Dec. 18, 1934. F. HOULT 1,985,032

CONSTRUCTIONAL TOY

Filed May 24, 1934

Fig. 1.

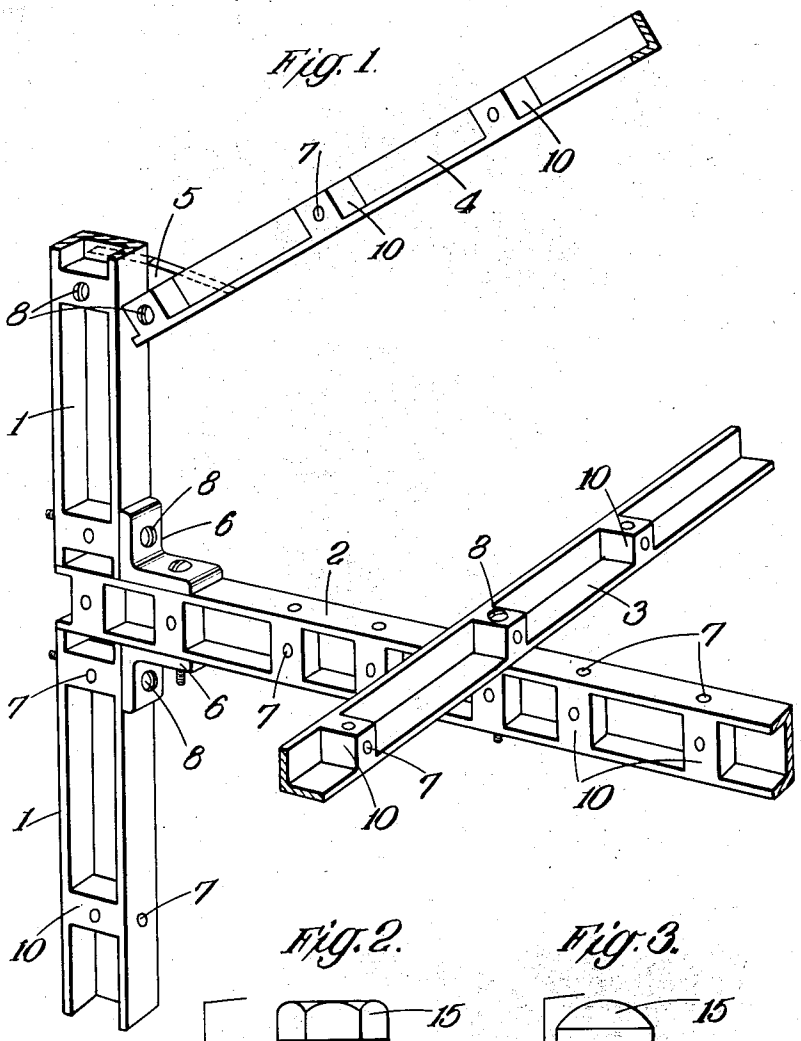


Fig. 2.

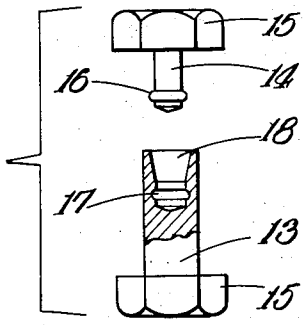
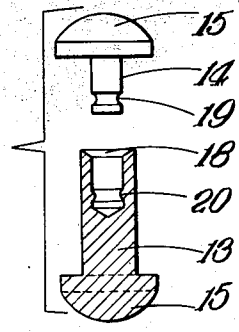


Fig. 3.



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Patented Dec. 18, 1934

1,985,032

UNITED STATES PATENT OFFICE

1,985,032

CONSTRUCTIONAL TOY

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Application May 24, 1934, Serial No. 727,247
In Great Britain February 1, 1933

4 Claims. (Cl. 46—35)

This invention relates to constructional toys of the kind which include a number of individual parts of various sizes and lengths representing girders, joists or similar members commonly employed by engineers in the construction of bridges, cranes and other structures. The chief object of the invention is to enable such members to be reproduced on a small scale in a more realistic manner, the various shapes and sections of the individual component parts simulating more closely those employed in full-size practice, whereby in addition to the use of such parts as a constructional toy, such parts will be suitable for use in technical colleges and schools in the teaching of engineering.

The various parts are constructed from a suitable nonmetallic mouldable material by means of a moulding or equivalent operation. The material employed is preferably one of the phenol condensation products, and it is preferred for this purpose to employ the material sold under the name of "Bakelite", said name being a registered trade mark. The various members or parts may be moulded from moulding powders of various colours, and if desired a distinctive colour may be used for different types or shapes of members, so as to designate the particular use to which the various parts are put in full-size practice. The various parts may be connected together by means of nuts and bolts or in any other suitable manner desired. For example, the connecting members may each consist of a separable two-part clip, each part having an enlarged head simulating either a rivet or the usual hexagonal head provided upon a nut or bolt.

Referring to the drawing:—

Figure 1 is a perspective view of a part of one example of an engineering structure which may be built up with individual component parts constructed in accordance with the present invention.

Figures 2 and 3 are part sectional views illustrating alternative forms of two-part separable fasteners or clips.

The various component parts may be of any suitable cross-sectional shape, but it is preferred that they shall simulate girders, joists, and similar members employed in full-size engineering practice, but on a much smaller scale, and as shown in Figure 1, which illustrates a number of such parts built up to form a portion of an engineering structure, vertical members 1 are shown of channel section, a horizontal girder 2 of channel section, a further horizontal girder 3 of angle section and a diagonal strut 4 of angle section, the diagonal strut 4 being connected to the uppermost vertical member 1 by means of a connecting plate 5. The horizontal girder 2 is secured to the vertical members 1 by means of cleats 6 similar to those employed in full-size practice, the various parts being provided with holes 7 in the flanges for the reception of nuts and bolts or other suitable connecting members 8, the various holes being preferably so arranged that the component parts can be readily connected together in a variety of alternative positions so that various structures can be readily built up as desired.

The holes in the various members are designated by the reference numeral 7, the holes in all cases passing completely through the members, but some of the holes being disposed at right angles to the remainder, whereby they intersect each other. In order to prevent any possibility of the flanges or webs of the members being broken when the bolts or other securing members are tightened up, the parts may incorporate integral strengthening portions 10 around each hole. The holes are formed partially during the moulding operation and are subsequently completed by means of a drilling or equivalent operation.

Although in the construction shown by Figure 1, the various members are straight they may nevertheless be curved or of any shape desired, whilst furthermore in order to give the members additional strength they may be reinforced with paper, laminated linen, metal or any other desired material, the various members being moulded around the reinforcing material during the moulding or equivalent operation.

Although as shown by Figure 1 ordinary small nuts and bolts may be employed for connecting the individual parts together, a two-part separable clip or fastening may be employed such as is, for example, illustrated in Figures 2 and 3. In the construction shown by Figure 2 the parts consist of a tubular or female member 13 which is adapted to receive a shank 14 on the opposite member, each part being provided with an enlarged head 15 of hexagonal or other suitable shape resembling the head of a bolt or rivet. In order that the parts shall come together with a snap action when inserted in the holes in the members to be connected together the shank portion 14 may be provided with a shoulder or protuberance 16 which is

adapted to enter and engage a recess or groove 17 in the co-operating part, the interior of the part 13 being provided with a tapering mouth 18 to give the shoulder or protuberance 16 a lead when the two parts are brought together. In order to increase the resiliency of the parts one or both parts may be split at one or more points.

In the alternative construction illustrated by Figure 3 the shank 14 is provided with a peripheral groove 19 which is adapted to engage with a shoulder or protuberance 20 provided in the female member 13, the parts 14 and 13 in this construction being each shown with a head simulating that provided on a rivet. The member 13 may, as in the case of that shown in Figure 2, be provided with a tapering mouth 18 to give the member 14 a lead when the two parts are brought together.

In order to compensate for the additional thickness when more than two of the moulded members are connected together the one part of the fastening device may be provided with a series of spaced recesses or shoulders with any one of which the corresponding shoulder or recess on the co-operating member may engage.

In addition to the parts referred to in the foregoing description, various other parts may be constructed for use therewith and formed by a moulding or equivalent process such as, for example, gear wheels or pulleys of various shapes and sizes and other parts, and which will enable the various component parts to be built up into working models of cranes or similar structures.

Although in the construction illustrated by Figure 1 the various parts include integral strengthening portions around the holes, the holes may if desired be bushed with metal strengthening sleeves, the sleeves in the case of a member of channel or similar section extending between the two flanges. Alternatively, the strengthening sleeves may be quite separate from the members, each sleeve being constructed of metal or a mouldable or other material and constituting a tubular distance piece adapted to abut at its ends against the flanges of the member at a point where a bolt or other fastening is to be inserted, the bolt or the like passing through the distance piece and thereby locating it in position. Should the integral strengthening portions be omitted, the various members may in such a case be formed by means of an extruding operation.

What I claim and desire to secure by Letters Patent of the United States is:—

1. A constructional toy comprising a number of individual parts of various sizes and lengths simulating in cross sectional shape but on a reduced scale corresponding parts employed in full size structural engineering practice, said individual parts each comprising two flanges connected together by means of an intermediate web, said individual parts being constructed from non-metallic mouldable material, means for connecting said individual parts together in a separable manner, said individual parts being pierced at spaced points throughout their length to provide holes for the reception of said connecting means, and said individual parts each incorporating strengthening portions disposed between the flanges or webs through which said holes pass.

2. A constructional toy comprising a number of individual parts of various sizes and lengths simulating in cross sectional shape but on a reduced scale corresponding parts employed in full size structural engineering practice, said individual parts each comprising two flanges connected together by means of an intermediate web, said individual parts being constructed from non-metallic mouldable material, means for connecting said individual parts together in a separable manner, said individual parts being pierced at spaced points throughout their length to provide holes for the reception of said connecting means, said individual parts each incorporating strengthening portions disposed between the flanges or webs through which said holes pass and each strengthening portion forming an integral part of its associated member.

3. A constructional toy comprising a number of individual parts of various sizes and lengths simulating in cross sectional shape but on a reduced scale corresponding parts employed in full size structural engineering practice, said individual parts each comprising two flanges connected together by means of an intermediate web, said individual parts being constructed from non-metallic mouldable material, means for connecting said individual parts together in a separable manner, said individual parts being pierced at spaced points throughout their length to provide holes for the reception of said connecting means, each individual part incorporating strengthening means disposed between the flanges or webs through which said holes pass, said strengthening means comprising tubular distance pieces located between said flanges or webs and through which said connecting means are adapted to pass.

4. A constructional toy comprising a number of individual parts of various sizes and lengths simulating in cross sectional shape but on a reduced scale girders, joists and similar flanged members employed in full size structural engineering practice, which individual parts are constructed from a non-metallic moldable material by means of a molding operation involving heat and pressure, means for connecting said individual parts together in a separable manner, the flanges of said individual parts being pierced at spaced points throughout their length to provide holes for the reception of said connecting means, and integral strengthening portions disposed around said holes for preventing collapse of said flanges under the action of said connecting means.

FRANK HOULT.