Flynn
ATTORNEYS

Fig. 4

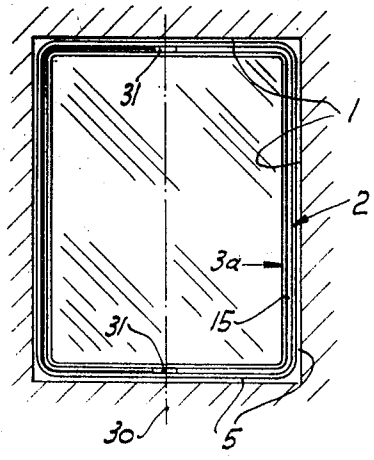


Fig. 5

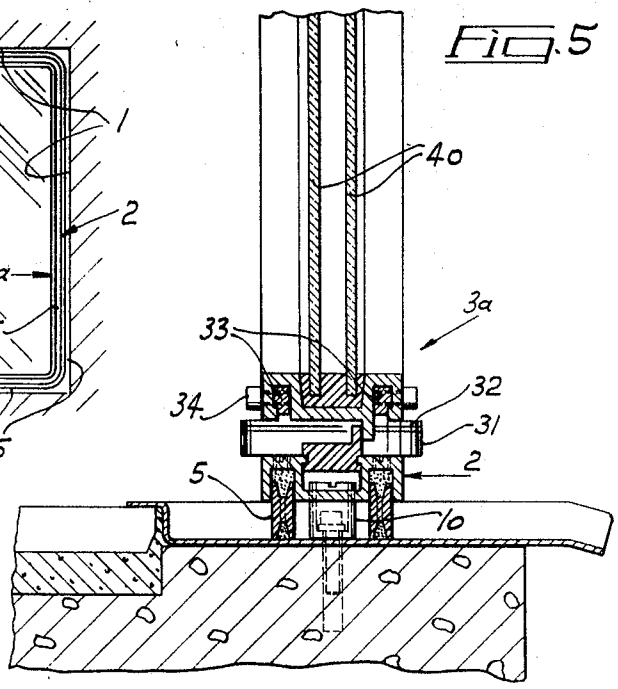
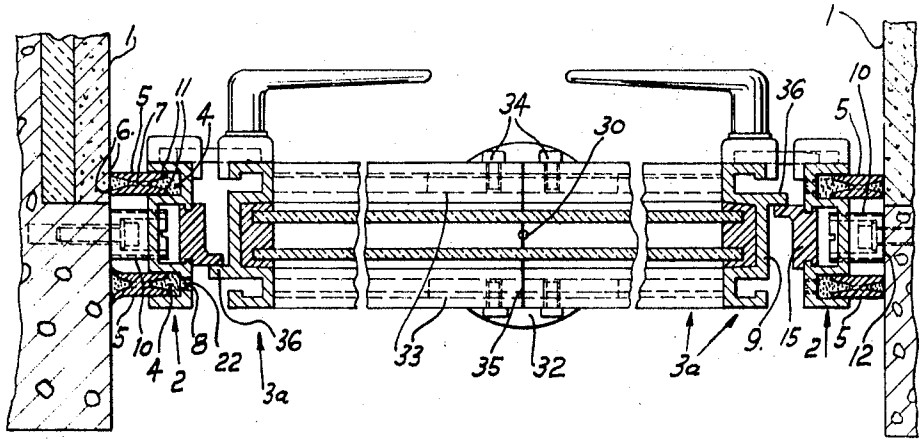


Fig. 6.



INVENTOR
KARL GARTNER
BY
Woodhams, Blanchard & Flynn
ATTORNEYS

Fig. 8

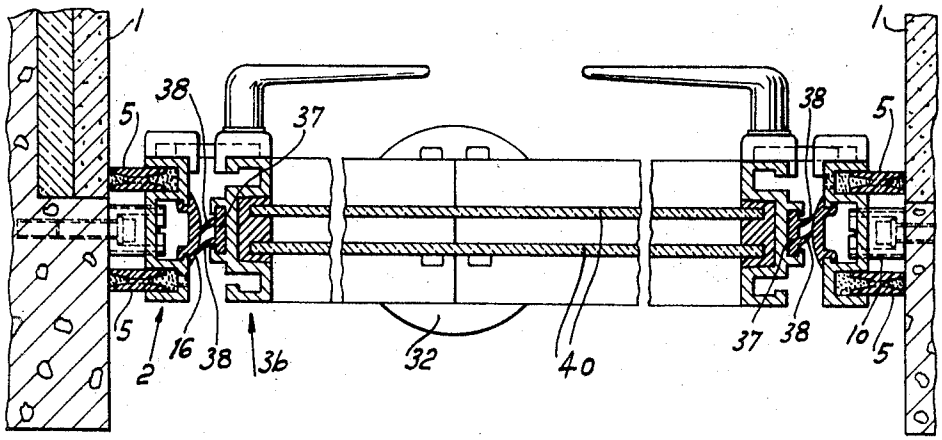


Fig. 7

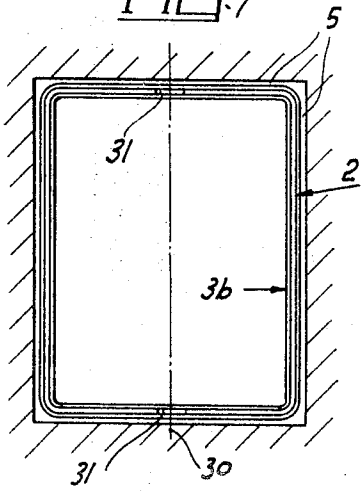
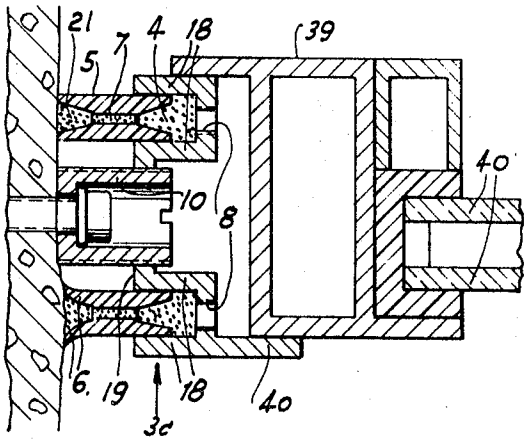


Fig. 10



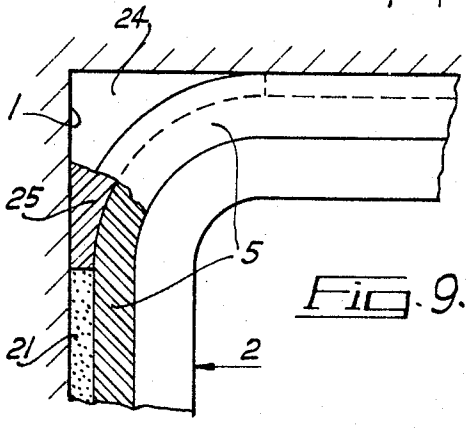


Fig. 9.

INVENTOR
KARL GARTNER

BY
Woodhams, Blanchard & Flynn
ATTORNEYS

METAL WINDOW OR DOOR CASING

The invention relates to a metal window or door with a casing adapted to be inserted without a mortar joint in an opening in masonry or brickwork.

The installation of metal windows and doors, in particular aluminum windows, in concrete or other masonry causes a number of difficulties.

From experience it is not possible to construct window or door openings in a building so that they are true to size. The dimensional differences must then be adjusted by applying mortar. As a result of this mortaring in of the windows, they become smeared with lime and cement mortar and must be cleaned and this not only causes great expenditure of time and heavy expenditure, but the surface, especially of aluminum windows, is attacked and corroded by the alkaline mortar. This circumstance is particularly troublesome in the case of anodized structural elements of aluminum because the surface attacked by lime or cement mortar cannot be repaired. In order to avoid these drawbacks, such structural elements must therefore be coated beforehand with a protective lacquer, which again results in additional cost and considerable expenditure of work, in particular if the protective lacquer must be removed subsequently. Apart from said corrosive attach by mortar, the metal structures to be installed in this way are damaged mechanically during the dressing process, so that the anodized coating is also damaged thereby.

Another considerable disadvantage of this jointing of the metal windows or doors together with the masonry is the direct contact of the metal parts with the masonry through the dressing mortar. As is known, steel or aluminum possesses great heat conductivity, in contrast to wood. The consequence of this great heat conductivity of metal window or door frames which are united with the masonry by means of mortar is the production of condensation water on the metal parts in consequence of differences in temperature between the outside air and the air in the room.

The hygroscopic dressing mortar absorbs this condensation water and carries it further into the masonry, which becomes wet through at these points of contact with the metal structures. When frost occurs, the dressing and the masonry are destroyed. Moreover, in consequence of this saturation with moisture, black fungi appear and cannot be eliminated, because they appear again after being removed.

In addition, a heat loss is associated with the cooling down of the masonry. The aluminum window casings and frames form a considerable cooling surface which is increased in size by the cooled-down masonry at the areas of contact. These cold zones cause considerable heat losses and thereby an inadequate degree of comfort for the inhabitants of rooms equipped with such windows.

Finally, attention must also be drawn to a particularly disadvantageous behavior evidenced by aluminum windows and doors when they are united to the masonry by dressing mortar.

Aluminum has the property of expanding considerably on being heated and of contracting considerably on being cooled. This behavior of aluminum makes it impossible to install aluminum windows or door frames in masonry with dressing mortar so that they are watertight. In fact, with the action of cold, the dressing mortar is torn away from the masonry by the contracting metal frames. When wind and rain occur, water therefore penetrates into the gaps produced between the masonry and the metal frame and this results in further saturation of the building with moisture. Attempts have been made to produce a joint between the metal frames and the masonry be means of Thyokol compounds and similar elastic sealing compounds. This sealing method can be undertaken only in favorable weather. It presupposes laboratory conditions which do not exist on a building site. If the masonry, which is generally soiled by building debris, is not carefully cleaned beforehand, the sealing material does not adhere to the masonry and immediately becomes detached. Moreover, the sealing material

becomes brittle in time through the action of ozone, ultraviolet rays, sunlight and substances in the atmosphere and thereby also gives rise to leaks. In addition, the use of this sealing material also has an extremely disadvantageous effect because of its high cost.

The problem underlying the invention is to avoid the abovementioned disadvantages and provide a metal window or door which makes simple, strong and watertight installation possible without dressing mortar, permits expansion through heat without any detrimental effect and substantially reduces heat losses. In order to solve this problem, a metal window or door is provided which, according to the invention, has the following essential features:

A casing section having two outer grooves arranged on the two sides of the section, sealing sections of permanently elastic material which are movable outwardly in these grooves and which each have two outer sealing lips and a plurality of channels leading outwardly between these lips, closable openings on the inside of the casing section which permit the forcing of a sealing compound into the two outer grooves, and cylindrical externally threaded supporting bushes which can be screwed outwardly in the middle portion of the casing section and serve to support the casing section on the masonry.

The details of the invention and the advantages thereof are described hereinafter with reference to embodiments illustrated in the drawings.

In the drawings:

FIG. **1** is a view of a metal window inserted in an opening in a wall and having a pivoting or hinged casement;

FIG. **2** is an associated vertical section on a larger scale;

FIG. **3** is an associated horizontal section;

FIG. **4** is a view of a metal window inserted in an opening in a wall and having a swing casement;

FIG. **5** is an associated vertical section;

FIG. **6** is an associated horizontal section;

FIG. **7** is a view of a revolving window inserted in an opening in a wall;

FIG. **8** is an associated horizontal section;

FIG. **9** is a view, partly in section, of a corner of a window;

FIG. **10** shows another construction in horizontal section.

In the drawings, there is indicated at **1** a wall opening in which a metal window consisting of a casing frame **2** and a window frame **3** is inserted. The frame **2** comprises a casing section having two outer grooves **4** arranged on the two sides of the section. Outwardly movable sealing sections **5** of permanently elastic material (synthetic rubber) are arranged in these grooves and each of these sealing sections has a wet and two outer sealing lips **6** and a plurality of channels or apertures **7** arranged at intervals and leading outwardly between these lips. Closable openings **8** are moreover provided on the inside of this casing section and enable a sealing compound (for example butyl mastic) to be forced into the two outer grooves **4**. Moreover, cylindrical externally threaded supporting bushes **10** are provided and can be screwed outwardly in the middle portion **9** of the casing section and serve to support the casing section on the masonry. As can be seen in the drawing, each sealing section **5** advantageously has two inwardly directed lips **11** which rest against the groove wall. The supporting bushes **10** are pot shaped, the base **12** of the bush supported against the masonry having a hole for the passage of a fixing bolt **13**.

The casing section moreover has an intermediate inwardly directed groove **14**. Furthermore, a plastics strip closing this groove is provided ad may be in the form of an abutment strip **15** or in the form of a sealing strip **16** (FIG. **8**). For the purpose of securing this plastics trips **15** or **16**, projecting edges **17** are provided on the casing section and corresponding grooves are provided in the strip **15** or **16** for engaging these edges.

In the advantageous embodiment illustrated, the casing section consists of two channel sections **18** and a secton web **19** joining these sections, all the parts of the section having approximately the same wall thickness. At the same time, the

casing section has in outline a narrow rectangular cross section the wide side *b* of which is a multiple of the narrow side *s*. This form not only has the substantial advantage that the casing frame **3** of the window can be bent into the form shown with a simple bending device from a single length of section, but that this frame also has a very small area in view of the very small narrow side *s*, so that the transfer of heat from the internal space to the outside through this window casing and also the radiation of cold towards the internal space are thereby considerably reduced.

In the advantageous constructions illustrated (FIGS. **1** to **8**), the pivoting or swingable window frame **3** or **3***a*, **3***b* mounted on the window casing consists of a section which corresponds substantially to the casing section in form and dimensions. The same advantages mentioned above therefore apply to this window frame, i.e. this window frame can also be produced in simple manner by bending lengths of section and, in consequence of the small narrow side *s*, likewise has a small area which reduces the transfer of heat. At the same time, as shown, the arrangement is advantageously such that the window casing **2** and the window frame **3**, **3***a*, **3***b* are flush on the internal space side and on the outside.

The installation of the above-described metal window is effected in very simple manner as follows:

The window, which is completely assembled and glazed in the factory, is inserted in the finished opening **1** in the masonry. By screwing the supporting bushes **10** outwardly, the casing frame **2** is adjusted at an even distance from the masonry, the threaded bushed being supported firmly on the masonry by their bases **12**. A hole **20** is drilled into the masonry through the hole in the base of the supporting bush and a plastics plug is pushed into the first-mentioned hole. By screwing in the bolt **13**, a strong and secure connection of the casing frame **2** to the masonry is obtained.

The sealing of this casing frame to the masonry is now achieved by forcing a sealing compound through the openings **8**. During this forcing operation, not only are the grooves **4** filled with this sealing compound, as shown, but the sealing sections **5** are also pushed outwardly until the outer lips **6** thereof are supported against the masonry **1**. As these lips are compliant and can spread, as shown in FIGS. **6** and **10**, a satisfactory seal is obtained even where the masonry is uneven. The sealing compound forced into the grooves **4** not only produces a pressing of the inner lips **11** against the groove wall (and thereby a sealing of the sections **5** in the grooves **4**), but is forced through the channels **7** into the space **21** between the outer sealing lips **6** and thereby against the masonry **1**. Satisfactory sealing of the casing frame **2** with respect to the masonry is thereby obtained. This joint or connection between the casing frame and the masonry is elastic, so that expansion of the metal frame **2** due to heat does not have any detrimental effect.

After the sealing compound has been forced through the openings **8**, they are closed, for example, by means of grub screws **22**, so as to maintain the applied pressure in the grooves **4** and **21** and prevent the sealing compound flowing back.

As a result of the arrangement according to the invention of two sealing sections **5** on the casing frame **2**, not only is there produced an effective supplementary support of this frame on the masonry, but also, due to the formation of an airspace **23** between these two sealing sections, an effective heat insulation between the outside air and the internal space. Moreover, the sealing sections **5** not only produce a permanently elastic, watertight joint between the masonry and the window or door casing frame, but they also even out irregularities and dimensional inaccuracies of the building or structure. Not lastly, they assist the external and internal appearance of the installed metal window in an advantageous manner by the black sealing sections **5** extending round the casing frame **2** (see FIGS. **1**, **4** and **7**). As can be seen in the drawings and in particular also in FIG. **9**, each sealing section **5** extends over the entire casing frame **2** and therefore also passes over the circularly bent corners of the frame. So as also to close and seal the wall corners, profiled corner pieces **24** of permanently elastic material are provided, said corner pieces engaging by means of a corresponding arcuate rib **25** in the groove **21** of the sealing section **5**.

As is apparent from the drawings, both hinged and swing casements can be arranged in the same casing section frame **2**. The above-described window frame section **3** to **3***b*, which corresponds in form to the casing section **2**, has the advantage that the inner intermediate groove **26** of said section serves for inserting a double pane of glass **40**, while the outer grooves **27** serve for securing bearing elements. Thus, in the pivoting casement window shown in FIG. **3**, the window hinges **28** are secured in an outer groove **27** of the casement **3**, this casement being adapted to pivot about the pin **29**. In the swing casement **3***a* according to FIGS. **4** to **6** which can turn about the vertical axis **30**, a bearing drum **31** is fixedly connected to the casing frame **2**. The rotary disc **32** supported on this bearing drum has two retaining bars **33** which are inserted in the grooves **27** of the casement **3***a* and secured by means of screws **34**. Said bars **33** serve at the same time to connect securely the parts abutting at **35** from which the casement frame **3***a* is made. In accordance with FIG. **6**, one and the same section provided with an abutment or stop ridge **36** may be employed for these frame parts.

The revolving window according to FIGS. **7** and **8** may likewise be mounted in the casing frame **2** in the manner hereinbefore described. Inserted in the casement frame **3***b* is a sealing strip **37** which advantageously has two sealing lips **38** arranged at a distance from one another. Since there is an airspace between these two lips, the passage of heat is reduced thereby at this point and, consequently, freezing of these lips to the sealing section **16** when it is extremely cold is also prevented.

The invention is not limited to the embodiments hereinbefore described, but can also be applied to metal windows of different type. Thus, FIG. **10** shows a window casement made from lengths of hollow section **39**. The casing frame **3***c* is constructed substantially in the manner hereinbefore described and has a stop ridge **40** for the window casement.

What I claim is:

1. A metal casing for a door or window, said casing having a plurality of supporting bushes spaced about the outer periphery of said casing in threaded engagement therewith, said bushes being screwable outwardly with respect to the casing to bear against the wall of an opening in which the casing is to be secured to thereby center said casing in said opening, two outwardly facing spaced parallel grooves extending around the outer periphery of said casing, one on each side of said supporting bushes, and sealing members of elastic material located in said grooves and movable outwardly thereof, each sealing member including an apertured web and a pair of spaced sealing lips projecting outwardly of said web around its outer periphery said web and spaced lips defining channels extending outwardly between the lips from the inner periphery of the sealing member, and said casing having closable openings communicating with said grooves whereby a sealing compound may be forced into said grooves through the apertured web to press said sealing members against the wall of the opening and to fill the space between said sealing lips.

2. A metal casing as claimed in claim **1** in which each sealing member has two inwardly directed lips which rest against the walls of the groove.

3. A metal casing as claimed in claim **1** in which each supporting bush has an opening therein for the passage of a fixing bolt.

4. A metal casing as claimed in claim **3** in which each bush is tubular with a base wall at its outer end, said opening being formed in said base wall.

5. A metal casing as claimed in claim **1** having an inwardly facing groove between said outwardly facing grooves and a plastic strip closing said inwardly facing groove.

6. A metal casing as claimed in claim 5 wherein said plastic strip has grooves and said inwardly facing groove has projecting edges engaged in said grooves to retain said strip.

7. A metal casing as claimed in claim 5 in which the cross section of the casing is rectangular with a depth in a direction perpendicular to the plane of the casing which is a multiple of the width.

8. A metal casing as claimed in claim 7 wherein a window frame is mounted, said window frame having in cross section substantially the same outline and dimensions as the casing.

9. A metal casing as claimed in claim 8 in which the casing and the frame are flush on the inside and outside of the window.

10. A metal casing as claimed in claim 5 formed of a profile strip of substantially uniform wall thickness.