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(54) **Toothed belt end connecting device**

(57) A device for endless connections of toothed belts having longitudinal reinforcing cords (2). Comprises at least two interconnecting lock parts (3, 4) each provided with bores (10) into each of which is passed a bare end of a reinforcing cord. The bare ends are secured in the respective lock parts e.g. by caulking, glueing or welding. The lock parts (3, 4) are interconnected by means of fitting screws (17). The ends of the toothed belt may additionally be connected with respective lock parts by means of transversely extending pins (33, Fig 4 not shown).

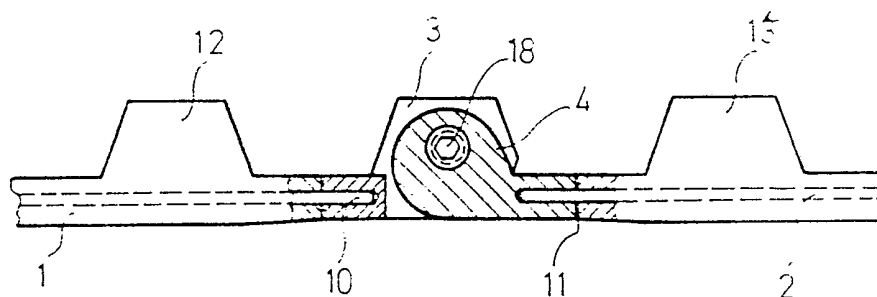


Fig. 1

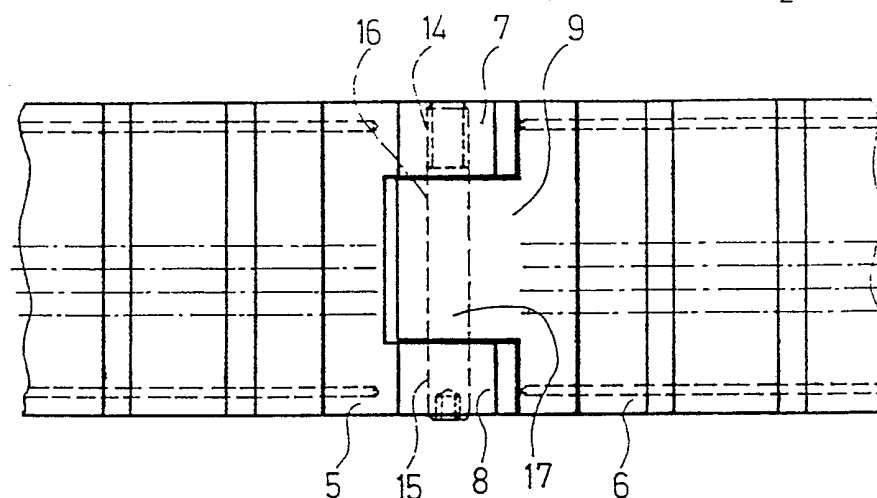


Fig. 2

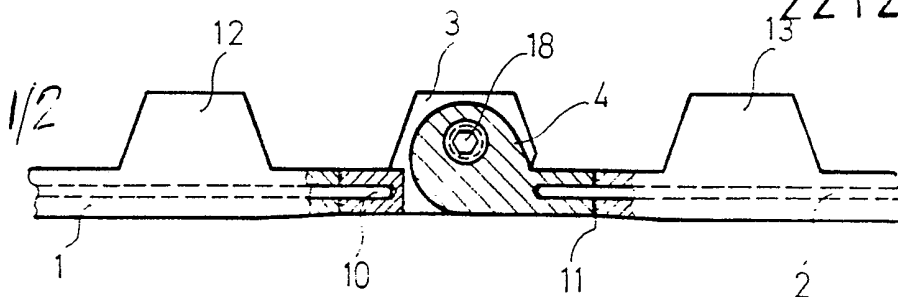


Fig. 1

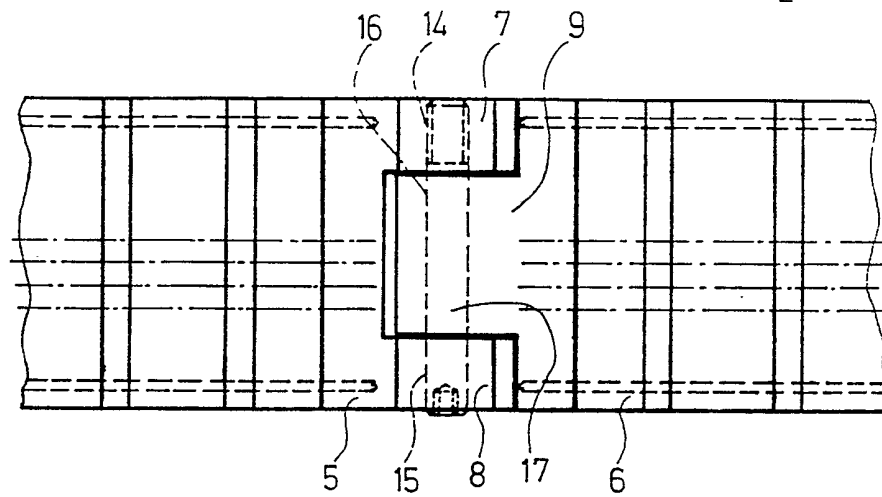


Fig. 2

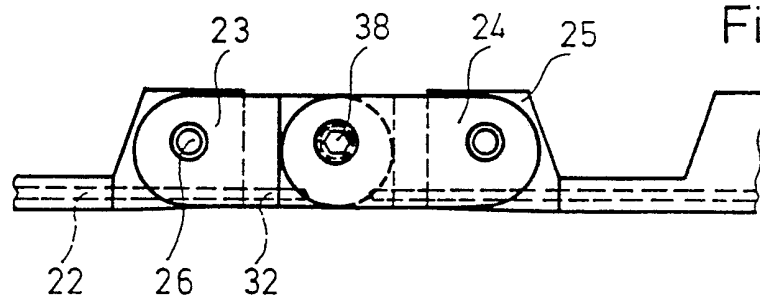


Fig. 3

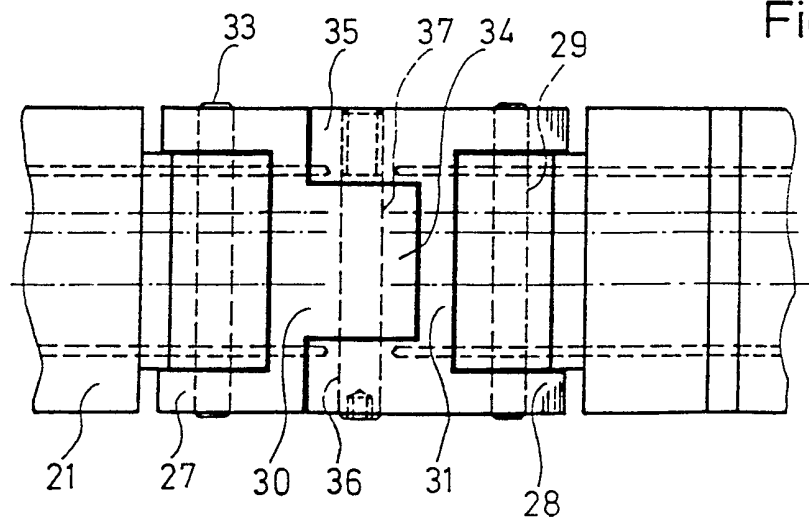


Fig. 4

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Fig. 5

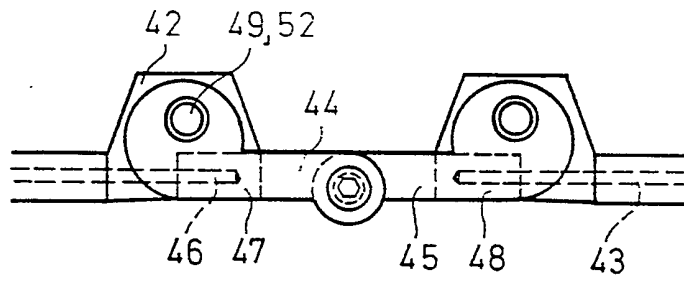


Fig. 6

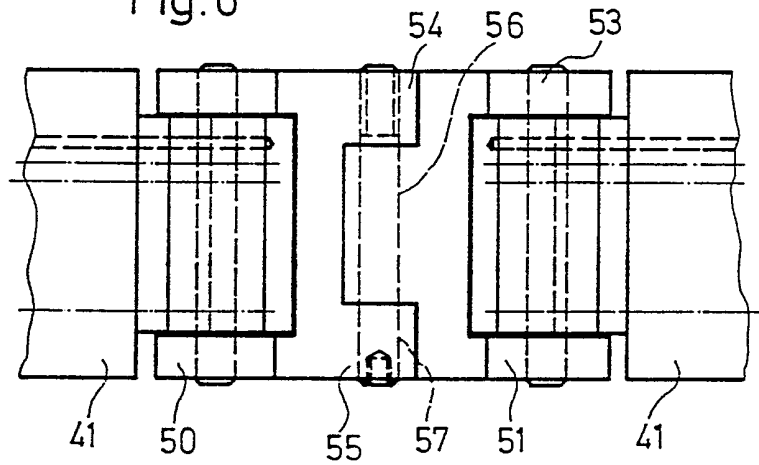
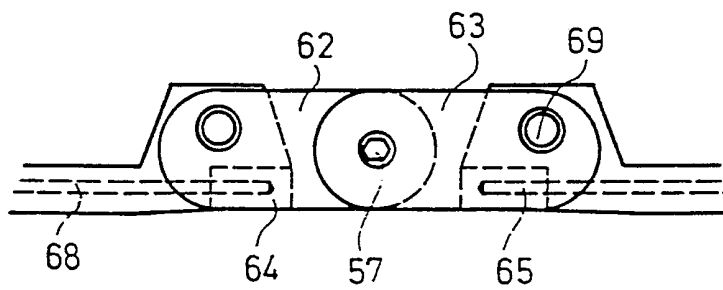


Fig. 7



DESCRIPTIONTOOTHED BELT END CONNECTING DEVICE

This invention relates to a toothed belt end connecting device, serving in use to connect together the ends of a toothed belt in which longitudinal reinforcing cords are incorporated.

German Published Patent Application ("Offenlegungsschrift") No. DE-OS 23 22 343 discloses a connection means for toothed belts. Here the ends of the toothed belt afford meshing tongues. Teeth of the tongues have bores positioned directly above the reinforcing cords, and transversely to the toothed belt. In the connection area, the two ends of the toothed belt are connected by means of pins inserted in said bores. These pins are held in the bores of the ends of the toothed belt by (e.g.) adopting a pin diameter larger than the bore diameter. In the connection area, one tooth is thus formed of one or more tooth segments of the two ends of the toothed belt. This has especially disadvantageous effects, however, when the toothed belt is subjected to tensile or compressive stress, insofar as this stress entails dimensional changes in the toothed belt, and, as a result thereof, the shape of a tooth is liable to deviate from its original shape, in the connection area. Moreover, the reinforcing cords acting as tension means are interrupted at the interface between the belt ends.

It is therefore an object of the present invention to provide a device which makes possible a secure connection between the ends of a toothed belt, and which excludes the disadvantages just mentioned.

According to the present invention, there is provided a toothed belt end connecting device, serving in use to connect together the ends of a toothed belt in which longitudinal reinforcing cords are incorporated, which device comprises at least two interconnecting lock parts, as herein defined, said lock parts being provided with bores into each of which is passed a bare end of a reinforcing cord, and the bare ends of said reinforcing cords being secured in the respective lock parts.

The "lock parts" referred to in the present description and claims are connective components which in use constitute an interconnecting assembly locking together the ends of the relevant toothed belt.

This arrangement makes possible a direct transmission of force from the reinforcing cords of one end of a toothed belt, via the lock parts, to the reinforcing cords of the other end of the toothed belt. The ends of the toothed belt here are subjected to reduced stresses in the tooth areas, and a particularly useful transmission of force, for given dimensions of the toothed belt, is achieved. Further advantages of a toothed belt end connecting device according to the invention are to be seen in the facts that an endless toothed belt can be shortened as desired, and that it can be lengthened as desired by the use of an additional toothed belt and of two connecting devices. This is of particular value if (e.g.) there is to be a change of the transmission ratio, or a re-dimensioning of a machine. Furthermore, it is possible to repair a toothed belt by detaching the damaged part of it and substituting a new part therefor, making use of two end connecting devices.

In a particularly advantageous device in accordance with the invention, the ends of the toothed belt, in addition to having their reinforcing cord ends secured in the respective lock parts, are connected with the respective lock parts by means of respective pins disposed transversely to the toothed belt, said pins being accommodated each within a respective end tooth of the belt. In this construction, the connection between the reinforcing cords and the lock parts is relieved, and bending of the ends of the reinforcing cords is prevented.

Moreover, the lock parts may be interconnected by means of one or more fitting screws. This feature is of assistance for the sake of quickly mounting and dismounting the toothed belt.

The invention is illustrated in the accompanying diagrammatic drawings, in which:

Figure 1 is a side view of a toothed belt end connecting device according to the invention,

Figure 2 is a top view of the device of Figure 1,

Figure 3 is a side view of a modification of the device of Figure 1,

Figure 4 is a top view of the device of Figure 3,

Figure 5 is a side view of a modification of the device of Figure 3,

Figure 6 is a top view of the device of Figure 5, and

Figure 7 is a side view of a further modification of the device of Figure 3.

Figures 1 and 2 show a device according to the invention for connecting toothed belts 1 having longitudinal reinforcing cords 2. The device performs this function by means of two lock parts, 3 and 4, said lock parts comprising, as shown, webs

5 and 6 and legs 7, 8 and 9. The webs 5 and 6 have bores 10 whose number and alignment are appropriate to the number and alignment of the reinforcing cords 2. From the belt end faces onwards, i.e. from the end faces beyond the last teeth 12 and 13 of the toothed belt 1 onwards, the ends of the reinforcing cords 2 are laid bare, said ends being passed into the bores 10 of the webs 5 and 6 and being securely fastened in the respective lock parts 3 or 4.

Preferably this secure fastening is achieved by a technique equivalent to caulking; however, glued or welded connections are also contemplated. The legs 7 and 8 which together with the web 5 form a U-shape, as shown in Figure 2, adjoin the web 5 of the lock part 3. The web 6 of the lock part 4 has an extension in the form of a leg 9, said web and said leg together forming a T. In the exemplifying construction shown in Figure 1, each of the legs 7 and 8 of the lock part 3 is designed as a tooth, and the leg 9 as a circular arc. As shown in Figure 2, the legs 7, 8 and 9 are provided with through bores 14, 15 and 16, respectively, which are disposed approximately in the middle of the tooth formation and parallel to the breadth of the toothed belt. The legs 7, 8 and 9 of the lock parts 3 and 4 mesh in such a manner that the through bores 14, 15 and 16 have a common centre line so that one can pass, through said bores, a bolt, a pin or a fitting screw 17 connecting the lock parts 3 and 4. When a fitting screw 17 is employed as a connecting element, one of the bores 14 and 15 can be screw-threaded so that the fitting screw 17 can be fastened therein, the screw 17 being so dimensioned that it projects only slightly from the bores 14 and 15. Preferably, the

fitting screw 17 is provided with a hexagonal socket 18.

Figures 3 and 4 show a second embodiment of the invention, for connecting toothed belts 21 having longitudinal reinforcing cords 22, by means of two lock parts 23 and 24. The ends of the toothed belt 21, whose breadth is reduced in a single step, as shown in Figure 4, are provided with bores 26 passing through the last teeth 25, and are sloped on the undersides so that they draw level with the lock parts 23 and 24. Beyond the last teeth 25, the ends of the reinforcing cords 22 are laid bare. As shown in Figure 4, the lock parts 23 and 24 comprise legs 27 and 28 which lie in recesses provided at the ends of the toothed belt 21 and which have bores 29 passing through them. Webs 30 and 31 having bores 32 adjoin the legs 27 and 28, the number and alignment of said bores being appropriate to the number and alignment of the reinforcing cords 22. The ends of the toothed belt 21 are securely fastened, e.g. by the above-mentioned caulking technique, in the lock parts 23 and 24, by means of the reinforcing cords 22, the latter being passed into the bores 32. In addition, the webs 30 and 31 are connected with the ends of the toothed belt 21 by means of pins 33 which are securely fastened in the bores 26 and 29, in order to prevent the ends of the reinforcing cords 22 from bending. From the web 30 of the lock part 23 there extends a leg 34, and correspondingly there are two legs 35 on the web 31 of the lock part 24, so that the leg 34 intervenes between the legs 35. By means of connecting elements, as described with respect to Figures 1 and 2, the two lock parts 23 and 24 are connected together; thus they may for example

be connected together by inserting a fitting screw 38 in the bores 36 and 37 provided in the legs 35 and 34. In this embodiment of the invention, the lock parts 23 and 24 represent one complete tooth gap, so that the gearwheels on which the toothed belt 21 runs have to be provided, at the position at which the respective lock part 23 or 24 is to occur, with a tooth gap having the length of two normal-sized tooth gaps.

A third embodiment of the invention is shown in Figures 5 and 6. In this there is a tooth 42 at each end of the toothed belt, and reinforcing cords 43 are laid bare approximately from the middle of the respective tooth onward. The ends of the toothed belt are connected with a respective lock part 44 or 45, as in the case of Figures 3 and 4. A first connection is made between the reinforcing cords 43 and bores 46 provided in the webs 47 and 48 of the lock parts 44 and 45 respectively. A second connection is made between bores 49 provided in the tapered teeth 42 and bores 52 provided in the legs 50 and 51 of the lock parts 44 and 45 respectively; this second connection is made by means of pins 53. As in the cases represented in Figures 1 to 4, the two lock parts 44 and 45 are connected via the legs 54, 55 and 56 by means of fitting screws 57 (Figure 6). The embodiment of Figures 5 and 6 differs from that of Figures 3 and 4 in that the legs 54, 55 and 56 are positioned below the level of the tooth gap, i.e. in the area of the tooth root; this means that the gearwheels on which the toothed belt 41 runs do not have to be of a special form.

A fourth embodiment of the invention is shown in Figure 7. Here the ends of the toothed belt resemble the ends of the toothed belt of Figure 5. The lock

parts 62 and 63 each comprise a web 64 having bores 65 and two oval legs. As in the embodiments of Figures 3 and 5, the ends of the toothed belt are securely fastened to the lock parts 62 and 63 by means of reinforcing cords 68 which are passed into bores 65. The second connection between the toothed belt and the lock parts 62 and 63 is achieved by providing, in the last teeth of the toothed belt, bores 69 in which pins similar to the pins 53 are inserted.

It will be understood that the invention has been described above purely by way of example, and that various modifications of detail can be made within the ambit of the invention.

LIST OF PARTS

1	toothed belt	34	leg
2	reinforcing cord	35	leg
3	lock part	36	bore
4	lock part	37	bore
5	web	38	fitting screw
6	web	39	
7	leg	40	
8	leg	41	
9	leg	42	tooth
10	bore	43	reinforcing cord
11	interface	44	lock part
12	tooth	45	lock part
13	tooth	46	bore
14	through bore	47	web
15	through bore	48	web
16	through bore	49	bore
17	fitting screw	50	leg
18	hexagonal socket	51	leg
19		52	bore
20		53	pin
21	toothed belt	54	leg
22	reinforcing cord	55	leg
23	lock part	56	leg
24	lock part	57	fitting screw
25	tooth	58	
26	through bore	59	
27	leg	60	
28	leg	61	
29	through bore	62	lock part
30	web	63	lock part
31	web	64	web
32	bore	65	bore
33	pin	66	
		67	
		68	reinforcing cord
		69	bore

CLAIMS

1. A toothed belt end connecting device, serving in use to connect together the ends of a toothed belt in which longitudinal reinforcing cords are incorporated, which device comprises at least two interconnecting lock parts, as herein defined, said lock parts being provided with bores into each of which is passed a bare end of a reinforcing cord, and the bare ends of said reinforcing cords being secured in the respective lock parts.

2. A device according to claim 1, wherein two lock parts are employed, the point of interconnection of these two lock parts occurs in the region of a tooth of the toothed belt for which the device is designed, and legs of said lock parts are connected together by means of a fitting screw passed through transverse bores in these legs.

3. A device according to claim 1, wherein the ends of the toothed belt, in addition to having their reinforcing cord ends secured in the respective lock parts, are connected with the respective lock parts by means of respective pins disposed transversely to the toothed belt, said pins being accommodated each within a respective end tooth of the belt.

4. A device according to claim 3, wherein the dimension, in the lengthwise direction of the toothed belt, of the interconnected lock parts substantially corresponds to a length of the toothed belt in which two consecutive teeth thereof are included, and the lock parts have a point of interconnection which occurs in a position intermediate between two consecutive tooth positions of the toothed belt.

5. A device according to claim 1, 3 or 4, wherein the lock parts are interconnected by means of one or more fitting screws.

6. A device according to claim 1, substantially as described with reference to any Figure or Figures of the accompanying drawings.