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(54) Connecting piece for construction parts

(57) The invention relates to a connecting piece (10) for mutually connecting construction elements. The connecting piece comprises for this purpose at least one male coupling part (11) to be received fittingly in a corresponding female coupling part on a construction element for connecting. The male coupling part is herein provided in a transverse direction with a continuous cavity (17) which, in coupled position, is at least substantially in register with a cavity in a wall of the female coupling part. A divided locking pin (40) is received in the cavity (17). The male coupling part (11) comprises a metal core (16) with the cavity (17) therein. The metal core (16) is at least partly enclosed by a plastic outer housing (15) which is received fittingly in the female coupling part.

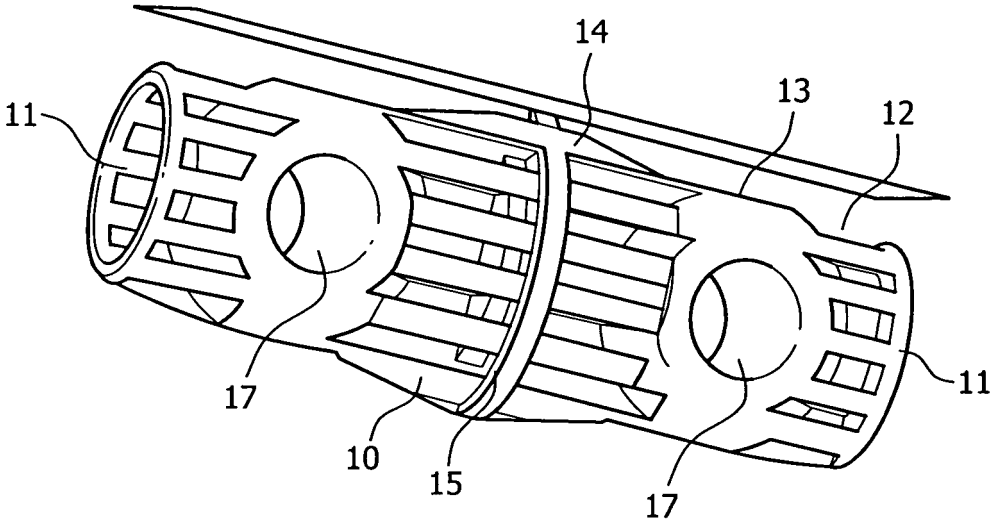

FIG. 1

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Description

[0001] The present invention relates to a connecting piece for mutually connecting construction elements, comprising at least one male coupling part to be received fittingly in a corresponding female coupling part on a construction element for connecting, wherein the male coupling part is provided in a transverse direction with a continuous cavity which, in coupled position, is at least substantially in register with a cavity in a wall of the female coupling part for the purpose of receiving a divided locking pin.

[0002] Such a connecting piece finds particular application in scaffolding, theatre and stage construction for temporary or permanent constructions, wherein construction parts have to be coupled to each other relatively easily and quickly but nonetheless reliably and substantially by hand. An example of such a connecting piece is described in Netherlands patent application no. NL 9300170. The rapid coupling described therein comprises a solid aluminium connecting piece which tapers conically on either side around a male coupling part on both sides. The conical outer ends are received in female coupling parts which are formed on the construction parts for connecting and which take the form of bushes having a corresponding conical form internally. The bushes are also manufactured from solid aluminium. Transversely of the direction of connection the connecting piece comprises in both male coupling parts a morse taper cavity which is in register with corresponding cavities in the walls of the bushes. By arranging a fitting morse taper locking pin in the conical cavity a strong connection which is free of play and which meets the required standards of reliability can thus be realized wholly by hand and can be dismantled again just as easily.

[0003] The latter in particular makes such a coupling suitable for temporary and repeated use. Particularly in the case of mobile stages the invention finds application in the erection of a stage floor, stage walls and truss systems from which lighting units, loudspeakers and other attachments can be suspended. It is not unusual for a stage builder to herein rent at least some of the required parts, for instance for the duration of an event being performed on the stage. Parts are then not infrequently hired from different hire companies. This has the drawback for these companies that it is not possible, or hardly so, to verify whether their own parts are being returned or that parts are being returned which actually belong to a different hire company and which are for instance more worn.

[0004] The present invention has for its object, among others, to provide a connecting piece of the type stated in the preamble which enables a better recognition and results in production costs that are hardly any higher.

[0005] In order to achieve the intended object, a connecting piece of the type stated in the preamble has the feature according to the invention that the male coupling part comprises a metal core with the cavity therein, and that the metal core is at least partly enclosed by a plastic outer housing which is received fittingly in the female coupling part. The invention is herein based on the insight that the connecting piece is usually the loosest part in the whole construction and that, by making it recognizable, the parts coupled thereto will share this recognition. By making use of an outer housing of plastic for the connecting piece, a logo or other identification mark can be arranged therein relatively easily and with hardly any additional cost. A preferred embodiment of the connecting piece according to the invention has in this respect the feature that the outer housing is coloured all through. With a specific colouring of the outer housing the origin of the connecting piece can thus be characterized at a glance. The use of plastic for the outer housing furthermore results in a cost price reduction relative to solid aluminium, while the metal core of the total connecting piece ensures the strength and reliability which is required thereof in practice. In addition, plastic is generally more adaptive to the specific dimensioning of the female coupling part, so that mutual play can be reduced further by a slight over-dimensioning.

[0006] A particular embodiment of the connecting piece according to the invention has the feature that at least two male coupling parts extend therefrom which comprise a joint metal core. A construction element can be coupled thereto on either side, this being a frequently occurring wish in practice. The invention thus provides an essential part of a construction which can be constructed in fully modular manner.

[0007] A preferred embodiment of the connecting piece according to the invention has the feature that on an outer surface the male coupling part narrows toward a free end over at least a part of the length hereof, in particular runs in conical, and more particularly in morse taper manner, and that the female coupling part is provided internally with a correspondingly running surface. Such a narrowing, or even conical, progression over at least a part of the length in the male and female coupling part makes the mutual coupling so-called self-locating or self-aligning, which significantly improves convenience of use of the coupling in practice.

[0008] A further preferred embodiment of the connecting piece according to the invention herein has the feature that the cavities in the male and female coupling part, just as the locking pin, run in a narrowing, in particular conical manner. By also making use for the locking pins and cavities of a narrowing, in particular conical progression, a comparable self-alignment is here achieved which moreover holds together and locks the entire coupling in a manner which is free of play. A connection can thus be realized in fully manual and rapid manner, which can be taken apart again quickly and easily if desired, but whose strength and reliability are nevertheless in no way inferior to a permanent connection or an integrated construction. In order to prevent the locking pin from shooting out of the cavity during use, a further preferred embodiment has the feature that the locking pin comprises a contin-

uous cavity in at least practically transverse direction on a free end thereof for the purpose of receiving a locking pin therein.

[0009] A variety of plastics are per se suitable for the outer housing of the connecting piece. A suitable plastic and the dimensioning thereof can be chosen depending on the forces to which the construction for erecting will be subjected during use. A further embodiment of the connecting piece according to the invention preferably has the feature that the outer housing comprises an at least practically splinter-free plastic, in particular one from a group of polyethylene, polypropylene, ABS and polyamide (nylon). With a view to possible relatively rough use of the connecting piece, use is made here of a splinter-free, in particular impact-resistant plastic for the outer housing, so that it does not become damaged or even unusable too quickly.

[0010] The connecting piece according to the invention can per se be assembled in various ways. A relatively simple and inexpensive, yet equally effective embodiment of the connecting piece according to the invention does however have the feature in this respect that the outer housing is cast round the core. The outer housing is herein arranged by pouring the plastic in liquid, at least soft form into a mould adapted for this purpose round the metal core. Not only does this give a smooth connection to the metal core, which provides a particularly good protection against outside (weather) influences, the outer housing can thus also be arranged integrally around the metal core without further fixing means. In order to save material, and thereby weight and material costs, a further particular embodiment of the connecting piece according to the invention has the feature that the outer housing comprises a number of ribs which form a surface corresponding in form with an internal surface of the female coupling part. The plastic is here not applied round the core as a solid whole, but use is made of a more open structure which is not however inferior in strength and usability. In a casting process such an open structure can be realized relatively easily and without additional processing steps by adapting hereto an internal form of a mould applied herein.

[0011] With a view to a high durability a further preferred embodiment of the connecting piece according to the invention has the feature that the core comprises a metal from a group of aluminium and stainless steel.

[0012] The invention will now be further elucidated on the basis of an exemplary embodiment and an associated drawing. In the drawing:

figure 1 shows a perspective view of a connecting piece according to an exemplary embodiment of the invention;

figure 2 shows a perspective view of a core of the connecting piece of figure 1; and

figure 3 shows an application of the connecting piece of figure 1 in a truss construction.

[0013] The figures are purely schematic and not drawn to scale. Some dimensions in particular may be exaggerated to a greater or lesser extent for the sake of clarity. Corresponding parts are designated as far as possible in the figures with the same reference numeral.

[0014] An embodiment of a connecting piece 10 according to the invention is shown in figure 1. The connecting piece is intended to rigidly connect two construction elements to each other, and comprises for this purpose a male coupling part 11 on either side which is received fittingly in a complementary female coupling part 21,31 on construction elements 20,30, see also figure 3. In the embodiment shown in figure 3 the construction elements 20,30 both comprise so-called triangle trusses which are coupled to each other by means of three such connecting pieces. The male coupling parts 11 narrow toward a free outer end and more particularly comprise a conical outer end 12, a straight part 13 running substantially parallel to a central axis and a morse taper connecting surface 14. In the coupled state this connecting surface lies fittingly against a correspondingly conical internal surface 24,35 of the female coupling parts 21,31, which extend from construction elements 20,30 as conical bushes.

[0015] In the shown exemplary embodiment the connecting piece comprises a housing 15 of plastic, in this example impact-resistant and splinter-free ABS which is coloured red all the way through and which is moulded seamlessly round a metal core 16 of aluminium, see figure 2. Plastic housing 15 here provides the fitting in conical bushes 21,31, while the metal core ensures the strength of the connecting piece. At the position of the straight parts 13 of the connecting piece, morse taper cavities 17 are arranged therein substantially transversely of a central axis. These cavities 17 extend at least substantially in the metal core of the connecting piece and serve to receive correspondingly conically-formed locking pins 40 therein. A rigid and permanently strong whole can be obtained by bringing together the construction elements 20,30 and enclosing connecting piece 10 and driving locking pins 40 into cavities 17. The narrowed design of both the coupling parts 11 and locking pins 40 makes the coupling self locating or self-aligning in all its parts, which automatically brings about an exact relative positioning of the separate parts. Owing to the conical progression of locking pins 40 and the similar progression of cavities 17, driving in of the locking pins 17 will result in the coupling being held together so that a rigid entity free of play is eventually created, which can nevertheless just as easily be taken apart again. In order to prevent the locking pins from unexpectedly shooting out of the cavities during use, these comprise a bore 41 on their outer end transversely of a central axis thereof for the purpose of receiving a fitting locking pin 50 therein.

[0016] In this embodiment the connecting piece 10 is manufactured by pouring a plastic in liquid, at least soft form round core 16 so as to thus form the housing 15 therearound. Extensions 18 on both ends of the metal

core herein ensure a reliable anchoring of core 16 in plastic housing 15. For the housing 15 use is here made of a mould which provides the shown open structure of the housing which comprises a number of ribs on a surface which together form a surface 14 corresponding in form with the internal surface of the female coupling part. Such an open structure saves plastic without losing functionality. If desired, it is also possible to arrange a logo, trade name or other identification symbol in the mould, which is thus transferred to the body of outer housing 15. The origin of the connecting piece can thus always be traced later, wherein the chosen colour combination of the plastic already enables a first selection.

[0017] Although the invention has been further elucidated above on the basis of only a single exemplary embodiment, it will be apparent that the invention is by no means limited thereto. On the contrary, many other embodiments and variations are still possible within the scope of the invention. In addition to being used for a two-sided connecting piece, the invention can thus also be used for a single-sided connecting piece, which is then fixedly connected to one of the two construction parts for connecting, or for a multilateral connecting piece wherein the male coupling parts enclose a mutual angle of less than 180 degrees. The connecting piece can also take a hybrid form in the sense that it comprises both a male and female coupling part.

[0018] The given exemplary embodiment is based on mutual connection of trusses, although the invention has many other fields of application, such as for instance in scaffolding for mutually coupling scaffolding pipes and platforms and other applications wherein it is desired to be able to build a construction relatively rapidly and to then be able to dismantle it again later just as easily.

Claims

1. Connecting piece for mutually connecting construction elements, comprising at least one male coupling part to be received fittingly in a corresponding female coupling part on a construction element for connecting, wherein the male coupling part is provided in a transverse direction with a continuous cavity which, in coupled position, is at least substantially in register with a cavity in a wall of the female coupling part for the purpose of receiving a divided locking pin, **characterized in that** the male coupling part comprises a metal core with the cavity therein, and that the metal core is at least partly enclosed by a plastic outer housing which is received fittingly in the female coupling part.

2. Connecting piece as claimed in claim 1, **characterized in that** at least two male coupling parts extend therefrom which comprise a joint metal core.

3. Connecting piece as claimed in claim 1 or 2, **characterized in that** on an outer surface the male coupling part narrows toward a free end over at least a part of the length hereof, in particular runs in conical, and more particularly in morse taper manner, and that the female coupling part is provided internally with a correspondingly running surface.

4. Connecting piece as claimed in claim 1, 2 or 3, **characterized in that** the cavities in the male and female coupling part, just as the locking pin, run in a narrowing, in particular conical manner.

5. Connecting piece as claimed in one or more of the foregoing claims, **characterized in that** the locking pin comprises a continuous cavity in at least practically transverse direction on a free end thereof for the purpose of receiving a locking pin therein.

6. Connecting piece as claimed in one or more of the foregoing claims, **characterized in that** the outer housing comprises an at least practically splinter-free plastic, in particular one from a group of polyethylene, polypropylene, ABS, nylon and.

7. Connecting piece as claimed in one or more of the foregoing claims, **characterized in that** the outer housing is coloured all through.

8. Connecting piece as claimed in one or more of the foregoing claims, **characterized in that** the outer housing is cast round the core.

9. Connecting piece as claimed in one or more of the foregoing claims, **characterized in that** the outer housing comprises a number of ribs which form a surface corresponding in form with an internal surface of the female coupling part.

10. Connecting piece as claimed in one or more of the foregoing claims, **characterized in that** the core comprises a metal from a group of aluminium and stainless steel.

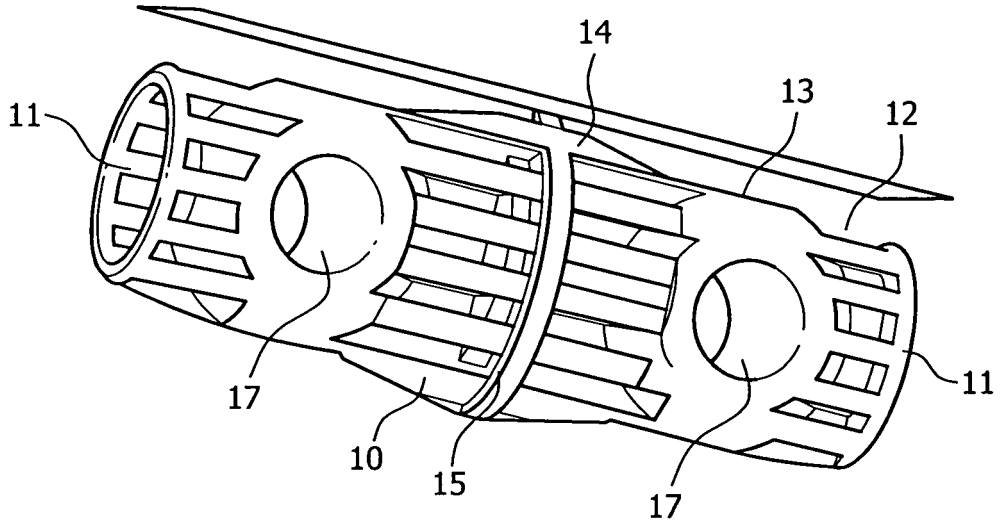

FIG. 1

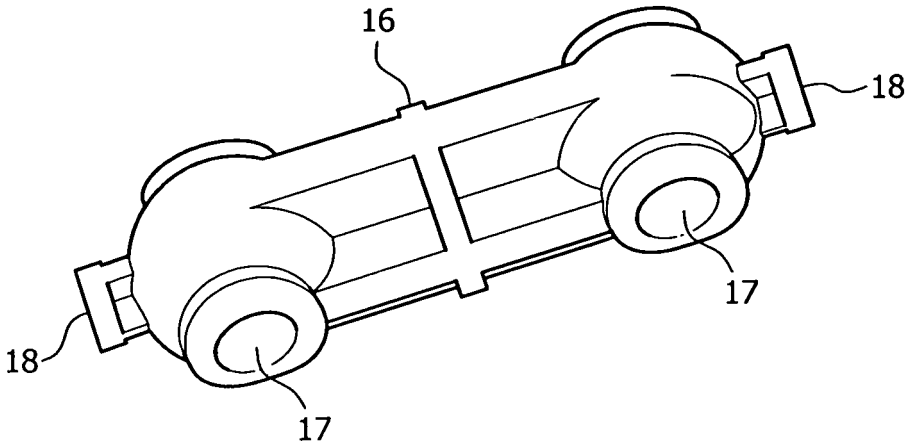

FIG. 2

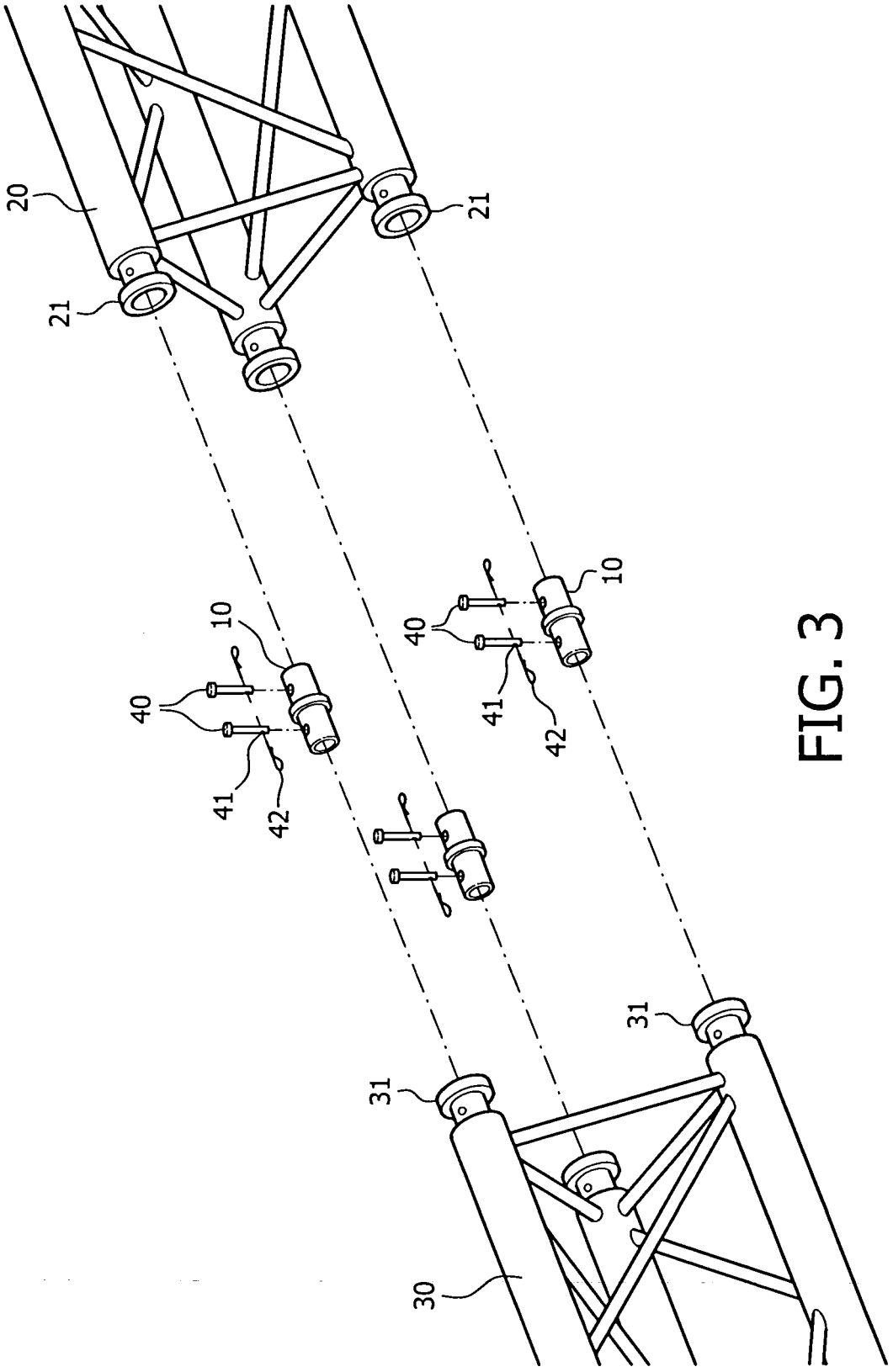

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 05 07 7615

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 April 2006	Porwoll, H

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