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[54] CONNECTING ARRANGEMENT FOR USE IN A TOY ASSEMBLY KIT

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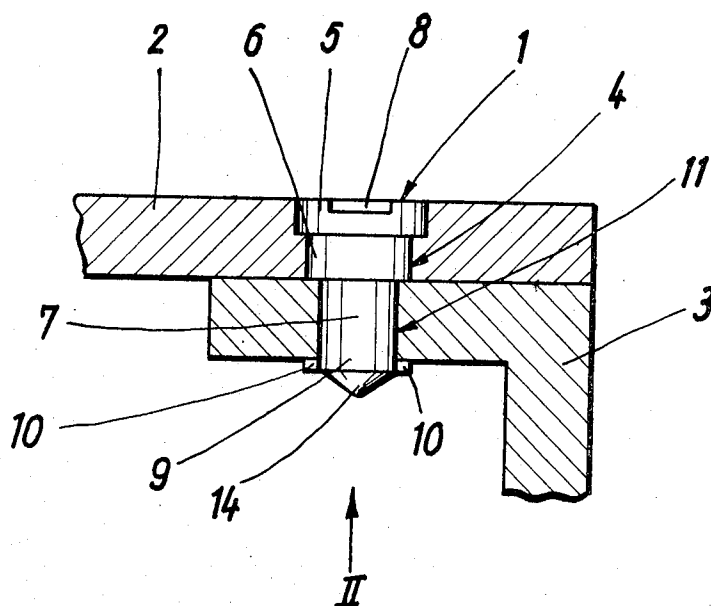
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[57] ABSTRACT

In a toy assembly kit two elements are to be connected with one another. They are superimposed and have juxtaposed first surfaces and second surfaces which face away from one another. Registering apertures are provided in both elements. An elongated connecting member extends through both of the apertures and is turnable therein. It has a head portion which engages the second surface of one of elements and a free end portion provided with projections which are receivable in response to turning of the connecting member in corresponding recesses provided in the inner circumferential surface of the aperture in the other element or in the second surface of the other element. Thereby, the elements are connected against separation but can be turned with reference to one another.

12 Claims, 7 Drawing Figures



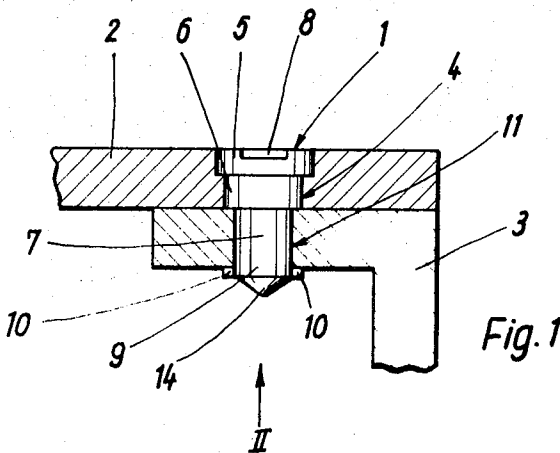


Fig. 1

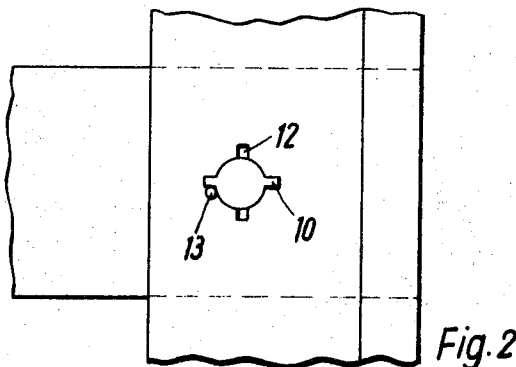


Fig. 2

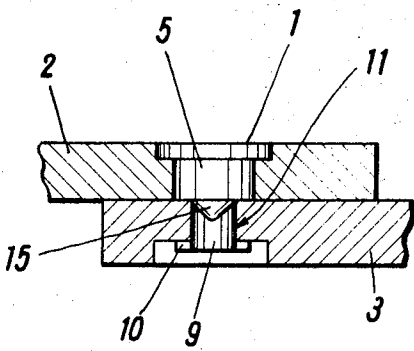


Fig. 4

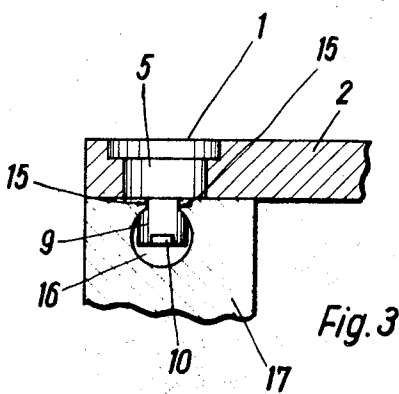
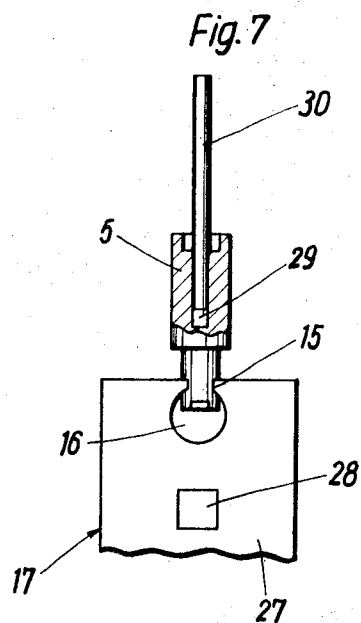
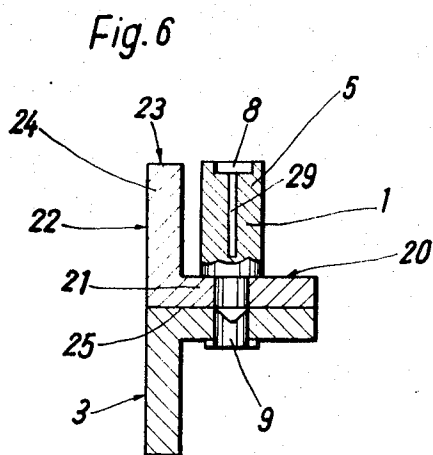
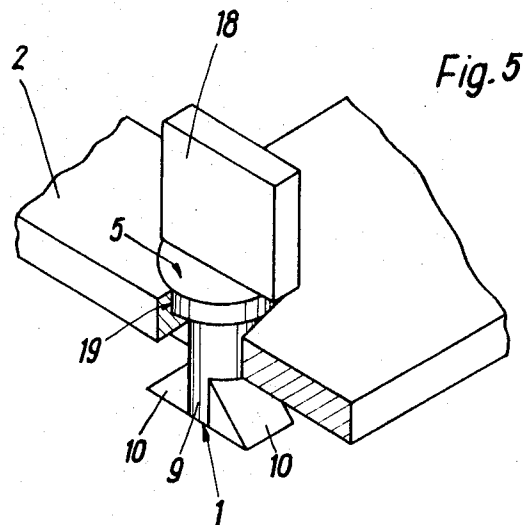


Fig. 3

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CONNECTING ARRANGEMENT FOR USE IN A TOY ASSEMBLY KIT

BACKGROUND OF THE INVENTION

The present invention relates generally to toy assembly kits, and more particularly to a connecting arrangement for use in a toy assembly kit. Still more specifically the invention relates to a releasable connecting arrangement for connecting two elements of a toy assembly kit with one another in such a manner that they can be pivoted with reference to each other in a plane common to them.

It is of course already known to connect such elements in a variety of different ways. A frequently employed arrangement for this purpose is to utilize a bolt and a nut. However, the use of bolts and nuts is somewhat difficult for many children who may be lacking in sufficient manual dexterity. In addition, both sides of the two elements to be connected must be accessible because it is necessary to insert the bolt from one side and to secure the nut to the bolt from the other side. This is frequently not possible. In addition it is necessary to provide at least one and usually two tools—such as a wrench or the like—for engaging and/or turning the nut and/or the bolt. Not only is this frequently beyond the skill of the playing child—because of their play value these assembly kits or construction kits are now given to rather young children—but also there is quite frequently inadequate space available for manipulating the tools for instance if the two elements to be connected are part of a larger structure with other elements preventing proper access to them.

Furthermore, there are constructions which can be erected with such kits wherein the rigidity of the finished assembly is—in accordance with real-life counterparts which these assemblies copy—which is desirably provided by the relative location and interaction of the various elements and not by a tight immovable connection between the elements as can be established by the use of a nut and bolt. This is undesirable because a primary purpose of these construction kits is to impart to the playing child an understanding of principles involved in the construction of real-life buildings, vehicles and the like which can be copied with the toy assembly kit. If in the real-life construction the rigidity of the structure depends upon the interrelationship of the elements rather than upon a rigid connection of the elements, and if this cannot be copied with the toy assembly kit, then the child cannot learn. For instance, it is difficult for a child to understand the use of cross braces in a construction for assuring the necessary rigidity when the rigidity is already present due to the immovability of the members resulting from the use of a nut and bolt connection.

SUMMARY OF THE INVENTION

It is, accordingly, an object of the present invention to avoid the aforementioned disadvantages.

A more particular object of the invention is to provide a connecting arrangement of the type under discussion which is not possessed of these disadvantages.

Still a further object of the invention is to provide such a connecting arrangement which is to be not only simple, but also releasable so that the connected elements can readily be separated again whenever this is desired.

A concomitant object of the invention is to provide such a connecting arrangement which permits displacement of the connected elements with reference to one another in a common plane but guarantees that no undesired disconnection will take place in response to such displacement.

In pursuance of the above objects, and others which will become apparent hereafter, one feature of the invention resides in a connecting arrangement for use in a toy assembly kit which, briefly stated, comprises a first and a second element which are to be connected, these elements having respective juxtaposed first surfaces, respective second surfaces facing away from one another, and respective registering apertures each extending from the first to the second surface

of the element. An elongated connecting member extends through both of the apertures turnable therein and includes a head portion engaging the second surface of the first element and a free end portion arrestingly engaging the second element in a sense preventing unintentional separation of the elements in direction lengthwise of the connecting member.

Thus, with this construction, one of the members—namely the one in whose aperture the free end portion is not located—is capable of pivoting displacement with reference to the other member. Using members connected in this manner for erecting a structure, for instance the skeleton of a building, a child will at once realize that to achieve the necessary rigidity of the structure it is imperative to provide cross-braces or the like. Despite the pivoting ability imparted to the members connected in this manner with the novel connecting arrangement, the members have no play in direction lengthwise of the pivot axis so that there is no danger of “sagging” of the erected structure.

The arresting engagement of the free end portion with the other structural element can be accomplished in various ways. For instance, brief mating screw threads may be provided on the free end portion and in the aperture of the second structural element, and the arrangement can be such that the screw threads can be engaged and tightened with reference to one another to the maximum possible extent while still permitting movement of the first structural element with reference to the second structural element.

However, this is by no means the only manner in which the desired purpose can be accomplished. A different and preferred possibility is to provide the free end portion with two projections preferably located diametrically opposite one another and to provide the inner circumferential surface bounding the aperture in the second structural element, or the second surface of the second structural element, with corresponding recesses in which the projections will enter when the connecting element is turned. Of course, the latter possibility would require that the free end portion actually slightly projects beyond the second end face of the second member with the projections being located at that part of the end portion which is outside the aperture in this second member and projects beyond the second surface. This is not only a particularly simple solution with respect to constructing the components involved, but also provides for an especially simple connection and disconnection. Here again an undesired disconnection of structural elements is not to be feared because the first structural element will turn by itself and the connecting member will not join in such turning. A further safeguard can be provided in having the aperture in the second structural element so configured that the free end portion is frictionally received and retained therein. This does not preclude turning of the connecting member when the connection is to be established or separated, but it does require that a greater force be exerted for the turning than otherwise.

Assembly kits of the type here under discussion frequently utilize cooperating mating female and male connecting portions on their various structural elements. In order to make it possible for the connecting member to be secured to structural elements—other than those which it connects—provided with such connecting portions, the structural element may be provided at its head portion with either a male or a female connecting portion, for instance an undercut coupling head or an undercut groove which can matingly engage with corresponding connection portions on other structural elements of the kit. Also, the juncture between the intermediate portion of the connecting member which extends between the free end portion and the head portion of the latter, may be provided with diametrically oppositely located recesses so that the connecting member can be secured to the structural elements just mentioned and provided with the cooperating connecting portions so that by this means structural elements connected by the connecting member can be secured to other structural elements having the aforementioned connecting portions. The diametrically opposite location of such recesses or cut-outs per-

mits the sliding insertion of the connecting member into an undercut connecting member or into an undercut groove provided on such structural elements because the recesses or cut-outs correspond to the undercut configuration of such a groove. If projections are provided on the free end portion as discussed before, they are not of any disadvantage in this connection. The recesses are offset through 90° with reference to the projections and this makes it possible to use the projections visually for orienting the connecting member in proper manner for insertion into an undercut groove. For this purpose it is simply necessary that the projections extend in direction lengthwise of the groove which will then automatically indicate that the recesses are properly located.

Advantageously the second element with which the free end portion and the projections, if there are any, co-operate is provided with an abutment which prevents excessive turning of the connecting member with reference to the second element. This is particularly important if the projections project to such an extent from the free end portion that the apertures in both the first and the second member must be provided with longitudinally extending grooves through which the projections slide as the connecting member is introduced into the aligned apertures. Excessive turning of the connecting member could in such case cause the projections first to wedgingly engage the corresponding surfaces of the second member and then to move beyond the same and enter again into these longitudinal grooves which would evidently destroy the connection. Hence, the abutment.

According to a further concept of the invention it is advantageous if the intermediate portion of the connecting member has a thickening extending from the head portion towards the free end portion and located in the aperture of the first member or element, namely the one closest to the head portion. The length of the thickening should be such that it extends just slightly beyond the aperture towards the second member or element. The purpose of this is to prevent the two connected members or elements from being drawn into such tight frictional engagement—for instance because of improper tolerances—that pivoting movement of the connecting elements relative to one another is impossible.

Also, the free end portion may have a conically tapered tip to facilitate its insertion into the respective apertures.

The manner in which the free end portion is releasably connected with the second element may vary as already indicated. As a rule, the connecting member will be turned about its own longitudinal axis for effecting connection or disconnection. If the arrangement is used in a toy building kit of the type having other structural elements some of which are formed with coupling heads of polygonal cross section, then the head portion of the connecting member may be provided with a recess capable of accommodating these coupling heads and turning can be very simply effected by inserting such a coupling head of another structural element into this recess and turning the structural element. This avoids the need for a tool and provides the equivalent of a tool in terms of convenience of operation. Of course, if the first element is of L-shaped cross section or of analogous cross section, then this is not possible any more because the structural element would be impeded—either during insertion or during subsequent attempted turning—by the upstanding arm of the L-shaped cross section, assuming that this arm extends upwardly away from the second element. In this case it is advantageous that the height of the head portion correspond to the height of the upstanding arm, or possibly be slightly in excess of such height so that it is again possible to utilize the coupling head of another structural element for turning of the connecting member in the manner just described.

In place of such recess accommodating a polygonal connecting head, or in addition thereto, the head portion of the connecting member may also be provided with a transverse bore extending transversely of the axis about which the connecting member is to be turned. In this case the bore accepts shafts and this is particularly advantageous if the elements

connected with this connecting arrangement comprise at least one L-shaped element of the type just outlined, because the shaft can be reliably journaled in this manner, a possibility which heretofore was frequently impossible because of the relative thinness of the arms of such L-shaped members.

An alternative to the use of other structural elements provided with polygonal coupling heads for turning the connecting member, either because no such coupling heads are present as part of the kit with which the arrangement is to be used or because a different solution is desired, the head portion may be substantially V-shaped analogous to a wing nut, and its lower portion, that is a portion of the head portion located intermediate the intermediate portion and the wing-shaped portion may be receivable in a depression provided in the second surface of the first element. In such a construction the head portion can be particularly readily engaged by the fingers of even a small child so that the connection and turning can be accomplished in a simple, effortless manner without the use of additional tools or help. If this type of configuration for the head portion is used, it is advantageous if engaging portions cooperating with the free end portion for effecting locking are provided in the region of the second surfaces of both of the structural elements to be connected. It is possible that under certain circumstances the relatively large wing-shaped head portion cannot be accommodated at one side of one of the elements, and in this case it is simply inserted from the other element in the direction oppositely the conventional direction of insertion, and of course in this case the locking occurs between the free end portion and the first-mentioned element whereas it is now the second element which is turnable about the connecting portion.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary sectional elevation showing a connecting arrangement according to the present invention;

FIG. 2 is a view of the embodiment in FIG. 1 as seen in the direction of the arrow II;

FIG. 3 illustrates the connecting element according to the present invention in a further embodiment;

FIG. 4 illustrates an additional embodiment of the invention in a view similar to FIG. 1;

FIG. 5 illustrates in partial section and partial perspective yet another embodiment;

FIG. 6 is a sectional elevation showing an additional embodiment; and

FIG. 7 is a fragmentary partly sectioned illustration showing still a further embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Discussing now the drawing in detail, and first FIGS. 1 and 2 thereof, it will be seen that reference numeral 1 identifies an elongated connecting member of the arrangement according to the present invention. It is shown in FIGS. 1 and 2 as connecting two structural elements 2 and 3 with one another. These structural elements are provided with aligned apertures. Specifically the structural element 2 is provided with an aperture 4 of stepped inner cross section (compare FIG. 1) and accommodates in this aperture 4 the head portion 5 and a thickening in form of an intermediate portion 6 of the member 1. A recess or depression 8 is provided in the exposed end face of the head portion 5 and permits the introduction of a suitable means for effecting turning of the member 1 about its longitudinal axis, for instance the insertion of a coupling head of polygonal cross section provided on another structural element of a toy assembly kit in conjunction with which the in-

vention is to be used. However, the recess 8 can of course also be in form of a slot for use with a screw driver.

The thickened intermediate portion 6 extends from the head portion 5 slightly beyond the surface of the element 2 which is juxtaposed with the element 3. The portion 7, that is the free end portion of the member 1, extends into the aperture 11 of the element 3. The arresting portion 9 of the member 1 is provided with two diametrically opposite projections 10. As is clear the portion 9 extends beyond that surface of the element 3 which faces away from the element 2 so that the projections 10 overlie such surface. Recesses 12 (compare FIG. 2) are provided through which the projections 10 pass as the member 1 is first inserted through aperture 4 and then the aperture 11. Thereupon the member 1 is turned about its longitudinal axis and the projections 10 engage the element 3 in locking relationship. To prevent turning of the member 1 to an excessive extent which would bring the projections 10 back into alignment with the recesses 12 and would negate the connection, an abutment or stop 13 is provided. This is shown in FIG. 2. The portion 9 is provided with a conically tapered tip 14 for facilitating insertion into the apertures 4 and 11.

In FIGS. 3 and 4 the portion 9 is provided with two diametrically opposite undercuts or depressions which correspond in shape to the undercut groove 16 of a structural element 17 which also forms a part of a toy building kit in which the present invention is to be utilized. The projections 10 extend at right angles to the direction of the undercuts 15 and provide for visual alignment in that they simply are aligned with the longitudinal axis of the groove 16 whereby a proper location of the recesses 15 with respect to the undercut groove 16 is achieved. Normally, the undercut groove 16 would receive correspondingly configured undercut male coupling heads provided on others of the building blocks 17, but here the member 1 is used to connect to this building block 17 in the illustrated manner the element 2. The narrow top portion of the groove 16 constitutes an aperture which extends between the top surface of the element 17 and the concave surface surrounding the main portion of the groove 16. The undercuts 15 in the arresting portion 9 of the member 1 shown in FIGS. 3 and 4 provide two projections which are angularly offset with reference to the projections 10 and engage the concave surface surrounding the groove 16 when the member 1 is mounted in a manner as shown in FIG. 3.

Coming to the embodiment in FIG. 5 it will be seen that here the head portion 5 is provided with a substantially wing-shaped gripping or engaging portion 18 which greatly facilitates ready turning of the member 1 about its longitudinal axis. If the portion 18 is in the way at the outer side of the member 2, then the member 1 is inserted from the inner side through the openings 4 and 11 and the arresting is accomplished again by turning. In this case the portion 9 is accommodated in a depression 19 and does not project beyond the outer side.

In the embodiment of FIG. 6 the element 3 is of L-shaped cross section, as is the element 22 which here has an arm 21 and an upright arm 24 projecting upwardly beyond that surface 20 of the arm 21 which faces away from the element 3 and from which the aperture 4 extends inwardly. The head portion of the member 1 is again identified with reference numeral 5 but here has such a height or length that its free end face is at least located in the plane of the surface 23 on the arm 24 so that the latter will not interfere with turning of the head portion 5. The portion 9 of the member 1 projects beyond the surface 25 of the element 22 through the aperture 11 of the element 3 for effecting locking in the aforementioned manner. Reference numeral 29 identifies a bore extending inwardly from the recess 8 into the head portion 5 and capable of accommodating a shaft 30 (see FIG. 7).

FIG. 7 shows that the member 1 is connected with the building block 27, or rather with the undercut groove 16 thereof, by means of the undercuts or recesses 15 as illustrated. Reference numeral 28 here identifies a projecting male coupling head of undercut configuration such as to mate with

grooves analogous to the groove 16 but in other structural elements which are not illustrated. In fact, the Configuration of the coupling head 28 corresponds to that of the recess 8 (see FIG. 6) in the free end face of the head portion 5 so that if a coupling head 28 of any structural element provided therewith is inserted into the recess 8, it can serve for effecting turning of the member 1 about its longitudinal axis between a connected and a disconnected position. In FIG. 7 a shaft 30 will be seen to be releasably accommodated in the bore 29.

It is clear that the construction according to the present invention is not only very simple and achieves all of the aforementioned objects, but also that it is highly versatile so that a toy assembly or building kit utilizing the present invention undergoes a significant increase in play value and in its inherent ability to teach the playing child certain fundamentals of structure.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in a connecting arrangement for use in a toy assembly kit, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

1. A connecting arrangement for use in a toy assembly kit, comprising a first element having first and second surfaces and a first aperture extending between said surfaces; a pair of additional elements separably connectable interchangeably with said first element and having first surfaces adapted to be placed adjacent to the first surface of said first element, second surfaces, and apertures extending between the respective first and second surfaces of said additional elements and movable interchangeably into register with said first aperture, the configuration of said second surface of one of said additional elements being different from the configuration of the corresponding surface on the other additional element; and a connecting member for separably connecting said first element with a selected one of said additional elements, said connecting member having a first end portion movable into abutment with the second surface of said first element, a median portion insertable into said first aperture, and a second end portion having at least one first projection extending transversely of the longitudinal axis of said connecting member, said first projection having a first engaging surface arranged to engage the second surface of one of said additional elements when the first surface of said one additional element is adjacent to the first surface of said first element and said second end portion extends through the aperture of said one additional element; said second end portion further having at least one second projection also extending transversely of the longitudinal axis of said connecting member and angularly offset with reference to said first projection, said second projection having a second engaging surface at a different level than said first engaging surface relative to the longitudinal axis of said connecting member, and said second engaging surface being arranged to engage the second surface of the other additional element when the first surface of said other additional element is adjacent to the first surface of said first element and said second end portion extends through the aperture of said other additional element.

2. A connecting arrangement as defined in claim 1, wherein said second projection of said connecting member is freely insertable into and withdrawable from the aperture of said one additional element and said one additional element has a recess through which said first projection is free to pass in a predetermined angular position of said one additional element with reference to said connecting member during introduction or withdrawal of said second end portion from the aperture of said one additional element.

3. A connecting arrangement as defined in claim 1, wherein the aperture of one of said additional elements is an elongated slot and forms part of an undercut groove in said other additional element, said groove having at least one open end, and said second end portion of said connecting member being insertable into said groove by way of said open end while said first projection is in at least substantial alignment with the longitudinal direction of said groove.

4. A connecting arrangement as defined in claim 1, wherein said second end portion is provided with a pair of first and second transversely extending projections, located substantially diametrically opposite each other with reference to the longitudinal axis of said connecting member.

5. A connecting arrangement as defined in claim 1, wherein at least one of said elements is a plate.

6. A connecting arrangement as defined in claim 1, wherein the apertures of said first element and said one additional element have a substantially circular outline.

7. A connecting arrangement as defined in claim 1, wherein

said first end portion of said connecting member is provided with means for facilitating angular adjustment of said connecting member.

8. A connecting arrangement as defined in claim 7, wherein said means for facilitating angular adjustment of said connecting member is provided with a recess of polygonal outline.

9. A connecting arrangement as defined in claim 1, wherein the axial length of said median portion exceeds the distance between the first and second surfaces of said first element.

10. A connecting arrangement as defined in claim 1, wherein said first element is of substantially L-shaped profile and has a first arm provided with said first and second surfaces of said first element, and a second arm projecting beyond said second surface of said first arm by a predetermined distance in direction away from said first surface, the axial length of said first end portion of said connecting member at least approximating said predetermined distance.

11. A connecting arrangement as defined in claim 10, wherein said first end portion has an opening dimensioned to receive a shaft.

12. A connecting arrangement as defined in claim 1, wherein the configuration of said first projection is different from the configuration of said second projection, said first projection arranged to engage only the second surface of said additional element and said second projection arranged to engage only the second surface of said other additional element.

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