F. A. WAGNER.

STRUCTURAL TOY.

APPLICATION FILED MAY 17, 1915.

1,242,892.

Patented Oct. 9, 1917.

Fig. 1.

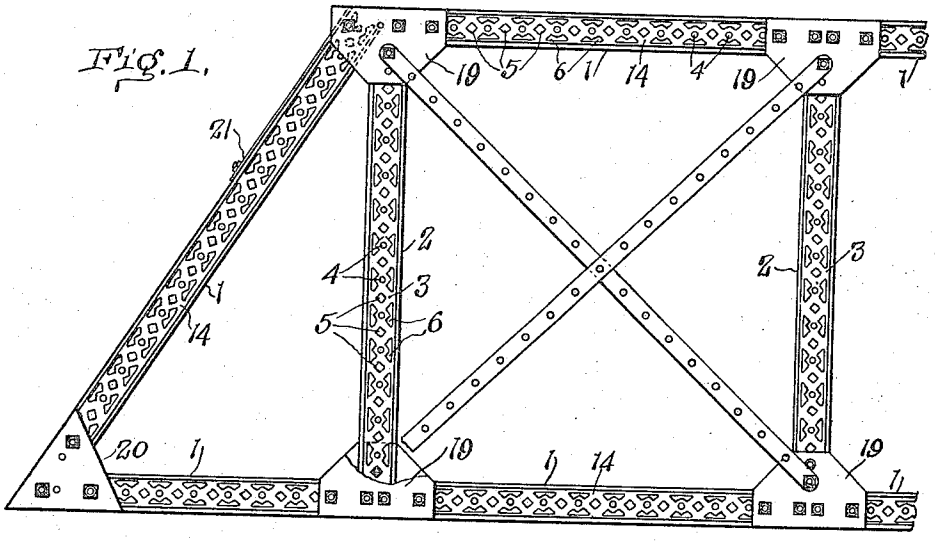


Fig. 2.

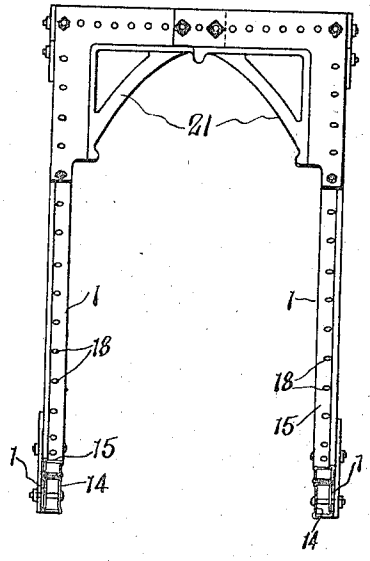


Fig. 3.

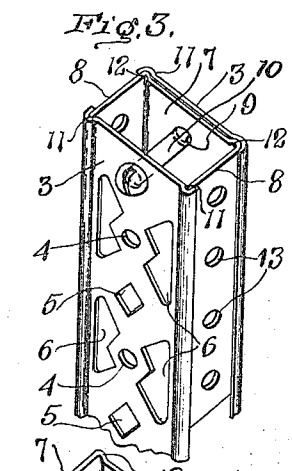


Fig. 4.

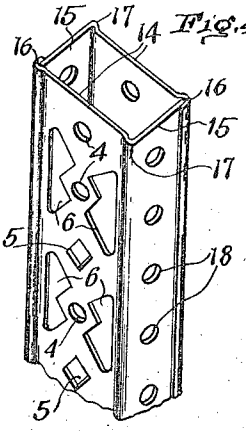
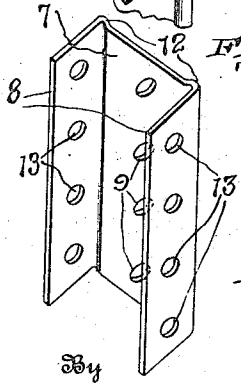


Fig. 5.



Witnesses

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STRUCTURAL TOY.

1,242,892. Specification of Letters Patent. Patented Oct. 9, 1917.

Application filed May 17, 1915. Serial No. 28,502.

To all whom it may concern:

Be it known that I, FRANCIS A. WAGNER, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Structural Toys, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to structural toys and more particularly to that class of toys comprising a series of structural elements which may be combined in various ways and forms to produce structures of different kinds. These structural elements are commonly formed from sheet metal and provided with openings to receive fastening devices or bolts for connecting the several parts together. The object of the present invention is to provide a structural element which can be used in combination either with a plurality of like elements or with other elements, such as are now in use, to produce a greatly increased variety of structures and which will be of such a character as to closely resemble actual steel structural work. To this end it is a further object of the invention to provide structural elements which can be combined in pairs to produce rectangular beams and the like; and further, to provide a structural element provided with a longitudinal series of openings to receive the fastening devices and having a series of other openings arranged adjacent to each of the first-mentioned openings and also adapted to receive fastening devices and further being adapted to give the structural element the appearance of a steel beam having cross braces extending between the two sides thereof. It is also an object of the invention to so arrange such other openings as to enable the point of connection between said element and other elements to be varied.

In the accompanying drawings, Figure 1 is a side elevation of a portion of a bridge embodying my improved structural element; Fig. 2 is an end elevation of such a bridge; Fig. 3 is a perspective detail view of a portion of a beam embodying my improved structural element; Fig. 4 is a similar view of another beam embodying such structural element; and Fig. 5 is a detail view of one of the spacing devices.

In these drawings I have illustrated one embodiment of my invention and have, for the purpose of illustration, shown the same as embodied in a bridge. The end frame member and the top and bottom frame members of this bridge are shown as formed from rectangular beams 1, while the vertical members extending from between the top and bottom members are formed of beams 2 of a lighter construction. Both types of beam embody my invention and both are useful in producing structures, such as that illustrated in Figs. 1 and 2.

In carrying out my invention I provide an elongated strip 3 provided with a longitudinally arranged series of openings 4 preferably spaced equal distances apart and adapted to receive fastening devices, such as bolts. These strips may be of any suitable width and length. As here shown they are slightly wider than the standard strip used in toys of this kind. Arranged about each of the openings 4 are other openings arranged to serve the purpose of providing means for connecting another structural element to the strip at any one of a plurality of points. This is a very valuable feature because in putting up these toy buildings and structures of various kinds it not infrequently happens that a brace arm or other part will be of such a length that its fastening holes cannot be made to register exactly with the fastening hole of one of the parts to which it is to be connected. By arranging the auxiliary fastening holes as shown such a strip may be fastened in any one of a variety of positions and its fastening hole can always be brought into registration with one or the other of the fastening holes in my improved strip. These auxiliary openings or holes also serve to give the strip, when viewed in face elevation, the appearance of a structural steel beam made up of side members and cross strips, thus giving the finished toy structure very much the appearance of an actual steel building or structure. The arrangement of the auxiliary openings may be varied but I have here shown them as comprising a series of square openings 5 arranged substantially midway between the respective openings 4. On either side of each of the openings 4 is arranged an elongated opening 6 having its intermediate portion reduced in width. In the present construction each of these elongated openings is made up of two substantially triangular openings having their bases connected one to the other and having their apices arranged above and below the adja-

cent opening 4. These triangular openings are each of a size to receive the usual fastening device or bolt, but the reduced portion, between the two triangular openings, is of a width which will not permit the fastening device to pass from one part of the opening to the other. Further, the triangular shape of these openings coöperates with the square intermediate openings 5 to give the structure the appearance of having cross bars. These structural elements or strips 3 may be used alone, after the manner of the usual flat strip forming a part of toys of this kind and when so used has, because of its auxiliary openings, a much wider range of utility. One of its most important uses, however, is in the construction of heavy beams each consisting of two of the strips 3 spaced apart and rigidly connected together. To form such a beam two of the strips 3 are arranged face to face, suitable spacing devices are interposed between the opposed edges of the strips and fastening devices are then extended through the two strips 3 to clamp the spacing devices and the strips firmly in their assembled positions. The spacing devices may be of any suitable character and may be formed either separate from the strips 3 or integral therewith. In that type of beam shown at 2 and in Fig. 3 I have formed the spacing devices separate from the strips themselves and have shown the same as comprising spacing blocks 7 formed from sheet metal and bent to the form of a channel having a body portion fitting against the face of one of the strips 3 and having flanges 8 extending between the two strips and adapted, respectively, to be confined between the opposed edges of the strip. The body portion of the spacing block is provided with a series of openings, as shown at 9, which are so spaced that they may be brought into registration with the openings 4 in the strips 3. A single fastening device, such as a bolt 10, is then passed through the three parts and these parts are clamped tightly in their assembled positions. I preferably provide each of the strips 3 at each edge with a longitudinal channel 11 adapted to receive the edges of the flanges 8 and forming an interlocking connection which effectually holds the flanges against lateral displacement. In order that both edges of each flange may engage the recesses in the respective strips I have pressed the body portion of the spacing block inward between the two flanges so as to provide ribs or beads 12 at the adjacent edges of the flanges 8, these ribs being of such a size as to fit within the channels 11 of the strip 3, thus enabling the edges of the flanges to extend into these channels. Further, the flanges are preferably provided with a series of openings 13 arranged longitudinally thereof to receive fastening devices and thus enable other parts of the structure to be secured to the lateral edges of the beam or frame member so constructed. The use made of this beam in the structure shown in Fig. 1 of the drawings is only one of a great many uses to which it may be put.

In Fig. 4 I have illustrated the element as having the spacing devices formed integral therewith. In this construction the strips, which are shown at 14, are similar to the strips 3 and are provided with similar openings 4, 5 and 6. To form the spacing devices each strip is provided at one edge with a flange 15 extending at substantially right angles to the body of the strip and these flanges preferably extend for the full length of the strip. Each of the strips is provided at that edge opposite its flange with a channel 16 to receive the edge of the flange of the other strip. The forming of these channels also forms a bead on the outer surface of the strip and to give the strip a uniform appearance and shape a similar bead is formed at 17 adjacent to the edge of the flange 15. The flanges 15 are provided with a longitudinal series of openings 18 to receive fastening devices whereby the rectangular beam so formed may be connected with other parts of the structure.

Referring again to the structure shown in Figs. 1 and 2 it will be noted that the top and bottom beams, as well as the inclined end beam, are all formed from the type of beam shown in Fig. 4, while the vertical members 2 are formed from that type of beam shown in Fig. 3. These beams are connected at their points of contact by means of connecting plates 19 and 20 which may be of any suitable character. In the present instance the plates 19 are shown as angle plates of ordinary construction.

The two end members of the bridge structure are connected at their upper ends by angle brackets 21, which are also shown as right angle brackets secured to the adjacent members of the bridge structure and are similar to those shown and described in my copending application, filed Apr. 30, 1915, Ser. No. 24,863. These brackets are secured at one edge to the respective beams and have their other edges extending transversely to said beam and overlapping in the center so that they may be connected one to the other and form the connection between the two sides of the bridge, as well as bracing the same at this point and giving the structure a close resemblance to an actual bridge.

It will be apparent that the structural elements or strips either when used individually or in combination with other similar elements or in combination with structural elements of other kinds have a very wide range of usefulness and enable a wide range of structures to be built; and further that the formation of the strips is such as to

greatly facilitate the building of these constructions by enabling other parts of the structure to be connected thereto at any one of a plurality of points and that the means for so connecting said other parts to the strip or strips is such as to give to the strip an increased resemblance to an actual steel beam.

While I have shown and described one embodiment of my invention it will be understood that this has been chosen for the purposes of illustration only, and that I do not desire to be limited to the details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

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

In a toy structure, a beam composed of a pair of oppositely disposed strips, each strip having channels at its edges formed by bending the material, parts interposed between said strips comprised of a spacing device having beads which fit in the channels of one strip and free edges which fit in the channels of the other strip, and bolts passing through the strips and acting to clamp the strips against the interposing parts.

In testimony whereof I affix my signature.

FRANCIS A. WAGNER.