

March 9, 1943.

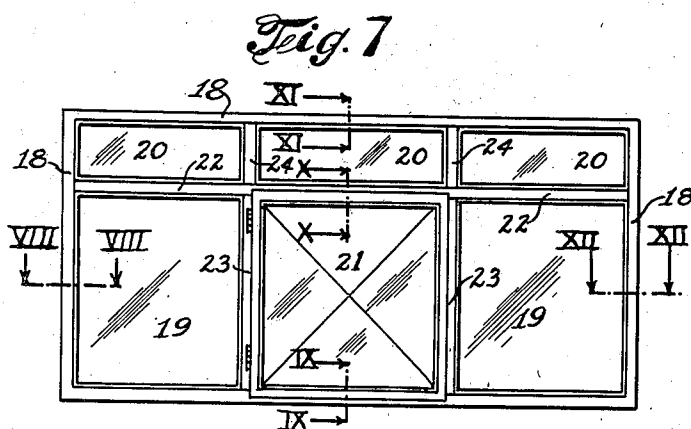
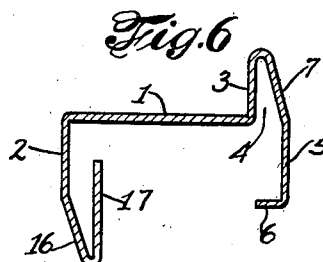
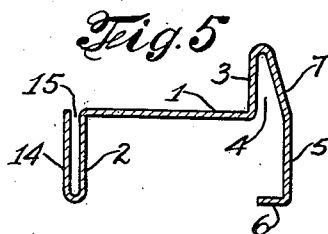
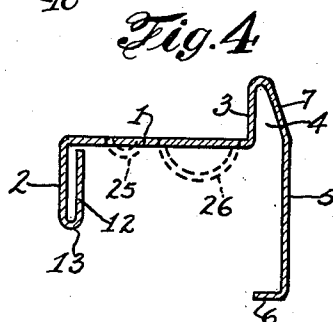
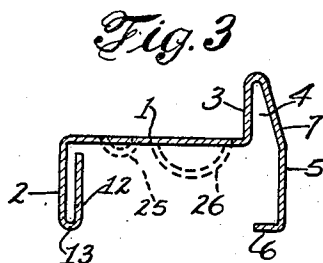
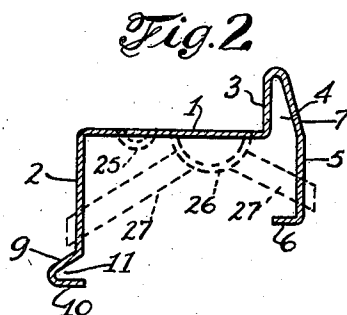
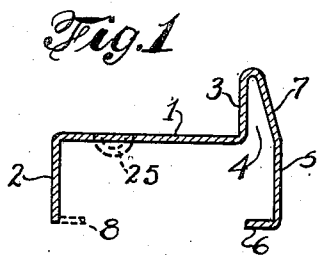
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2,313,488

WINDOW STRUCTURE

Filed June 17, 1939

3 Sheets-Sheet 1



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Fig. 8

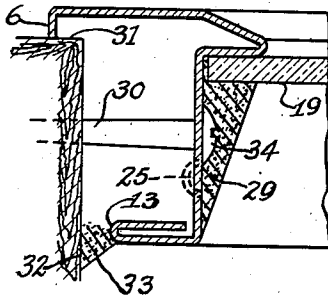


Fig. 9

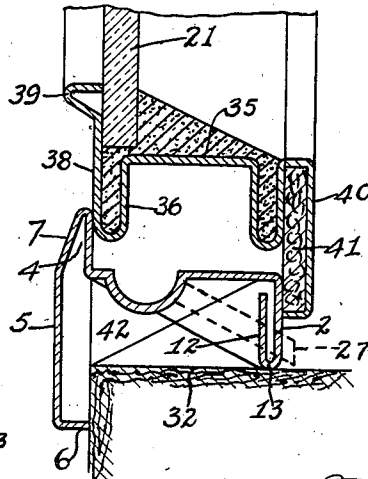


Fig. 10

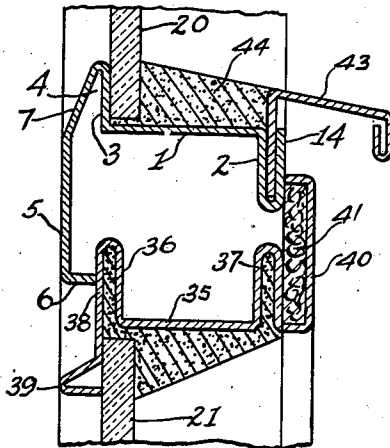


Fig. 11

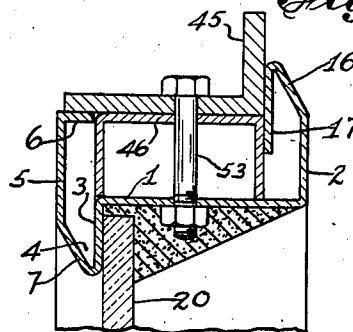


Fig. 12

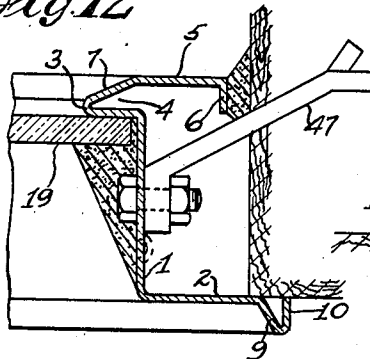
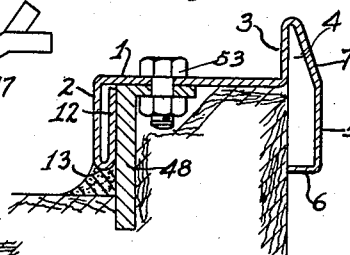


Fig. 13



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Fig. 14

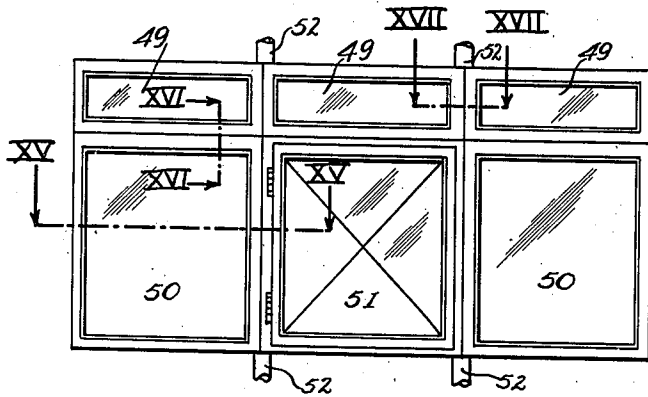


Fig. 15

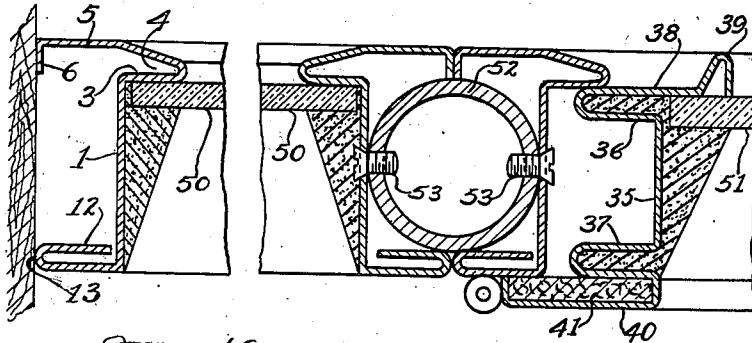


Fig. 16

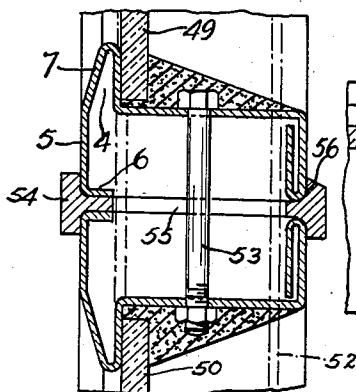
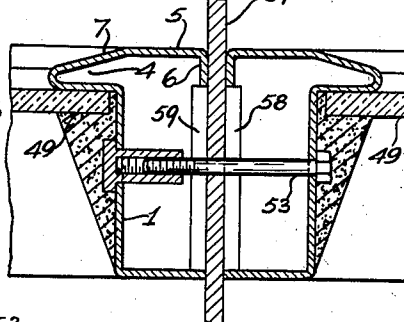


Fig. 17



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UNITED STATES PATENT OFFICE

2,313,488

WINDOW STRUCTURE

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Netherlands; vested in the Alien Property Custodian

Application June 17, 1939, Serial No. 279,647
In the Netherlands February 27, 1939

3 Claims. (Cl. 189—75)

My invention relates to structural elements, particularly to structural elements for sashes and frames of windows and doors, and more particularly, to such elements consisting of a sheet of metal, but my invention is not limited to elements of sheet metal.

In my previous and pending patent application, Serial Number 226,898, filed August 26, 1938, I described and disclosed structural elements, particularly for sashes and frames of windows and doors, comprising a substantially straight web which is provided on both sides with double flanges both extending from the web in the same direction. The outer leg of one double flange forms a so-called rabbet and the outer leg of the other double flange forms a so-called tightening border. Such structural elements according to my prior invention have proved to be very useful in practice, but they require a certain skill and good equipment if they are to be used for pivotal windows and the construction of combined windows, door constructions, etc. This offers no difficulties when the various parts can be assembled directly in the plant and delivered to the building lot or where sufficient skilled labor is available. However, a direct delivery from the plant is not always possible, for instance if delivery is to be made abroad or if the order is too small to warrant the employment of skilled labor. It is also often desirable to have very inexpensive structural elements available for the construction of so-called standardized windows and doors. Such windows and doors are manufactured on a large scale and may be kept in stock. Of course, they are less expensive than windows and doors having special dimensions.

One object of my invention is to create a structural element which can be very easily and inexpensively manufactured and which does not require highly skilled labor and special experience when used for assembling sashes and frames of windows and doors.

Another object of my invention is a structural element which is particularly suitable for stationary windows, for frames and sashes of rotatable doors and pivotal windows and the like. Such a structural element according to my invention may comprise a substantially straight web, one side of which is provided with a leg or a flange substantially at a right angle to the web and the other side of which is provided with a leg or flange which also extends substantially at a right angle from the web but in opposite direction to the first-mentioned leg. This second leg is bent off outwardly thus forming a pocket or

groove and is extended beyond the main web and ends in a flange which is bent inward and substantially parallel to the straight web. Such a structural element according to my invention can be used in combination with structural elements according to my prior application. With such elements, structures can be assembled with rapidity, a minimum of labor and without the destruction or marring of material.

Another object of my invention is to insure the elimination of surfaces which might retain rain or snow water. This is particularly essential since I intend to use structural sections primarily for frames and sashes to be located on the outside of buildings. I accomplish this thereby that the second leg or flange which is bent off outwardly is bent in such a manner that it forms an acute angle relative to the web until it reaches about the plane of the web and is then continued substantially parallel to the leg or flange provided at the other side of the web. This extended leg may end finally in an inwardly bent off flange.

The end of the first leg or flange can be adapted to the particular circumstances. For instance, this leg or flange can be extended and bent off outwardly and upwardly so that a groove is formed parallel to the length of the web. I thereby obtain a strong abutment with a smooth marginal edge.

Another object of my invention is a structural element which is particularly suitable for the combination of various frames and sashes, for instance for the assembly of window constructions consisting of several units with standardized lower parts. I accomplish this by extending the first leg or flange and bending it off inwardly and upwardly while leaving a groove or pocket between the two legs of the thus formed double flange.

Another object of my invention is to provide a structural section which is particularly suitable to be attached to an L-iron. I accomplish this by bending off an extension of the first leg or flange first inwardly at an obtuse angle relative to the first section of the leg and then upwardly at such an angle that the end of the leg is substantially parallel to the first section of the leg.

Another object of my invention is a sectional structure which is particularly suitable where there is a danger of water seeping in. I accomplish this by bending off the first leg or flange outwardly and upwardly leaving a groove or pocket between the inner leg and the outer leg of

the double flange thus formed. In this groove I may insert an eave-like strip.

Another object of my invention is a structural section which is provided with means for the reception of the putty for the securing of panes of glass. I accomplish this by providing one longitudinal groove in the straight web.

Another object of my invention is to provide means for the removal of water which might be retained on the web. I accomplish this by providing one or more longitudinal grooves and connecting these grooves with one or more outwardly leading channels. These longitudinal grooves can also be used for the reception of putty.

Finally, another object of my invention is to provide sashes and frames of windows and doors which are provided and mounted with structural sections according to my invention if suitable in combination with structural sections according to my prior invention.

Other and further objects and advantages of my invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the accompanying drawings several embodiments of my invention are shown.

Figs. 1 to 6 are sectional views of various embodiments of structural elements according to my invention.

Fig. 7 shows a front view of combined windows for the sashes of which structural elements according to my invention are used.

Fig. 8 is a cross-section along line VIII—VIII of Fig. 7 on an enlarged scale.

Fig. 9 is a cross-section along line IX—IX of Fig. 7 on an enlarged scale.

Fig. 10 shows a cross-section along line X—X of Fig. 7 on an enlarged scale.

Fig. 11 shows a cross-section along line XI—XI of Fig. 7 on an enlarged scale.

Fig. 12 shows a cross-section along line XII—XII of Fig. 7 on an enlarged scale.

Fig. 13 shows a particular application of a structural element according to Fig. 3 in a sectional view.

Fig. 14 shows in front view combined windows for the sashes and frames of which structural elements according to my invention in combination with standardized elements and structural elements according to my prior invention are used.

Fig. 15 shows on an enlarged scale a cross-section along line XV—XV of Fig. 14.

Fig. 16 shows a cross-section along line XVI—XVI of Fig. 14 on an enlarged scale, and

Fig. 17 shows a cross-section along the line XVII—XVII of Fig. 14 on an enlarged scale.

Fig. 1 illustrates in cross-section the simplest profile of a sash rail or structural element according to my invention. The sash rail consists of sheet metal or any other suitable material. It comprises a substantially straight web 1 which is bent off on one side into a downwardly extending leg or flange 2 substantially at a right angle to the web. The other side of the web is bent off into an upwardly directed leg or flange 3 which is extended and bent off again downwardly into an outer leg or flange 5 whereby a pocket or groove 4 is formed. Flange 3 is substantially at a right angle to web 1. The end of outer flange 5 is bent off inwardly at substantially a right angle to flange 5 and forms an end flange or in-turned lip 6. Outer flange 5 has preferably an outwardly slanted section 7. The removal of water which falls upon the structural element

is thereby facilitated. The shape of flange 2 can be adapted to the particular circumstances. In certain instances it may be profitable to provide an inwardly bent off lip 8 as indicated in Fig. 1 by dotted lines.

The embodiment according to Fig. 2 differs from Fig. 1 thereby that flange portion 2 is extended and forms a kind of bead. This bead consists of an outwardly bent off portion 9 and an inwardly bent off portion 10. This portion 10 is preferably parallel to the plane of web 1 and creates together with portion 9 a pocket or groove 11. The structural element according to Fig. 2 is particularly suitable for sashes of windows and doors which open outwardly. Flange 2 will then be located on the outside.

Fig. 3 shows a structural element in which flange 2 is extended and bent off upwardly into a flange 12, so that a groove or pocket between flanges 2 and 12 is formed. The distance between bend 13 of the double flange formed by 2 and 12 and web 1 is about the same as the distance between lip 6 and the web. This embodiment of my invention is particularly preferable for so-called standardized windows which should be simple to assemble with a minimum of labor.

Fig. 4 illustrates a structural element which is distinguished from the element according to Fig. 3 thereby that bend 13 of double flange 2, 12 is nearer to web 1 than inwardly bent lip 6. This structural element is particularly suitable for windows and doors which open inwardly.

In Fig. 5 an embodiment of a sash rail according to my invention is shown in which flange 2 is extended and bent off outwardly and upwardly thus forming a flange 14 which ends on about the same plane as web 1 and forms together with flange 2 a groove or pocket 15. If desirable, an eave-like element can be inserted into groove 15.

Fig. 6 shows a structural element in which an extension of flange 2 is bent off inwardly into a flange 16 at an obtuse angle relative to flange 2. Flange 16 is in turn bent off upwardly thus forming a flange 17 which is substantially parallel to flange 2.

Sash rails or structural elements according to Figs. 1 to 6 can if preferable be provided with groove 25 in web 1 as indicated by dotted lines for the reception of putty. Furthermore recesses or grooves 26 connected with channels or outlets 27 can be provided for the discharge of water as indicated by dotted lines.

Fig. 7 illustrates a window construction comprising several units. For this window construction sash rails according to my invention are used. The window construction comprises a main frame 18 within which several stationary smaller windows 19 and 20 and a pivotal window 21 are arranged. The various windows are separated by posts 22, 23 and 24. As Fig. 7 shows the structural elements forming frame 18 can extend over the whole length and width of the frame. This is one of the advantageous results of the great simplicity of structural elements according to my invention. It is also possible to have posts 22, 23 and 24 extend over the whole length and width. Hereby a substantial amount of labor will be saved, the danger or likelihood of leaks will be greatly reduced and the appearance of the whole structure will be improved.

For the sashes of pivotal window 21, structural elements as described and claimed in my pending application can be used. Cross-sections of such structural elements are clearly shown in Figs. 9 and 10.

Fig. 8 illustrates how the pane of glass 19 is inserted into its window sash and secured in its position by means of putty 29. The sash, itself, is fixed into the opening provided for the window construction by a screw 30. Putty 29 serves also to make head 34 of screw 30 invisible and in addition protects it. Lip 6 rests closely against the outer edge 31 of a window frame. Bend 13 of the double flange may rest closely against the marginal edge 32 of the opening provided for the window. If there is an intermediate space left as indicated in Fig. 8 it may be filled with putty 33.

Fig. 9 illustrates a combination of a sash rail according to Fig. 4 with a structural element according to my previously mentioned co-pending application. This structural element according to my previous application comprises a straight web 35 which is continued at both sides into double flanges 36 and 37. The outer flange 38 of double flange 36 is bent off to form a bead-like element 39. Bead 39 together with flange 38 serves as an abutment for the pane of glass 21. Double flange 37 is bent off to form a reentrant flange 40. This reentrant flange together with flange 2 of the sash rail according to Fig. 4 secures a tight connection. In order to improve this connection a tightening strip 41 may be inserted. The sash rail is fixed to marginal edge 32 of the opening provided for the window construction by means of blocks or rods 42 which fit into the interior of the sash rail.

Fig. 10 shows a cross-section of the upper end of pivotal window 21 and the lower end of window 20 and of the sash and frame elements for these windows. Window 21 is inserted into a structural section, according to my previously mentioned prior application. The sash rail for window 20 corresponds to Fig. 5 except that flange 5 is extended beyond flange 2. In order to avoid any possibility of water seeping between outer flange 14 and tightening connection 40, 41 an eave-like strip 43 is inserted into the groove between flanges 2 and 14. The space left between the pane of window 20 and eave strip 43 is filled with putty 44.

In the structure shown in Fig. 11 it is assumed that the opening for the window is framed with an L-iron 45. The used sash rail corresponds to Fig. 6. However, any other suitable sash rail according to my invention can be used. The space between flanges 6 and 17 of this sash rail is filled in with a U-shaped rod 46. Seeping in of water is prevented by slanted flange 16.

Fig. 12 illustrates the use of a sash rail according to Fig. 2 for the right window post of frame 18. The sash rail is fixed within the opening provided for the window construction by means of an anchorage 47 which in turn is attached by any suitable means, for instance by a bolt, to straight web 1.

Fig. 13 shows the employment of a sash rail according to Fig. 3. This rail is affixed to an L-iron 48 by any suitable means, for instance by bolts. L-iron 48 is set into the marginal edge of the window opening provided for the window construction.

Fig. 14 shows a window construction which is composed of several so-called standardized windows. Each section of the entire structure has its own frame or sash so that each section forms a separate complete unit. It is essential to use as many inexpensive and simple structural elements as possible for the construction of such combined windows since otherwise too much material will

be necessary and the windows will be too expensive. It is also important that the elements used can be easily coupled with each other. The composed window shown in Fig. 14 consists of three small upper windows 49, two larger stationary windows 50 and a pivotal central window 51. The sashes for these windows comprise sash rails according to Fig. 3 as is obvious from Figs. 15, 16 and 17. The window sashes are connected or coupled in the vertical direction simply and effectively by means of tubes 52 which extend over the whole height of the window construction. Fig. 15 shows the tube connecting left stationary window 50 with pivotal window 51. Tubes 52 fit into the space left between two adjacent sash rails. The two sash rails and tubes 52 can be held together by any suitable means preferably by bolts 53. A further advantage of tubes 52 is that they reinforce and stiffen the whole construction very effectively.

If tubes are used to couple the various sashes in a vertical direction it is very convenient to employ bars or strips 54 to connect the sash rails in the horizontal direction. These elements have preferably a substantially I-shaped cross-section and are provided with a hole or aperture 55 for the passage of a tube 52. They are slid over the tubes and close or seal up the space left between two sash rails as Fig. 16 shows. In order to prevent the seeping in of water the legs of the I-shaped rods 55 can be slanted at 56. Fig. 16 shows clearly the shape and arrangement of strips 54.

Connecting strips can also be shaped as illustrated in Fig. 17. The elements shown in this figure consist of a broader strip of metal 57 to which two smaller strips 58 and 59 are attached on both sides in order to center the connecting strips. Fig. 17 also shows the employment of a sash rail according to Fig. 1. A connecting strip according to Fig. 17 can be used as a substitute for tubes 52 or such connecting strips can be used in combination with tubes 52 instead of I-shaped elements according to Fig. 16. Finally, it is possible to use both I-shaped elements 54 and connecting strips 57, 58 and 59 or only one type of connecting elements. If such connecting strips instead of tubes are used in vertical and horizontal directions they must be provided with interlocking recesses or must pass through each other as described for tubes 52 and connecting strips 54.

My invention is not limited to the embodiments shown but various changes and alterations may be made without departing from the scope of my invention.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a window construction composed of several separate windows, each unit comprising a separate sash consisting of structural elements comprising a substantially straight web, a flange provided on one side of said web substantially at a right angle to said web, a double flange forming a groove between its inner and outer legs provided on the other side of said web in an opposite direction to said first flange, said outer leg being extended beyond the plane of said web and being bent off inwardly to form a lip, the ends of said first mentioned flanges and the lips of said double flanges of oppositely arranged structural elements of two adjacent sashes of the window construction facing each other thus forming a closed space defined by said two straight webs,

said two first mentioned flanges and two legs of said two double flanges, vertically arranged tubes fitted into the spaces between each two adjacent sashes, for supporting and stiffening said structural elements forming said sashes and means for coupling said sashes with said tubes.

2. In a window construction composed of several separate windows, each unit provided with a separate sash consisting of structural elements comprising a substantially straight web, a double flange provided on one side of said web substantially at a right angle to said web, consisting of an outer leg extending from said web and an inner leg bent off inwardly from said outer leg forming a groove between it and said outer leg, a second double flange forming a groove between its inner and outer legs provided on the other side of said web in an opposite direction to said first double flange, the outer leg of said second double flange being extended beyond the plane of said web and being bent off inwardly to form a lip, the bends of said first mentioned double flanges and the lips of said second mentioned double flanges of oppositely arranged structural elements of two adjacent sashes of the window construction facing and contacting each other thus forming a closed space defined by said two webs, said two inner legs of said first mentioned double flanges and said extended legs of said second mentioned double flanges, tubes fitted into the spaces between each two adjacent sashes said tubes abutting against said two webs, said two inner legs and the edges of said two lips for supporting and stiffening said structural elements forming said sashes and means for coupling said sashes with said tubes.

3. In a window construction composed of sev-

eral separate windows, each unit provided with a separate sash consisting of structural elements comprising a substantially straight web, a double flange provided on one side of said web substantially at a right angle to said web, consisting of an outer leg extending from said web and an inner leg bent off inwardly from said outer leg forming a groove between it and said outer leg, a second double flange forming a groove between its inner and outer legs provided on the other side of said web in an opposite direction to said first double flange, said outer leg of said second double flange being bent off outwardly from said inner leg of said second double flange at an acute angle, bent off again inwardly at about the plane of said web substantially at a right angle to said web and bent off again inwardly and substantially parallel to said web to form a lip, the bends of said first mentioned double flanges and the lips of said second mentioned double flanges of oppositely arranged structural elements of two adjacent sashes of the window construction facing and contacting each other thus forming a closed space defined by said two webs, said two inner legs of said first mentioned double flanges and said extended legs of said second mentioned double flanges, vertically arranged tubes fitted into the spaces between each two adjacent sashes said tubes abutting against said two webs, said two inner legs and the edges of said two lips for supporting and stiffening said structural elements forming said sashes, means for coupling said sashes with said tubes and horizontally arranged strips for closing and sealing the spaces left between two adjacent sashes.

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