



Date of Application, 16th Apr., 1890

Complete Specification Left, 15th Jan., 1891—Accepted, 16th Apr., 1891

PROVISIONAL SPECIFICATION.

Improvements in Apparatus for Building Toy or Model Buildings, Bridges, Towers, and the like.

We, GEORG KELLER and PAUL KELLER, of the Town of Rudolstadt, in the Empire of Germany, Manufacturers, do hereby declare the nature of this invention to be as follows:—

This invention relates to an extension of the means for instructive occupation known as "The building with real stone blocks" and has for its purpose to provide new constructions which permit the building of iron in combination with stone and are suitable both for the youth of more advanced age and adults.

The improved means consists of peculiarly shaped T pieces, plain and adjustable connecting pieces, chains, plain and adjustable wires, which constituents either for themselves or in combination with stone or other material admit of the erection of any kind of model building such as roof-bridge, viaduct, hall, tower and other constructions.

The principal and most essential parts of the improved construction are T pieces of suitable lengths, straight or curved according to the nature of the part they are used for. These pieces are formed by bending strips of sheet metal so as to leave a space, open above or below, between the adjoining flanges, this space admitting of the introduction of sheet metal connecting parts. Or the T pieces, instead of being made of a piece, may be formed by suitably joining two angle pieces at intervals or throughout their length by means of an angle piece or angle pieces of smaller size, one flange of which is placed above between the two large angle pieces, while the other flange carries on top a flat sheet extending over the upper flanges of the large angle pieces. Thereby each of the three longitudinal extremities of the T iron form clamping or connecting means. I pieces are formed by relatively placing two T pieces which are open at the free extremity of their longer shank, into each other with the halves of this shank or by introducing a separate flat sheet metal piece into and between two T pieces.

To join two or more T pieces longitudinally, flat pieces are used, which have a suitable number of overlapping tongues, by means of which they are secured on the top surfaces of the T pieces to be joined. Or the latter may be made adapted to be shifted into each other, for which purpose their closed sides must be provided with short cuts at the ends. To obtain rods or ties, sheet metal strips are bent so as to form narrow U shaped pieces which have short cuts at their closed ends for coupling purposes. As bars for framework constructions, either plain or adjustable flat strips are employed.

In the latter case, one of the two parts has tongues overlapping the other part, thereby rendering the whole bar longitudinally adjustable. As horizontal connecting bars or stays, flat pieces are used, which are so slitted at their extremity as to form clamps when the middle one of the three tongues thus produced is turned upwards or downwards. For suspension bridge or similar constructions, chains are used, from which can be suspended by hooks plain or adjustable rods having angular bends below for supporting the lower structure. These rods may be made longitudinally adjustable by twisting the extremity of one of the two parts screw- or worm-fashion so as to allow the other part to slide therein.

Dated this 16th day of April 1890.

HUELSE & Co.,
Attorneys

COMPLETE SPECIFICATION.

Improvements in Apparatus for Building Toy or Model Buildings, Bridges, Towers, and the like.

We, GEORG KELLER and PAUL KELLER, both of Rudolstadt, in the Empire of Germany, Manufacturers, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention has for its object to imitate iron structures, more especially iron bridges, girders and the like, chiefly in the form of models, which may serve as toys, but may also be used for other purposes.

The material used for manufacturing such model-structures consists substantially of strips of sheet metal which are partly bent to the form of T-girders, and partly form struts, clamps and the like. The webs of the T-girders are of such form that the struts and other parts can simply be slid into the same and are thereby clamped. For connecting several T-girders one behind the other they are either fastened together by small shoes of sheet metal or their ends are adapted to be slid one into the other. With such material all kinds of bay girders can be made, which may be united in a suitable manner by horizontal struts of sheet metal to form a comparatively large structure. With the aid of toy or model building blocks any structures made of stone and iron, such as bridges, roofs, halls, viaducts and the like, may be imitated.

The accompanying drawing shows how the said invention may be conveniently and advantageously carried into practice, the figures of the said drawing being hereinafter referred to.

The T-girder may be constructed in various manners for the above-stated object. The two simplest modes of construction are represented in Figures 1 and 2. In the first construction the flanges B B¹ of the girder designated by A are double, and in the second construction they are single. In either case the double web C C¹ forms an intermediate space for inserting the tie plates or diagonal struts of sheet metal; these are held between the walls C C¹ of the web by the elasticity of the same. A third mode of constructing the T-girder is shown in Figure 12. In this instance the two angle-irons V and W are so connected by small intermediate pieces Z to form a girder that a narrow intermediate space is produced for clamping the struts between the walls C and C¹ of the webs. In a similar manner the girder shown in Figure 13 is also produced. In this case the flanges of the same also consist of two plates of sheet metal situated one above the other so that the struts of sheet metal can be slid into the same in a similar manner as into the double web. The two angle-irons and the strip of sheet metal placed on the top are soldered together to form a whole.

The simplest modes of using such T-girders are represented in Figures 3 to 6. In Figure 3 two of these girders A are united to form an I-girder by sliding one double web into the other, in Figure 4 to form an angle such as is used for the construction of roofs. In Figure 5 two girders A are placed one behind the other and are connected by the shoes D to form a single girder. The shoe D either consists of a plate of sheet metal having its edges turned over for receiving the flanges of the girder, or they are held by small hooks E, as represented. The girders A of the kind shown in Figure 1 may also be connected to form one girder by sliding the ends into one another, as illustrated in Figure 10. For this purpose the flanges B and B¹ must be cut open a little distance at their bent edges, in order to enable the two ends of the girders to be slid into each other as in Figure 10. For producing girders of sheet metal, plates F, as shown in Figures 6, of any desired width are inserted between the double webs C C¹.

In Figures 7, 8 and 9 are represented bay girders which are formed by means of the described T-girders A and struts clamped between them. The girders A receive either a straight form or bent form as in Figure 3 according to exigencies.

G. & P. Keller's Improvements in Apparatus for Building Toy or Model Buildings, &c.

For producing such structures use is made of simple sheet metal struts G, Figures 7, 9, or adjustable struts G¹, Figures 8, 8¹. The latter are made of two parts which are placed one upon the other a short distance in the middle, the two halves embracing each other by means of the hooks H or in a similar manner; this can for instance also be effected by rings slid upon them. By displacing the two halves G, G¹ upon each other longer or shorter struts or diagonals are obtained to suit the structure to be made.

For connecting two or more T-girders A, Figures 1 and 2 by flanges with each other we employ simple or adjustable struts K of the kind indicated in Figure 7¹. These are provided at their ends with short incisions so as to produce tongues L L L which are bent out alternately in such a manner that the flanges of the T-girders can be held between these tongues which are adapted to spring a little. In order that these struts shall not be liable to slide from the flanges of the T-girders it is important that the flanges as shown somewhat exaggerated in Figure 1, are made to bulge a little towards the edges.

In order to produce draw-rod connections or rods use is made of the U-shaped sheet-metal strips S S¹, Figure 11. Several of these can be coupled together in the longitudinal direction; for this purpose their ends are cut open a short distance at the bent edges so that clamps are produced which can be slid one into the other. As in Figures 7 to 9 the struts G G¹ can also here be inserted in order to produce the most varying structures. These ties are chiefly used for imitating the American bolt bridges and for roofs.

If it is desired to imitate trusses by means of the above-described material, it is necessary to employ, as shown in Figure 9, also chains M and draw-rods N of wire or other suitable material. It is simplest to make the draw-rods of wires of various lengths, which are bent over above and below to form hooks. The upper hook O is then attached to the chain, whilst the lower hook P has to carry the girder. But use may also be made of adjustable draw-rods made of two or more parts, for instance by coupling the parts through the medium of screws or in any other suitable manner. In lieu of draw-rods, chains may be employed.

Of course this material is chiefly used in connection with small building stores or model-blocks, these serving to make the substructure upon which the iron structure rests, or to which the chain M is attached in a suitable manner.

Instead of the above described T-girders use can be made of hollow girders employed with them, which have the same object as girders, and are similarly adapted for the insertion of flat parts. Such hollow girders are made of sheet metal in the manner represented in Figures 14 to 19, and may present any forms in transverse section. The tubes are not closed, their adjoining longitudinal edges form a slit for inserting the flat parts. Figure 14 shows such a model of a girder having a circular transverse section and longitudinal edges C² C³ and forming a slit. In the tube shown in Figure 15 the part situated opposite the slit is pressed flat, for enabling for example flat parts to be built upon the girder. The transverse section represented in Figure 16 is again of circular shape, as in Figure 14, but the longitudinal edges C⁴ C⁵ forming the slit are bent inwardly a little in order to impart to them greater rigidity and strength. The same is the case with the transverse section shown in Figure 17, only this girder is flattened above, as in Figure 15.

In Figures 18 and 19 the girders present the same transverse section as in Figures 14 and 15, with this difference that the longitudinal edges C⁶ C⁷ are completely turned up inwardly; by the inwardly bent edges C⁶ C⁷ situated opposite each other is produced a narrow and deep slit in which the parts inserted have a firm hold.

For connecting such hollow girders with each other we employ, in addition to the V-shaped sheet-metal strips shown in Figure 11, flat connecting pieces / of the kind represented in Figure 20 which are provided on either side with U-shaped slits f¹, f² in order to enable further connecting-pieces to be slid into the same. These flat pieces f as shown in Figure 21 can be bent to the form of angle-bars

G. & P. Keller's Improvements in Apparatus for Building Toy or Model Buildings, &c.

and can thus be employed as intermediate girders and the like, but especially for making corner joints. All these parts present the characteristic feature that they form somewhat elastic walls which are open to the outside and between which other flat parts are slid. In like manner as shown in Figures 10 and 11, the parts in Figures 14 to 21 can be optionally prolonged by simply sliding the ends into one another, for the purpose of producing structures of various sizes and forms. 5

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

First. For making model structures the employment of T-girders of sheet metal, 10 the web of which has a double wall (Figures 1, 2, 12, 13) which is thereby adapted for the reception of other girders (Figures 3 and 4) plates (Figure 6) or struts (Figures 7 and 8) or can be slid together and connected with other building parts (Figure 11).

Second. The employment of hollow or tubular girders Figures 14 to 19, in lieu 15 of the T-girders characterized in the first claiming clause, in which the elastic slit for inserting the flat parts is formed by the adjoining edges, these being placed opposite each other as at C² C³ Figures 14 and 15, or curved inwardly as at C⁴ C⁵, Figures 16 and 17, or bent at a sharp angle as at C⁶ C⁷ Figures 18 and 19.

Third. For making model-structures by means of the girders described in the 20 first and second claiming clauses the employment of flat bars which form either on one side Figure 11, or on both sides, Figure 20, or at an angle Figure 21, open double walls for inserting further flat connecting parts, and of sheet-metal struts G G' Figures 7 and 8 and strips K Figures 7, 7^A which form clamps at their ends in order to embrace other parts. 25

Dated this 15th day of January 1891.

HASELTINE, LAKE & Co.,
45, Southampton Buildings, London, Agents for the Applicants.

Fig. 1.

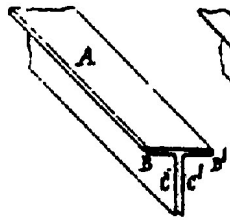


Fig. 2.

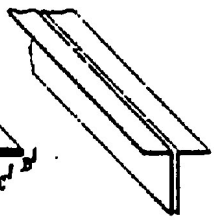


Fig. 3.

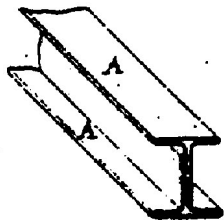


Fig. 4.

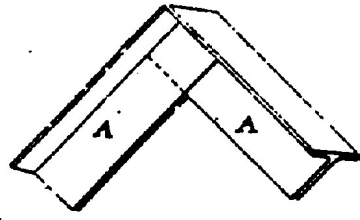


Fig. 1a.

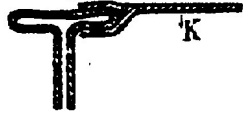


Fig. 5.

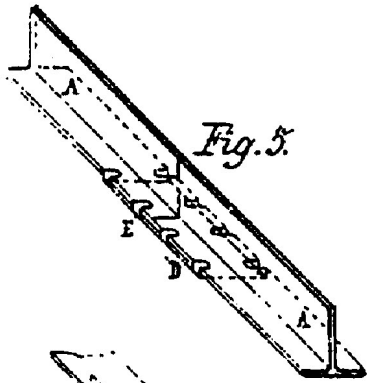


Fig. 6.

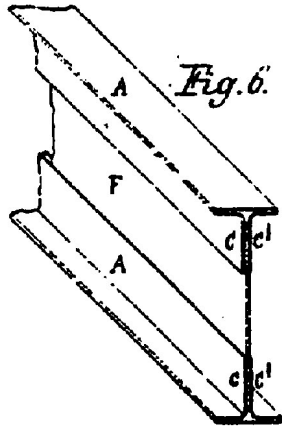


Fig. 8.

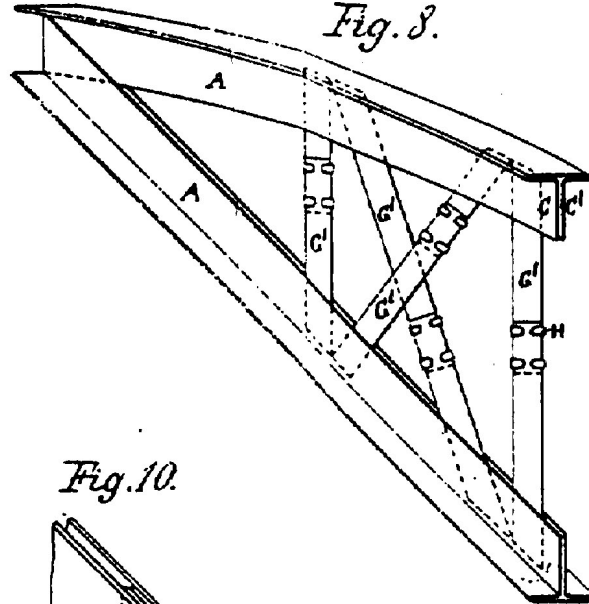


Fig. 10.

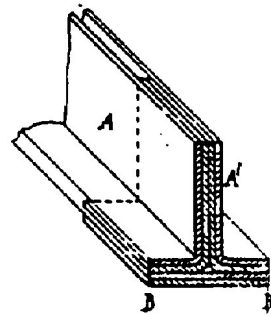


Fig. 13.

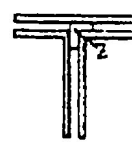


Fig. 14.

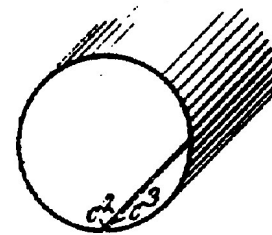


Fig. 15.

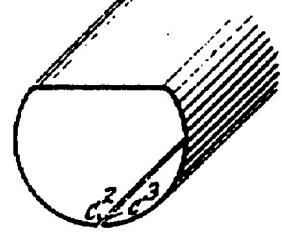


Fig. 16.

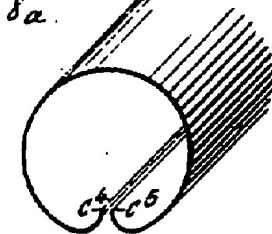


Fig. 17.

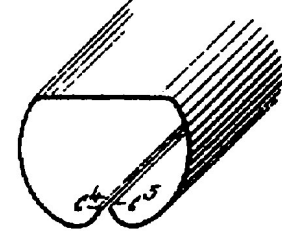


Fig. 18.

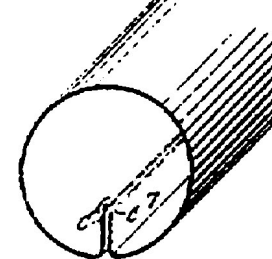


Fig. 19.

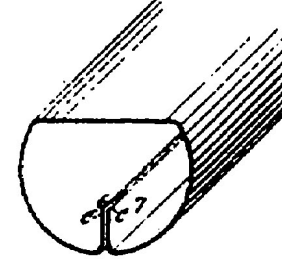


Fig. 7a.

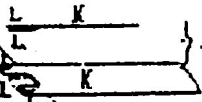


Fig. 9.

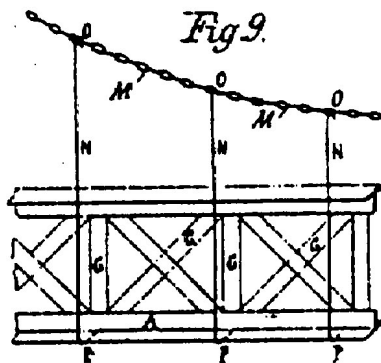


Fig. 11.

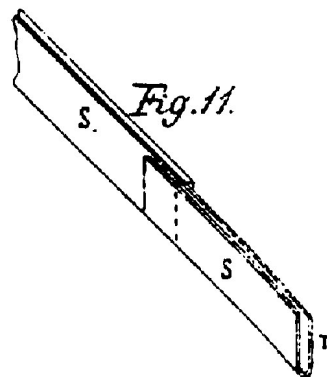


Fig. 12.

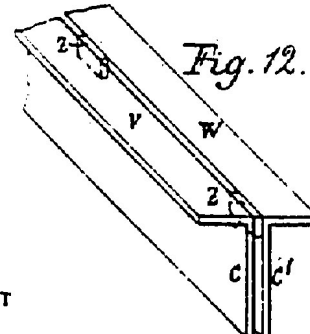


Fig. 20.

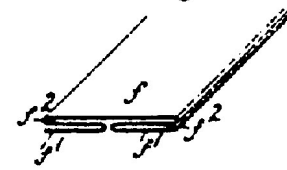


Fig. 21.

