F. HORNBY.

ELEMENT FOR USE IN BUILDING CONSTRUCTIONAL TOYS OR MODELS.

APPLICATION FILED MAY 9, 1918.

1,355,975. Patented Oct. 19, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

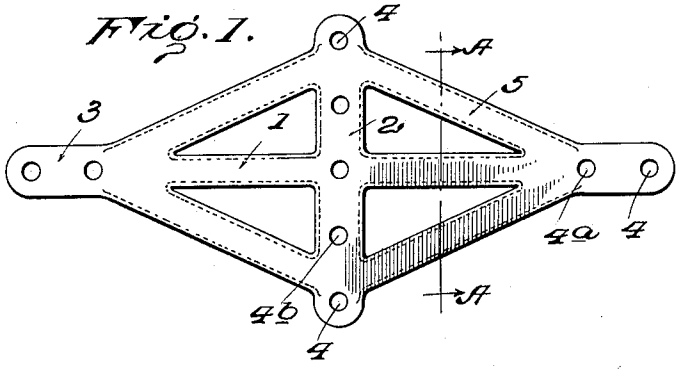


Fig. 2.

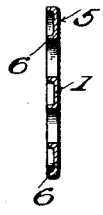


Fig. 3.

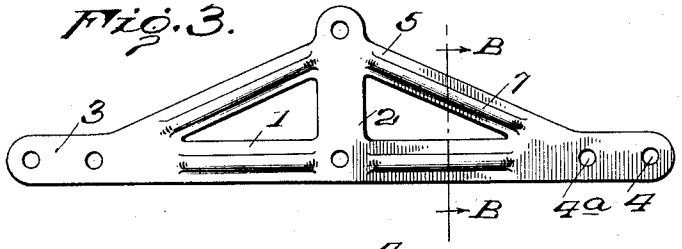


Fig. 6.

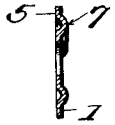


Fig. 4.

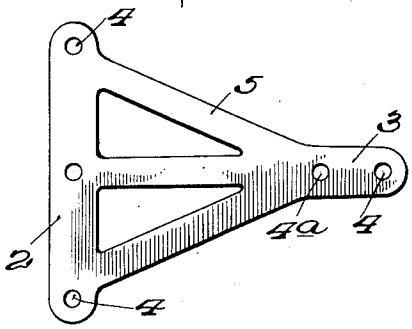
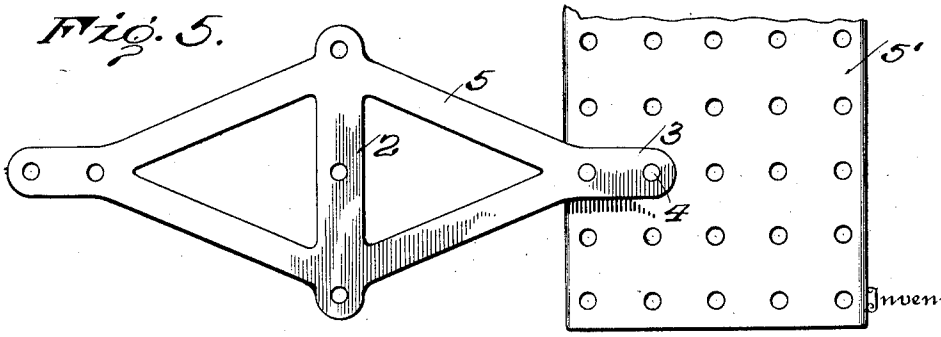


Fig. 5.



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2 SHEETS—SHEET 2.

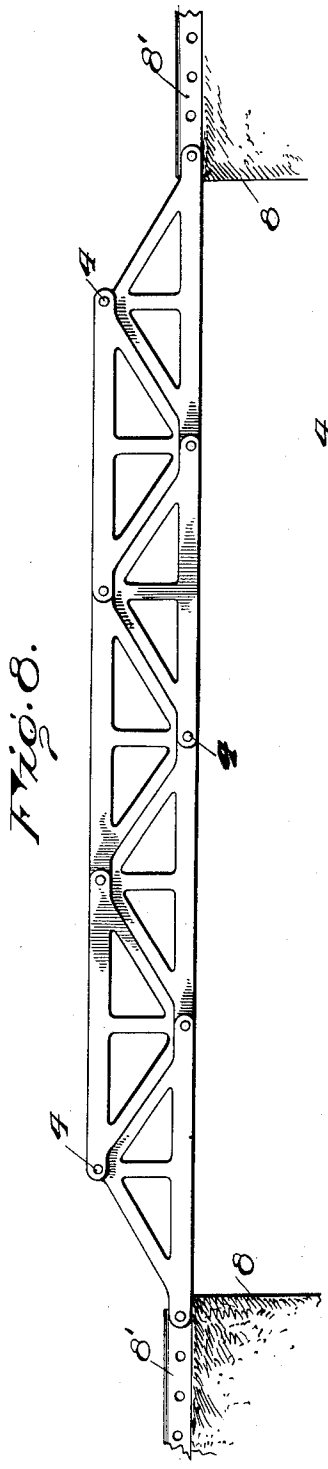

Fig. 8.

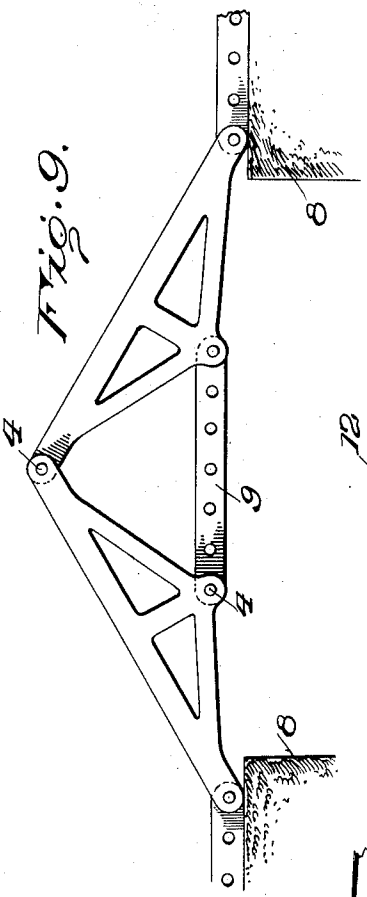

Fig. 9.

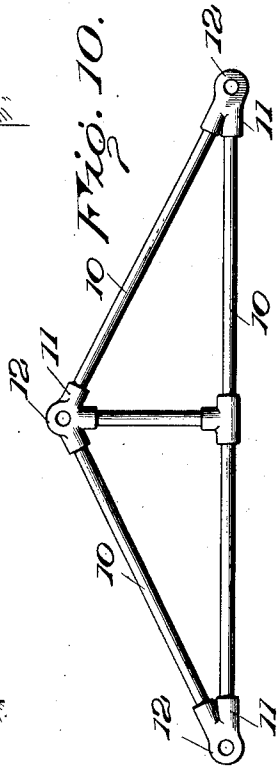

Fig. 10.

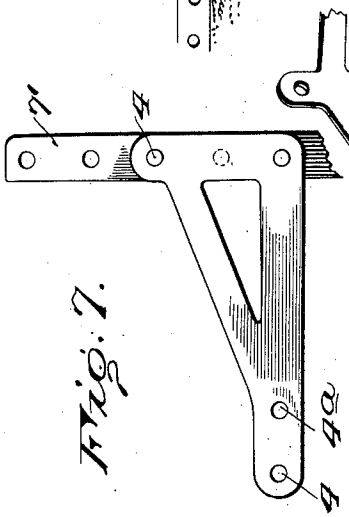

Fig. 7.

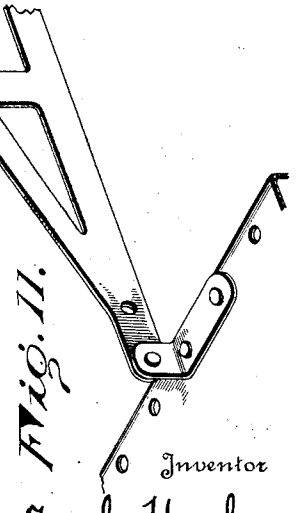

Fig. 11.

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UNITED STATES PATENT OFFICE.

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ELEMENT FOR USE IN BUILDING CONSTRUCTIONAL TOYS OR MODELS.

1,355,975. Specification of Letters Patent. Patented Oct. 19, 1920.

Application filed May 9, 1918. Serial No. 233,502.

To all whom it may concern:

Be it known that I, FRANK HORNBY, a subject of the King of Great Britain, and a resident of Liverpool, England, have invented a new and useful Improvement in Elements for Use in Building Constructional Toys or Models, which invention is fully set forth in the following specification.

This invention relates to an improved part or element for use in the construction of toys or small engineering models adapted to be built up from interchangeable separate parts, such models being capable of being taken to pieces and the parts again utilized by being re-made up into other toys or models, as required. It is desirable that the parts used in the construction of such toys should be available for fulfilling several functions in order that the number of parts required in an outfit for building a series of models may be minimized. The part or element forming the subject of the present invention responds to this desirability, and is capable of a variety of uses or functions.

According to this invention the part or element consists in its complete form of a lozenge-shaped plate having a major axis considerably longer than the minor, say four times as long. The corners of the lozenge are provided with lugs perforated preferably with a standard sized hole, and these perforations being preferably spaced according to a predetermined standard, so as to be interchangeable with and fit in the other parts of the outfit. The lozenge-shaped plate may be solid or apertures may be punched therein so as to leave webs along the minor and major axes of the plate and, if desired, its outer edges may be flanged in order to strengthen the plate, or the plate itself may may be corrugated or ribbed longitudinally or transversely for this purpose.

Where the plate is lightened so as to leave webs along the major and minor axes, a considerable amount of unperforated metal is left at the ends of the major axis, and in this metal other holes besides those at the extreme ends may be punched, such holes being preferably spaced apart to conform to the standard pitch of the perforations adopted in the other elements of the toy building system, such as the well-known "Meccano," in which this part is to be used; and similarly the web of metal along the minor axis of the plate may be punched with holes, the pitch of which also conforms to the standard pitch of such holes obtaining in the system.

Various modifications of this arrangement may be made by dividing the elements along the major or minor axes so as to produce parts in the form of isosceles triangles, the base and equal sides of which are made of webs of metal, a vertical web preferably passing from the base to the apex. In every case projections are preferably formed at the corners of the triangular plates in which holes are punched, or the holes may be punched in the corners themselves. In a further modification, the plate when of lozenge formation, may not be provided with a web along the major axis, but only with a transverse web across the minor axis.

Elements in accordance with this invention are illustrated in the accompanying drawings, in which Figure 1 shows the complete form of lozenge-shaped plate element.

Fig. 2 is a cross-section on the line A—A of Fig. 1, showing a flanged construction of the webs.

Figs. 3, 4, 5, 6 and 7 show various modified constructions of the plate element, Fig. 6 being a cross-section on the line B—B of Fig. 3, illustrating the longitudinal ribbing of the webs.

Fig. 8 shows how the type of plate illustrated in Fig. 3 may be assembled to form a bridge girder.

Fig. 9 shows the application of the same plate to the construction of a roof truss;

Fig. 10 illustrates a modified construction of the elements, built up of tubing or rods and end lugs, and Fig. 11 shows the application of one of the elements to a bed plate by means of a bracket-piece.

In carrying out the invention, the element in its complete form, as shown in Figs. 1 and 2, comprises a lozenge-shaped plate having webs 1 and 2, along its major and minor axes, respectively. The plate has a considerably longer major than minor axis, and the corners of the plate are provided with lugs 3 perforated preferably with standard sized and spaced holes 4 so as to be interchangeable with and fit in the remaining parts of an outfit. The lozenge-shaped plate is completed by the oblique webs 5 which are preferably unperforated. In addition to the extreme holes 4 at the

corners of the plate, additional inner holes 4^a may be made at the longer ends of the plate, and the holes 4 at the ends of the transverse web 2 may be continued to form a series 4^b throughout this transverse web, such holes 4^b and the end holes 4 being preferably spaced equally apart to conform to the standard pitch of the perforations adopted in the other elements of the toy building system with which the plate is to be used. This same standard pitch preferably obtains as between the holes 4 and 4^a on the longitudinal web 1, and it is desirable also that the distance apart of the holes 4^a with reference to the central hole 4^b should be some multiple of the standard pitch of the perforations in the toy building system.

In order to strengthen the webs 1, 2 and 5 of the plate, they may be flanged up as shown at 6, Fig. 2, thus producing a shallow channel section. Or, as illustrated in Figs. 3 and 6, this strengthened construction may take the form of stamping up a longitudinal ridge 7 in the webs. In the construction shown in Fig. 3, the plate is practically halved along the major axis, and in the form shown in Fig. 4 the lozenge plate is practically divided along the minor axis; while in Fig. 7 the form shown is the corner triangular portion of the lozenge. From any of these elements, Figs. 3, 4 or 7, the complete form of lozenge plate may be built up by bolting together complementary parts. In Fig. 5 is shown a lighter form of the lozenge plate where the major axis web is eliminated.

Such types of plates lend themselves to a variety of constructions.

Any of these elements as described may be coupled together through the holes in their lugs with bolts and nuts to build up a strong type of braced structure such as the sides of model bridges, towers, platforms, observation posts, and standards generally, the triangular form of the elements serving to provide a flat finish along the side of the structure and acting as filling-in pieces. For instance, in Fig. 8 a series of half plates as shown in Fig. 3 are bolted together at their perforations 4 to form a braced girder suitable for toy bridge construction, the ends of the girders being supported upon any suitable abutments 8, and being connected to suitable perforated elements 8′.

With any of the forms described tie pieces may be used consisting of plain bands having perforations at each end, by means of which the bands may be bolted to the plate elements and form tie members; and the ends of these bands in which are formed the perforations may be bent up at right angles, if desired, or well known forms of perforated strips may be used.

An example of this is illustrated in Fig. 9, where the two plate elements are bolted together to form a roof truss, the end holes being connected by a bolt and nut at 4, and the other end holes 4 of their transverse webs being coupled by a perforated strip 9 which forms the tie member of the roof truss. By assembling a series of such trusses together a serviceable roof suitable for toy construction may be quite quickly put together, the feet of the trusses resting again on some abutments 8.

In the embodiment of the invention shown in Fig. 10, short rods, tubings or strips 10 are secured in brackets 11, the ends of which are formed as perforated lugs 12 by means of which a series of these elements may be bolted together.

In order to secure the feet of any of the elements to a bed plate or otherwise, a bracket piece may be provided consisting of a sole plate having an upstanding lug or lugs, the sole plate and the lugs of this bracket piece being perforated so that they may be bolted down on the bed plate and to the perforated lugs of the elements respectively (see Fig. 11). The relation of the perforations of the said elements to the perforations of other elements of the system is illustrated, for example, in Figs. 5 and 7. In the former a lozenge-shaped element is shown in association with a perforated plate 5′; and in the latter a triangular-shaped member is shown in association with a perforated strip 7′. As heretofore indicated, the perforations of elements 5′ and 7′ conform to a predetermined standard.

Such an element forms an extremely light, yet rigid part, and is very useful for building up various types of models.

While for the purpose of illustration, the inventive idea has been described and illustrated with considerable particularity, it is to be understood that the invention is not limited to the structures illustrated, but that it is susceptible of modifications, the scope of the invention being indicated by the appended claims.

What is claimed is:—

1. An element for use in building constructional toys or models, comprising a symmetrical lozenge-shaped plate having a major axis considerably longer than its minor axis, and the corners of the plate being provided with perforations.

2. An element for use in building constructional toys or models, comprising a symmetrical lozenge-shaped plate having a major axis considerably longer than its minor axis, and the corners of the plate being provided with perforations spaced according to a predetermined standard.

3. A lozenge-shaped element having apertures formed therein so as to leave material along the major axis and inclined side webs forming a periphery to the element, the

ends of the webs being provided with holes to enable a series of elements to be assembled together.

4. A lozenge-shaped element having apertures formed therein so as to leave material along the minor axis and inclined side webs forming a periphery to the element, the ends of the webs being provided with holes to enable a series of elements to be assembled together.

5. A lozenge-shaped element having apertures formed therein so as to leave material along the major axis and inclined side webs forming a periphery to the element, the ends of the webs being provided with holes to enable a series of elements to be assembled together, and said major axis being perforated according to a predetermined standard.

6. A lozenge-shaped element having apertures formed therein so as to leave material along the minor axis and inclined side webs forming a periphery to the element, the ends of the webs being provided with holes to enable a series of elements to be assembled together, and said minor axis being perforated according to a predetermined standard.

7. A lozenge-shaped element having apertures formed therein so as to leave material along the major and minor axes, said element having axial webs and inclined side webs forming a periphery to the element, the ends of the axial webs being provided with holes to enable a series of elements to be assembled together.

8. A lozenge-shaped element having apertures formed therein so as to leave material along the major and minor axes, said element having axial webs and inclined side webs forming a periphery to the element, the ends of the axial webs being provided with holes spaced according to a predetermined standard to enable a series of elements to be assembled together with a series of similarly spaced holes extending along the major axis.

9. A lozenge-shaped element having apertures formed therein so as to leave material along the major and minor axes, said element having axial webs and inclined side webs forming a periphery to the element, the ends of the axial webs being provided with holes spaced according to a predetermined standard to enable a series of elements to be assembled together with a series of similarly spaced holes extending along the minor axis.

10. A lozenge-shaped element having apertures formed therein so as to leave material along the major and minor axes, said element having axial webs and inclined side webs forming a periphery to the element, the ends of the axial webs being provided with holes spaced according to a predetermined standard to enable a series of elements to be assembled together with a series of similarly spaced holes extending along the major and minor axes.

11. A triangular element having apertures formed therein so as to leave material only along the base, perpendicular and oblique side of the triangle, the ends of the triangle being provided with lugs having perforations therein by means of which the elements may be assembled together.

12. A triangular element having apertures formed therein so as to leave material only along the base, perpendicular and oblique sides of the triangle, the ends of the triangle being provided with lugs having perforations therein by means of which the elements may be assembled together.

In testimony whereof I have signed this specification.

FRANK HORNBY.

Witnesses:
A. J. DAVIES,
JOSEPH FLACK.