May 23, 1933. H. JUNKERS 1,910,608

STRUCTURAL ELEMENT

Filed Aug. 25, 1930

Fig. 1

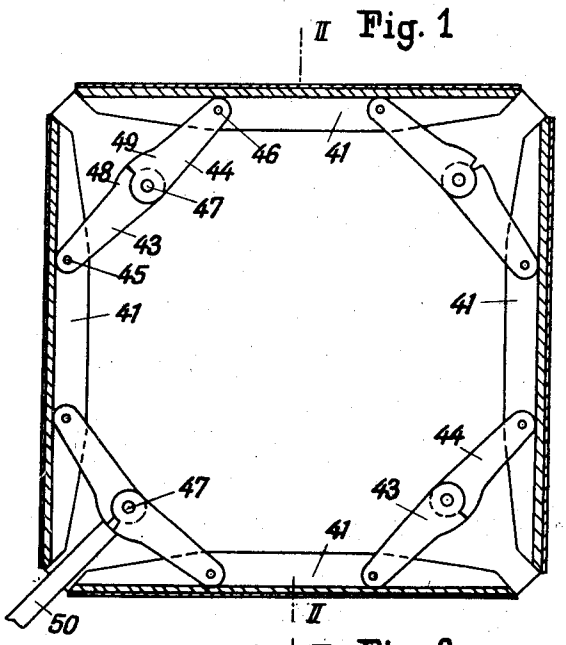


Fig. 2



Fig. 3

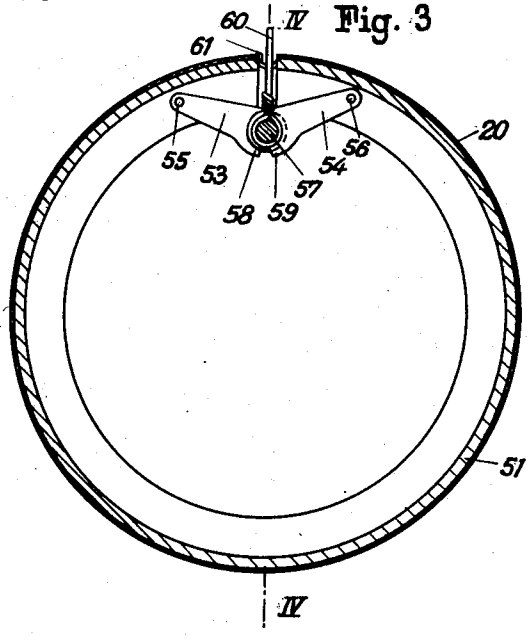
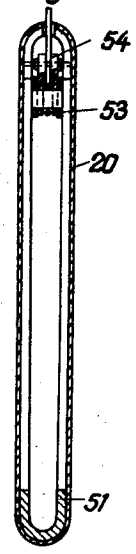


Fig. 4



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UNITED STATES PATENT OFFICE

HUGO JUNKERS, OF DESSAU, GERMANY

STRUCTURAL ELEMENT

Application filed August 25, 1930, Serial No. 477,592, and in Germany September 7, 1929.

My invention relates to structural elements, and more particularly to structural elements in which a frame is covered with sheet metal or other thin material so as to obtain a hollow element. It is an object of my invention to improve a structural element of this type. To this end I provide a covering of sheet metal. The covering is so arranged as to form two parallel walls at opposite sides of the element. In the covering I insert a frame the bars of which are spread apart by any suitable means such as toggle levers, for stretching the covering in a plurality of intersecting directions. The elements according to my invention are hollow plates and may be used as substitutes for other flat elements wherever it is desirable to combine low weight with stiffness and strength. The facts that the parallel walls of the element are under initial tension and that the tension is imparted in a plurality of intersecting directions, are important. The elements support loads, and particularly local loads, without bulging of their walls which would inevitably occur in sheet metal not under tension, and the initial tension is distributed all over the element and makes its walls as flat as drum skins. If the tension were exerted in one direction only, the sheet metal would become corrugated or creased which is not only undesirable with consideration of the appearance of the elements but also renders them unsuitable if flatness is important, for instance, if an element is employed as a table board.

The range of usefulness of my elements is very wide. For instance, they may be employed as panels inserted between the pillars or posts of buildings, car bodies, doors and other structures to form walls, or as flooring or other slabs, or as parts of articles of furniture, such as table boards, chair seats, and the like.

In the drawing affixed to this specification and forming part thereof various types of elements embodying my invention are illustrated diagrammatically by way of example.

In the drawing

Fig. 1 is a section of a square element having strips along its sides, and toggle levers connecting the strips at the corners of the element,

Fig. 2 is a section on the line II—II in Fig. 1,

Fig. 3 is a section of a circular element with a divided strip which is spread apart by toggle levers,

Fig. 4 is a section on the line IV—IV in Fig. 3.

Referring now to the drawing, and first to Figs. 1 and 2, this element is a square, or rectangular, plate or slab with a frame by which tension is exerted on its four sides. 41 are strips of channel section which extend along the four sides of the slab and may be forced apart by any suitable means for stretching the covering 20. In the present instance the spreading means are illustrated as toggle levers 43 and 44 which are pivoted at 45 and 46 to the strips 41 near the corners of the square. 47 are the pins of the toggle levers, 48 and 49 are checks limiting their inward movement, and 50 is a push rod which is inserted through the corners of the slab (which are cut away for introducing the push rod 50).

Referring now to Figs. 3 and 4, this element is circular and is equipped with a channel strip 51 below the covering 20. The strip 51 is divided, and the covering 20 is cut away, at 61. 53 and 54 are toggle levers which are pivoted to the strip 51 and extend across its division line, 55 and 56 being the pivots connecting the toggle levers with the strip 51, 57 being their central pin, 58 and 59 being their checks, and 60 being a rod, here shown as a wire, for pulling straight the toggle levers 53 and 54, as far as permitted by their checks 58, 59. The force exerted on the strip by the toggle levers is uniformly distributed over the perimeter of the strip 51, and corresponding uniform tension in all directions is exerted on the covering 20.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described for obvious modifications will occur to a person skilled in the art.

In the claims affixed to this specification no selection of any particular modification of

the invention is intended to the exclusion of other modifications thereof and the right to subsequently make claim to any modification not covered by these claims is expressly reserved.

I claim:—

1. A polygonal hollow structural element comprising a covering of sheet metal arranged to form two parallel walls on opposite sides of the element, a frame within said covering including a member extending along each side of said element and means engaging said frame near the ends of two adjacent members, for forcing apart each two opposite members, said means being accessible for operation from the outside of said element.

2. A circular hollow structural element comprising a covering of sheet metal arranged to form two parallel walls on opposite sides of the element, a divided circular strip within said covering, and means for forcing apart the ends of said divided strip so as to impart initial tension to said covering, said means being accessible for operation from the outside of said element.

3. A hollow structural element comprising a covering of sheet metal arranged to form two parallel walls on opposite sides of the element, a frame within said covering, and means for expanding said frame in a plurality of intersecting directions and for imparting initial tension to said covering.

4. A hollow structural element comprising a covering of sheet metal arranged to form two parallel walls on opposite sides of the element, a frame including a plurality of members within said covering, and toggle levers each engaging a pair of said members for expanding said frame in a plurality of intersecting directions and for imparting initial tension to said covering.

5. A hollow structural element comprising a covering of sheet metal arranged to form two parallel walls on opposite sides of the element, a frame including a plurality of members within said covering, and toggle levers each engaging a pair of adjacent members at the ends of said members which face each other for expanding said frame in a plurality of intersecting directions and for imparting initial tension to said covering.

6. A hollow structural element comprising a covering of sheet metal arranged to form two parallel walls on opposite sides of the element, a frame including a plurality of members within said covering, toggle levers each engaging a pair of said members for expanding said frame in a plurality of intersecting directions and for imparting initial tension to said covering, and means for arresting said toggle levers in a position beyond their straightened-out position.

In testimony whereof I affix my signature.

HUGO JUNKERS.