

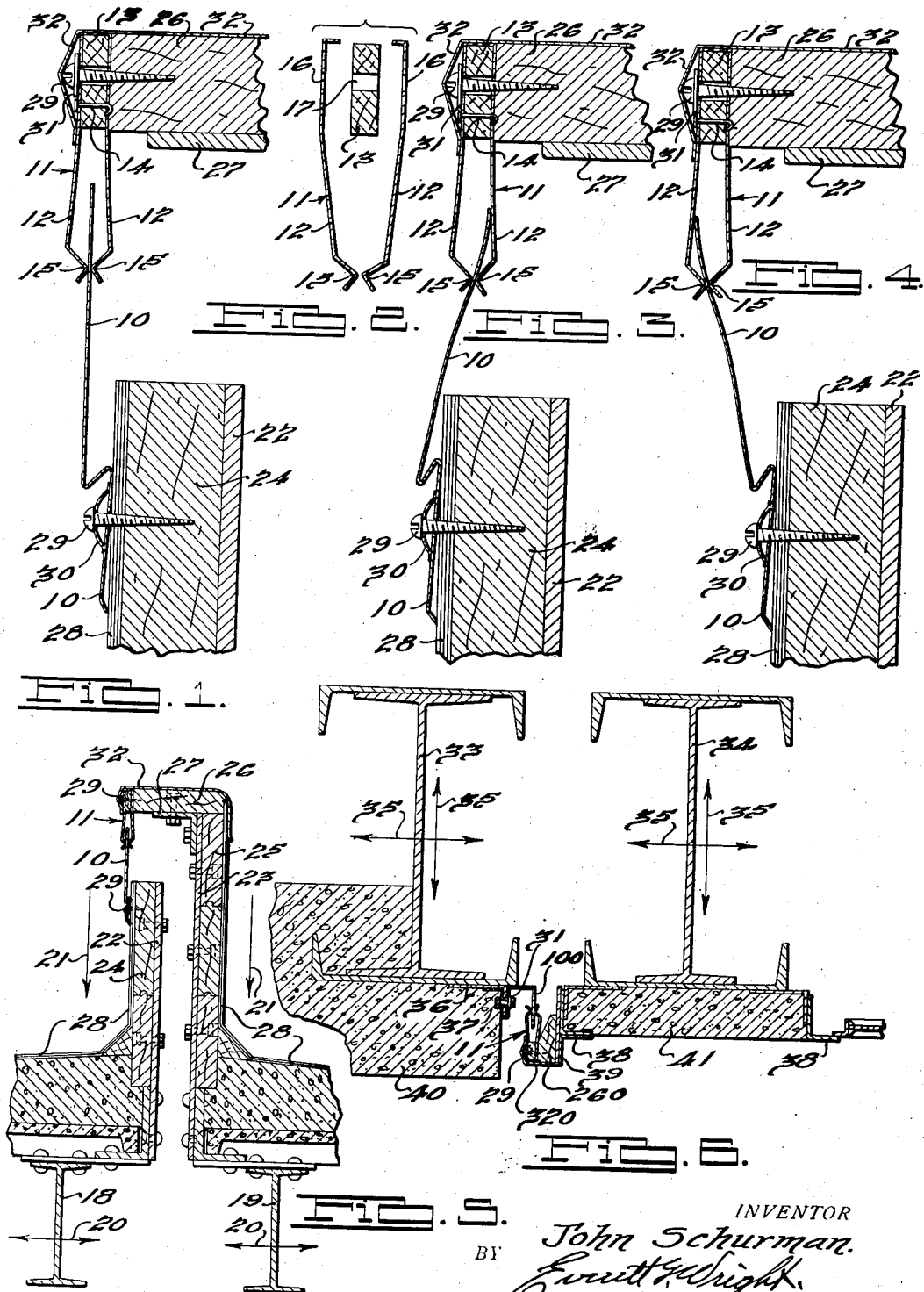
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EXPANSION JOINT

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EXPANSION JOINT

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This invention relates to expansion joints and in particular to expansion joints for use in buildings and the like.

In the construction of buildings, particularly in factory buildings, exhibition buildings, stadia, railroad stations, hangars and the like covering large areas, it is often necessary to make joints therein at suitable spacing to allow for the creeping of the building longitudinally and transversely due to the expansion and contraction of materials employed in the construction thereof caused by changes in temperatures to which the structure is exposed.

In addition to the longitudinal and transverse movement of a building resulting from temperature changes, the various portions thereof are apt to settle unevenly on their respective foundations which is generally caused by loading the structure unevenly or in excess of the live load for which the structure is designed to support, or is the result of supporting a structure on an unstable soil.

Therefore, at any expansion joint made in a building or at any expansion joint made between buildings, if the buildings are of any major size, weatherproof means for permitting free relative multi-directional movement between the parts of a building or between adjoining buildings is required.

With the foregoing in view, the main object of this invention is to provide an expansion joint adapted to permit free relative multi-directional movement between buildings or portions thereof.

Another object of this invention is to provide a weatherproof expansion joint for use between buildings and portions thereof which will admit of a substantially universal movement therebetween.

Another object of the invention is to provide a simple, inexpensive and easy to erect weatherproof expansion joint for building construction and the like which may be readily applied to vertical, horizontal and diagonal joints and which admits of a substantially universal movement between parts of buildings or adjoining buildings connected thereby.

Other objects of the invention will become apparent by reference to the following detailed description taken in connection with the accompanying drawing, in which:

Fig. 1 is a detailed sectional view showing an expansion joint embodying the invention in its normal position.

Fig. 2 is an exploded cross sectional view of the grip member of the embodiment of the ex-

pansion joint disclosed in Fig. 1 showing the shape to which the cover plates of the grip member are formed prior to assembly on a spacer strip.

Figs. 3 and 4 are detailed sectional views similar to Fig. 1 showing how the expansion joint disclosed in Fig. 1 accommodates itself to movements between portions of a structure joined thereby.

Fig. 5 is a vertical cross sectional view showing the application of the expansion joint disclosed in Figs. 1 and 2 to a transverse joint at the roof of a building.

Fig. 6 is a horizontal cross sectional view showing the application of the expansion joint disclosed in Figs. 1 and 2 to a transverse joint at the roof of a building.

Referring now to the drawing wherein like numerals refer to like and corresponding parts throughout the several views, the preferred embodiment of the novel expansion joint disclosed in Figs. 1 to 5 inclusive comprises, in general, a resilient sheet metal diaphragm 10 frictionally engaged in slidable relationship within a grip member generally designated by the numeral 11 throughout the drawing which is composed of a pair of resilient sheet metal grip plates 12 bent preferably as indicated in Fig. 2 prior to assembly on a spacer strip 13 by the nails 14 or other like securing means, the said diaphragm 10 being frictionally telescoped within the said grip member 11 when the said diaphragm 10 and the grip member 11 are secured by suitable means to adjacent parts of a structure or to adjacent structures joined thereby.

The diaphragm 10 is formed to suit the structure to which it is attached and is always fixed to its support in such a manner as to present a free and unsupported strip capable of being flexed with respect to its support without fouling structure adjacent thereto. The said diaphragm 10 is formed of a flexible metal preferably thinner than the flexible metal of which the grip plates 12 of the grip member 11 are formed.

The grip plates 12 of the grip member 11 are formed opposite hand substantially as indicated in Fig. 2 to provide oppositely disposed contact points 15 which are constantly urged toward each other by the resiliency of the flexible sheet metal of which the said grip plates 12 are formed after the said grip plates 12 are secured to the spacer strip 13 by the securing means 14.

Suitable apertures 16 and 17 are preferably provided through the grip plates 12 and the spacer strip 13 respectively through which means for securing the grip member 11 to its support

may be positioned. Although the grip member 11 has been disclosed as comprising a pair of grip plates 12 secured to a spacer strip 13, it is obvious that the spacer strip 13 may be dispensed with and the grip plates 12 may be joined together at the portion thereof which is secured to the structure to which the said grip member 11 is attached.

Because of the fact that the diaphragm 10 is thinner and consequently more resilient than the grip plates 12 of the grip member 11, the contact points 15 of the said grip member 11 will always maintain themselves in substantially opposite abutment to each other on opposite sides of the diaphragm 10 when the diaphragm is telescoped therebetween regardless of whether the diaphragm 10 maintains itself in its normal position with respect to the grip member 11 as shown in Fig. 1 or flexes due to the relative lateral movement of the structure to which the diaphragm 10 and the grip member 11 are secured as best indicated in Figs. 3 and 4.

In addition to flexing as indicated in Figs. 3 and 4 the diaphragm 10 slides between the contact points 15 of the grip member 11 as it flexes with respect thereto, or, the diaphragm 10 may slide between the contact points 15 of the grip member 11 when the structure to which the said diaphragm 10 and grip member 11 are secured moves in a direction normal or substantially normal to the lateral movement thereof as indicated in Figs. 3 and 4.

Also, the diaphragm 10 will obviously slide upwardly and downwardly between the contact points 15 of the grip member 11 simultaneously with the other hereinbefore described movements of the said diaphragm 10 with respect to the grip member 11. Therefore, inasmuch as both the said flexible and sliding movements of the diaphragm 10 with respect to the grip member 11 may occur simultaneously, it is obvious that the use of the novel expansion joints disclosed herein admits of a substantially universal movement of parts of structures and structures with respect to each other when joined by the said expansion joints.

Because of the fact that the resilient grip plates 12 of the grip member 11 constantly and firmly engage both sides of the diaphragm 10 at all times, a double weather joint is always provided between structures or parts thereof employing the novel expansion joint herein disclosed.

Fig. 5 shows a typical application of the novel expansion joint disclosed in Figs. 1 and 2 to a transverse joint at the roof of a building. The purlins 18 and 19 and the roof carried thereby are each free to move laterally with respect to each other as indicated by the double headed arrows 20 in Fig. 5, also, the said purlins 18 and 19 and the roof carried thereby are each free to settle downwardly independent of each other as indicated by the arrows 21 in Fig. 5. The said purlins 18 and 19 and the roof carried thereby are also each free to move longitudinally with respect to each other.

In the construction shown in Fig. 5, the said purlins 18 and 19 support curb plates 22 and 23 respectively to which wooden curbs 24 and 25 are secured. A cap nailer 26 is secured to a continuous angle 27 disposed along and supported by the curb plate 23. Roofing 28 from the roof carried by the said purlins 18 and 19 is turned up and nailed to the said curbs 24 and 25. In the particular construction shown, the purpose of the said curbs is to provide, in effect, a parapet between two portions of a building joined

together by an expansion joint embodying the invention and to position the said expansion joint sufficiently above the roof supported by the said purlins 18 and 19 to prevent water from the said roof, if flooded, from leaking through the said expansion joint.

A diaphragm 10 is preferably secured to the wooden curb 24 by suitable wood screws 29 and the roofer's washers 30, and the grip member 11 is preferably secured to the wooden cap nailer 26 by suitable wood screws 29 and metal disc washers 31. A cap flashing 32 is preferably provided over the top of the cap nailer 26 and the grip member 11.

Fig. 6 shows a typical application of the novel expansion joint hereinbefore disclosed and described in detail to a vertical joint at the side of a building. The columns 33 and 34 are each free to move laterally and transversely with respect to each other as indicated by the double headed arrows 35 in Fig. 6, also, the said columns 33 and 34 are each free to settle on their respective foundations independently with respect to each other.

In the particular construction shown in Fig. 6, the columns 33 and 34 are composed of an I-beam and two channels. The column 33 is provided with a continuous vertical angle 36 to which a diaphragm 100 is secured by suitable bolts 37 and disc washers 31. The diaphragm 100 is similar to the diaphragm 10 hereinbefore described except that it is suitably bent to fit around the outstanding leg of its supporting angle 36. The column 34 is provided with a plurality of continuous vertical gunite trim angles 38. The gunite angle 38 disposed nearest the column 33 has a continuous plate 39 welded thereto to which a suitable wooden nailer 260 is secured. A grip member 11 is preferably secured to the wooden nailer 260 by the wood screws 29 and metal disc washers 31. A flashing strip 320 is preferably provided over the wooden nailer 260 and the grip member 11. It will be noted that the diaphragm 100 flashes itself behind the brick wall 40 at column 33 and that the flashing strip 320 at column 34 extends around one leg of the gunite angle 38 nearest column 33 and flashes itself in the gunite column facing 41.

Except for the surrounding details of construction, the installation of the applicant's novel expansion joint disclosed herein is the same in the case of the vertical joint shown in Fig. 6 as for the horizontal joints shown in Figs. 1 to 5 inclusive. It is obvious that the novel expansion joint disclosed herein may be easily and readily applied to the endless number of conditions which present themselves in building construction and the like and which require a simple, positive, inexpensive weatherproof means for permitting a free relative substantially universal movement between parts of buildings or adjoining buildings.

Although but a single embodiment of the invention and two applications thereof have been shown and described herein, it is obvious that many changes and modifications may be made in the size, shape, arrangement and details of the various elements of the invention without departing from the spirit thereof and it is not intended to limit the scope of the invention other than by the terms of the appended claims.

I claim:

1. An expansion joint of the class described comprising a grip member composed of a pair of continuous resilient grip plates secured fixed with respect to each other along one side thereof,

inwardly disposed continuous contact points formed along the unconnected sides of the said grip plates constantly urged toward each other by the resiliency of the said grip plates, and a continuous resilient diaphragm telescopically engaged in slidable relationship between said grip plates, the said joint admitting of a substantially universal movement between structures connected thereby simultaneously with maintaining a double weather joint at all times between said structures.

2. An expansion joint of the class described comprising a grip member composed of a pair of continuous resilient grip plates secured fixed with respect to each other along one side thereof, inwardly disposed continuous contact points formed along the unconnected sides of the said grip plates constantly urged toward each other by the resiliency of the said grip plates, and a continuous diaphragm of greater resiliency than each grip plate of the said grip member telescopically engaged in slidable relationship between said grip plates, the said joint admitting of a substantially universal movement between structures connected thereby simultaneously with maintaining a double weather joint at all times between said structures.

3. In combination, an expansion joint comprising a grip member secured to one structure composed of a pair of continuous resilient oppositely disposed grip plates each having a continuous contact point therealong spaced from the said structure, the said grip plates being formed to constantly urge the said contact points toward each other by the resiliency of the said grip plates when juxtaposed, a continuous diaphragm secured to an adjacent structure telescopically engaged in slidable relationship between the contact points of the said grip plates, the said joint admitting of substantially universal multi-directional movement of the said structures with respect to each other while constantly maintaining a double weather joint therebetween.

4. In combination, an expansion joint comprising a grip member secured to one structure composed of a pair of continuous resilient oppositely disposed grip plates each having a continuous contact point therealong spaced from the said structure, the said grip plates being formed to constantly urge the said contact points toward each other by the resiliency of the said grip plates when juxtaposed, and a continuous dia-

phragm of greater resiliency than each grip plate of the said grip member secured to an adjacent structure telescopically engaged in slidable relationship between the contact points of the said grip plates, the said joint admitting of substantially universal multi-directional movement of the said structures with respect to each other while constantly maintaining a double weather joint therebetween.

5. An expansion joint of the class described comprising a grip member composed of a pair of continuous resilient grip plates secured fixed with respect to each other along one side thereof, a continuous contact point formed along the free side of each of the said grip plates disposed to register with each other when the said grip plates are juxtaposed, the said grip plates being bent near the fixed sides thereof whereby to cause the said contact points formed along the free sides thereof to be constantly urged toward each other by the resiliency of the said grip plates when the said grip plates are secured together, and a continuous resilient diaphragm telescopically engaged in slidable relationship between the contact points of the said grip member, the said joint admitting of substantially universal movement between structures connected thereby simultaneously with maintaining a double weather joint at all times between said structures.

6. An expansion joint of the class described comprising a grip member composed of a pair of continuous resilient grip plates secured fixed with respect to each other along one side thereof, a continuous contact point formed along the free side of each of the said grip plates disposed to register with each other when the said grip plates are juxtaposed, the said grip plates being bent near the fixed sides thereof whereby to cause the said contact points formed along the free sides thereof to be constantly urged toward each other by the resiliency of the said grip plates when the said grip plates are secured together, and a continuous diaphragm of greater resiliency than each grip plate of the said grip member telescopically engaged in slidable relationship between the contact points of the said grip member, the said joint admitting of substantially universal movement between structures connected thereby simultaneously with maintaining a double weather joint at all times between said structures.

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