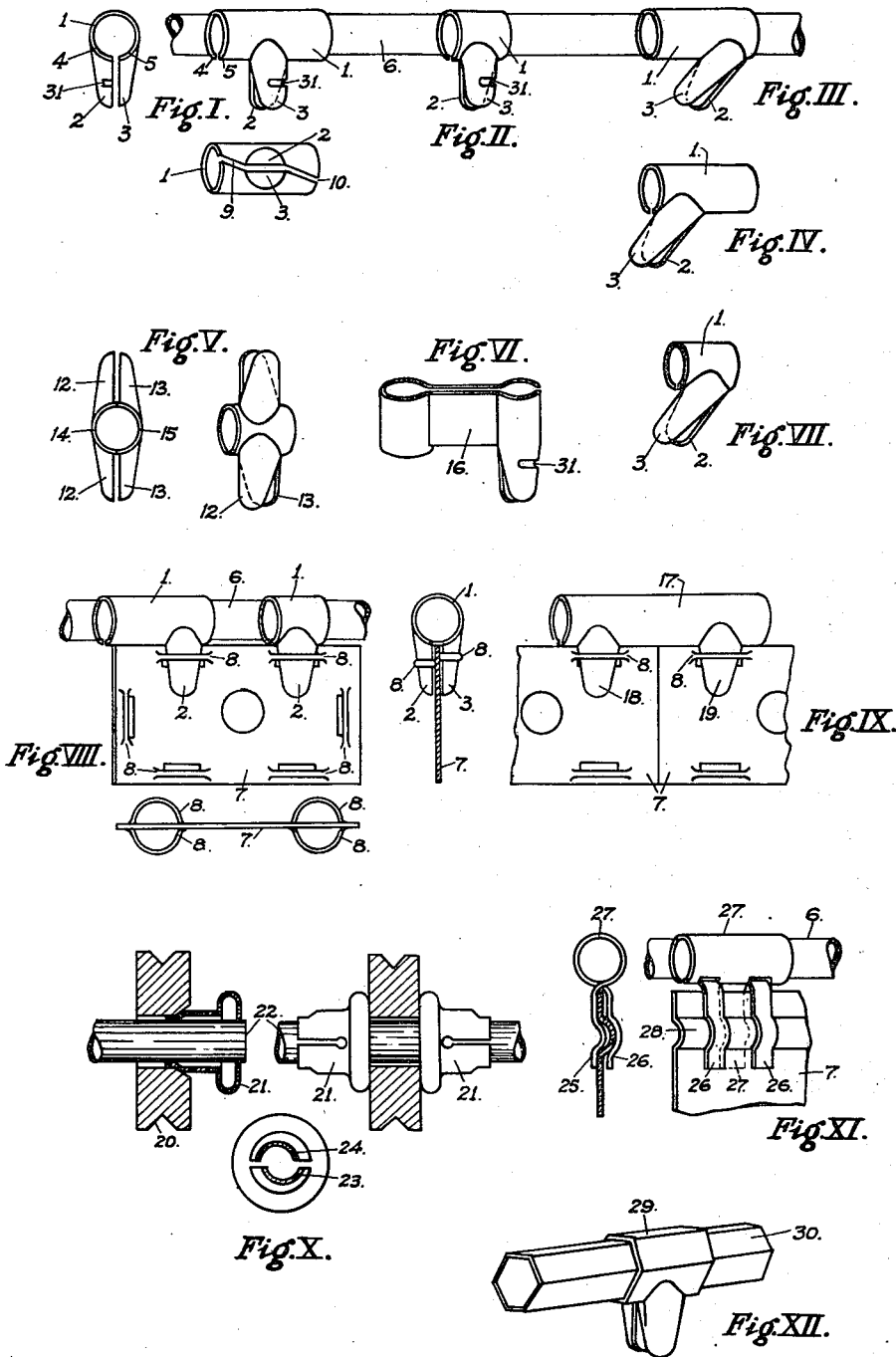


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J. F. KENNEDY  
CONSTRUCTIONAL TOY ELEMENTS CONSISTING OF  
TUBES, PLATES, AND CONNECTING PIECES  
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R. O. Edwards  
h. L. Charles

Inventor.  
J. F. Kennedy

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## CONSTRUCTIONAL TOY ELEMENTS CONSISTING OF TUBES, PLATES, AND CONNECTING PIECES

Jerome Francis Kennedy, Berlin, Germany

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The subject of the present invention is a constructional toy consisting primarily in metal parts, such as tubes or four cornered plates or strips with or without rounded corners and connecting pieces whereby of course wooden or other metal parts capable of interconnection with the above building elements can be employed. It also relates to elements thereof, as articles of manufacture.

10 According to the present invention the various building elements are joined together by means of connecting pieces, the partially flat or saddle shaped middle section of which is bendable and is provided with two or more flat or semi-cylindrical legs projecting, when the middle section is in the open or unbent position, from opposite sides thereof.

15 The connecting piece may be so constructed that the saddle shaped middle section thereof, when bent over the tube, forms a cylinder encompassing the tube in such a way that the projecting legs of the connecting piece are then projecting in the same direction and are capable of being inserted together into the hollow end of another tube or alternatively engaged with loops, slots, ribs or the like with which the other elements such as the plates are provided.

20 Objects of the invention consist in the provision of a novel connecting member, as an article of manufacture; a novel plate construction, as an article of manufacture; the combination of connecting members with tubular members, or with plate members, or with both, and, generally, in the provision of improved combinations of parts, and elements of construction, all as will more fully appear in the following specification, and be particularly pointed out in the appended claims. A feature of the invention, it will be noted consists in the provision of a connecting member capable of connecting, as desired, a tube with a tube, or a plate with a tube, or a plate with a plate. Another feature consists in the provision of plates with loops outstanding therefrom, arranged for binding connection with the connecting members, or for direct connection with each other, as will be explained hereafter.

25 Preferably the legs of the connecting piece are tapered or formed in a semi-conical shape so that they, on the one hand can be inserted easily into slots or loops on the plate element or into the hollow end of the tube, and so that on the other hand the pressure brought to bear on the connecting piece upon the tube can be increased by pushing the half conical legs into the tube; the further the legs are pushed in the greater be-

comes the pressure both upon the interior of the tube or of the loops of the plate into which the legs are pushed and upon the exterior of the tube around which the saddle shape section is placed, the split in the cylinder when the ends of the saddle section meet allowing sufficient play for this purpose.

5 It is clear that the increase of pressure on the one element e. g. a tube, produces an increase of pressure upon the other element e. g. in the loops of a plate or interior of a second tube and conversely.

10 The pressure between the connecting piece and the two elements to be connected can be further increased by constructing the legs of the connecting piece in such a way that they do not lie directly in line with one another, in other words, so constructed that one leg is slightly off set from the other, so that on insertion into the interior of the tube or loops additional pressure is brought to bear both on the interior of the tube or loops and by reason of the twisting or scissor action so effected, also upon the tube around which the saddle section is placed. The pressure resulting from the twisting or scissor-action causes the corners or edges of the saddled section to have a tendency to dig into the surface of the tube thereby preventing not only the twist but also longitudinal slip upon the tube.

15 The connecting piece when in the flat i. e. before the saddle section is bent round can be used if placed one upon the other as a connecting piece to join two tubes together in prolongation or can be used singly to join one plate to another, or one tube to another and can be bent to any desired angle.

20 Further the legs may be provided with notches in such a way that on insertion of the legs into the loops or slots on the plates or into the interior of the tube, the notch or notches may effect a snap grip therein.

25 It is also possible to provide the saddle shaped section with holes so that a tube may be passed through the hole enabling it to be connected with another tube, the legs of the connecting piece being passed into the end of the second tube.

30 According to this invention the plates appertaining thereto are so constructed as to provide a means of engagement with the said legs of the connecting piece by providing the said plates with raised loops or slots which correspond in size or shape to the said legs of the connecting piece.

35 This can be attained for example in the case of

semi-cylindrical legs by making the inner radius of the loops correspond with the outer radius of the legs.

Where the said loops are provided on both sides of the plates they form thus in cross section substantially a cylindrical opening divided only in the middle by the normal plane of the plate. The legs of the connecting piece may thus be inserted on both sides of the plate in such a way that the dividing plate itself contributes to the clamping of the legs while preventing rotation of the said semi-cylindrical legs within the cylindrical opening provided by the loops, which latter prevent lateral movement of the connecting piece.

The connecting piece can also be so constructed that the projecting legs are provided with ribs or notches capable of engagement with corresponding ribs or slots in the plate.

It is also possible, besides being able to connect plates with each other by means of the connecting pieces, to connect them together directly with one another. For this purpose, the loops on the plate are so formed that when they are placed over one another the loops of one plate can be snapped into the loops or slots in another plate somewhat in the manner of a so called press button.

A special feature of the plate is its flexibility in both directions whereby step like formation of the plate is possible. The plates are bendable at those points at which no loops or ribs are raised out of the normal plane. If the raised loops are placed at regular intervals on the plate therefore it is possible to bend the plate to any desired angle at points lying between the loops in such a way as to make for example, regular steps or a substantially circular wheel.

The plates can be further provided with holes through which the tubes may be passed.

A technical advantage of a constructional type which is provided with connecting pieces according to the present invention, is its property of enabling interconnection of the various building elements with one and the same connecting piece, whereby for example, one single type of connecting piece is capable of connecting a tube with a tube, a plate with a plate and also a tube with a plate, thus reducing the number of connecting pieces required for building a larger variety of models than would otherwise be possible.

The accompanying drawing shows as an example parts constructed in accordance with this invention.

Figure 1 shows in cross section and in plan and in elevation a T shaped connecting piece with saddle shaped middle section after having been bent in cylindrical form and showing the projecting legs.

Figure 2 shows inside elevation, a similar connecting piece with a short saddle shaped section.

Figures 3 and 4 show inside elevation two further types of connecting pieces with angularly disposed legs.

Figure 5 shows in cross section and in plan a connecting piece in double T shape.

Figure 6 shows in side elevation a connecting piece for the parallel connection of two tubes or one tube and a plate.

Figure 7 shows in side elevation a connecting piece for angular connection with a short saddle.

Figure 8 shows in plan, in sectional elevation, and in cross section a means of connecting tubes with plates.

Figure 9 shows the connection of two plates with one another.

Figure 10 shows in sectional elevation two wheel hubs and in end view, this same connecting piece constructed in accordance with this invention.

Figure 11 shows in cross-section and elevation an alternative form of the connecting piece and plate and Figure 12 is a perspective view showing a connecting piece for hexagonal tubes and the like.

The connecting piece is constructed in all the forms described from a saddle shaped section 1 and projections or legs 2, 3. It may conveniently be formed from a thin metal stamping, in which, it will be noted, the saddle shaped section 1 comprises a bendable central band or strip which, before bending, may be somewhat arched in the lengthwise direction of the piece, or may be substantially flat, with its end edges arched downwardly somewhat, the arms or legs, 2, 3, extending outwardly from these end edges, either parallel to each other and to the central strip (before bending), or at angles to the central strip and to each other. In the first case, of course, tubes may be connected together at right angles to each other, by such connecting pieces, and in the second case, at other angles to each other. The arms, or legs, 2, 3, it will be seen, are preferably arched laterally, and are preferably made of tapering shape, longitudinally, with rounded ends, all of which may readily be provided in stamping the piece out. As will be seen from the drawing the two legs are set at a slight angle to one another, when the central section 1 has been bent around a tube, in such a way that on connecting them to a plate or tube in the manner described a lever action is effected and when a tube is situated within the saddle section after being bent into cylindrical form, this lever action (which is caused by bringing the legs in line with one another on inserting them into the loops or tube) causes the points 4 and 5 of the saddle section 1 to press against the tube 6.

The saddle section 1 and the legs 2 and 3 are so constructed that a plate 7 can be inserted between the said legs and a clamping action takes place between the loops 8 on the plate 7 and the legs 2 and 3 on their insertion into the said loops.

In Figures 3, 4, and 7 examples are shown of the connecting piece set at an acute and obtuse angle to the saddle section.

In Figure 5, is shown a connecting piece which enables two parts to be connected together lengthwise or three tubes crosswise, in which the connecting piece is constructed out of two parts 12 and 13, which when the saddle sections thereof are placed together to form a cylinder the two pair of legs can be connected to two separate elements while the tube can pass through the cylinder thus formed.

Figure 6 shows a construction of connecting two tubes together parallel to one another, or a tube and plate, there being a section 16 connecting the two operating parts together.

Figure 8 shows a connection of a plate and tube with connecting pieces through the medium of loops 8. It will be noted that the length of the central strip 1 of a connecting member is such, in relation to the circumference of a tube about which it is to be bent, that when it encircles the tube the space between the two ends of the central strip, and therefore the space between the bases of the two arms or legs of a coacting pair, 2, 3, is substantially equal to the thickness of the

plate 7, so that when the arms 2, 3, are forced well down through loops 8, 8, on opposite sides of the plate, they may lie quite closely against the faces of the plate, and the central strip 1 of the connecting member will be drawn tightly about the tube which it encircles. Figure 9 shows a connecting piece 17 with two parallel pairs of legs 18 and 19 connecting two plates together.

The connecting piece 17 when in the open or unrolled position can be used in conjunction so as to effect the connection of four plates together.

The plates may also be connected with one another by placing one plate on top of the other so that the loops 8 snap into one another on the principle of a press button. This is possible because, as is shown in the sectional view at the right of Fig. 8, the loops on one side of a plate are preferably offset slightly in relation to those on the other side, so that the loops on the under side of one plate may be snapped over loops on the upper side of another plate, it being noted that the plates are preferably made as stampings of light metal, with the loops struck up on opposite sides, these loops therefore being somewhat resilient.

In Figure 10 is shown the connection of a tube with a wheel hub 20. The two legs 23 and 24 are offset, i. e. not parallel to one another so as to effect a tight joint.

Figure 11 shows an alternative method of connecting a tube to a plate whereby the connecting piece has three legs so shaped that they engage with a rib on the plate. The legs of course may alternatively pass through slots in ribs on the plate.

The legs 2 may be provided with notches 31 in which the loop or loops 8 engage, it is an advantage to provide two or three notches one behind the other. It is thus possible, by altering the position of the loops and notches to increase or decrease the pressure or grip of the one part with the other. If the notch is on the edge of the leg, the scissor action of the legs will cause it to engage in the loops.

The tubes 6 may also be provided with notches or ribs to engage in the notches 31 of the legs when the latter are inserted in the tube.

What I claim is:

1. In a constructional toy, the combination of tubular members, plates having receiving means, and connecting members, each constructed to fit about one of said tubes, and having arms projecting therefrom side by side, constructed for insertion together into frictional engagement within another of said tubes, or for separate insertion into frictional engagement within said receiving means of a plate or plates.

2. In a constructional toy, the combination of tubular members, plates having means providing receiving openings, and connecting members, each having a flexible central portion, adapted to be bent around one of said tubular members to bring the edges thereof adjacent to each other, and arms extending oppositely from said edges, adapted to project side by side, when the central portion is thus bent, for insertion together, if desired, into the end of another of said tubular members, said arms also being capable, when desired, of being inserted, singly, into frictional contact with said receiving openings of the plates.

3. In a constructional toy, the combination of tubular members, plates having loops extending outwardly from opposite sides thereof, and connecting members, each having a flexible central

portion, adapted to be bent around one of said tubular members to bring the edges thereof adjacent to each other, and arms extending oppositely from said edges, adapted to project side by side, when the central portion is thus bent, for insertion together, if desired, into the end of another of said tubular members, or alternatively, for insertion separately within loops on opposite sides of one of said plates.

4. In a constructional toy, the combination of tubular members and connecting members, of resilient material, each comprising a band portion adapted to encircle one of said tubular members, with its end edges adjacent, and arms extending outwardly from said edges, for insertion together into the end of another of said tubular members, said arms together forming a tapered projection, when thus inserted, constructed to fit more tightly within said last tubular member as the latter is pushed farther along said arms, the edges of said band portion being out of contact with each other until said last named tubular member is pushed along said arms to force said edges towards each other.

5. In a constructional toy, the combination of longitudinal members, plate members and connecting members, the latter having means for attachment, if desired, to said longitudinal members, and being bendable; said plate members having receiving means on opposite sides thereof, and said connecting members having arms on opposite sides thereof, constructed for insertion into binding engagement with receiving means of different plate members, when not bent into parallelism, and into binding engagement with receiving means on opposite sides of the same plate member, when bent to bring said arms into parallel relation.

6. In a constructional toy, the combination of plate members having loops struck out from sides thereof, and connecting members each comprising a bendable central strip, arched in the longitudinal direction of the member, and arms extending from opposite ends of said strip, laterally arched for insertion into binding engagement within loops of said plate members.

7. As an article of manufacture, a connecting piece for use in constructional toys, comprising a flexible central strip, adapted to be bent around a tubular or rodlike member of the toy, to conform in shape thereto, and arms extending from the opposite edges thereof, so that when the central strip is bent around a tubular or rodlike member of suitable diameter, said arms will project in the same general direction for insertion together, if desired, into the end of another tubular member, said arms being constructed to effect frictional engagement within such tubular member.

8. As an article of manufacture, a connecting piece for use in constructional toys, comprising a flexible central strip, adapted to be bent around a tubular or rodlike member of the toy, to conform in shape thereto, and laterally-arched arms extending from the opposite edges thereof, arranged, when the central strip is bent around a tubular or rodlike member of suitable diameter to project in the same general direction, to form, together, a divided extension of approximately cylindrical cross section, adapted for insertion into the end of another tubular member of the toy.

9. As an article of manufacture, a connecting piece of flexible sheet material, for use in con-

structional toys, comprising a flexible central strip with downwardly bent end portions, and arms extending outwardly from said end portions, said central strip being adapted to be bent around a tubular or rodlike member of the toy, to bring the edges of said bent end portions adjacent to each other with said arms extending in the same general direction, for insertion together, if desired, in the end of another tubular member, said arms being constructed to effect frictional engagement within such tubular member.

10. As an article of manufacture, a connecting piece for use in constructional toys, comprising a flexible central strip, adapted to be bent around a tubular or rodlike member of the toy, and arms extending from the opposite edges thereof, so that, when the central strip is bent around a tubular member of suitable diameter, said arms will project in the same general direction for insertion together, if desired, into the end of another tubular member, said arms being laterally arched and longitudinally tapered.

11. As an article of manufacture, a connecting piece for use in constructional toys, comprising a flexible central strip, adapted to be bent around a tubular or rodlike member of the toy, and arms extending from the opposite edges thereof so positioned that, when the central strip is bent around a tubular member of suitable diameter, said arms will project side by side, but with the longitudinal centre line of one at a small angle to the centre line of the other, said arms being resiliently bendable into parallelism if inserted

together into the end of another tubular member of the toy.

12. As an article of manufacture, a sheet metal connecting piece for use in constructional toys, comprising a flexible central strip with downwardly bent end portions and arms extending outwardly from said end portions, said central strip being adapted to be bent around a rounded or angular member of the toy to bring edges of said bent end portions adjacent to each other with arms which project from opposite end portions extending in the same general direction, said arms being laterally arched and longitudinally tapered.

13. As an article of manufacture a plate for use in constructional toys, said plate having a number of pairs of loops integral therewith, the loops of each pair being struck up from the opposite sides of the plate for the reception of portions of connecting devices, and said pairs of loops being disposed adjacent but within the edge of the plate so that between each pair of loops and the adjacent edge of the plate a flat part of the plate extends.

14. As an article of manufacture a plate of bendable stiff material having spaced pairs of loops extending outwardly from opposite sides thereof, said pairs being disposed adjacent to but within opposite edges of the plate so that between each pair of loops and the respective edge of the plate a flat part of the plate extends, and the loops on one side of the plate being offset laterally in relation to the corresponding loops on the other side.

JEROME FRANCIS KENNEDY. 35