

TRAILING CABLE DEVICE

The invention concerns a trailing cable device in which several cable carriages are guided along a platform girder. At least one cable is guided over the cable
5 carriages with spring mounted train connections extending between the cable carriages. Each train connection has at least one series arrangement of an essentially inelastic traction mechanism and an elastic traction mechanism.

Such a device is known from DE 26 28 112 C2. In such a trailing cable device system, starting from a terminal clamp, energy, for example, electrical power is
10 supplied to a consumer via cables which are supported by cable carriages. Traction cables, which are designed shorter than the lengths of cable in between, are arranged between the individual cable carriages in order to ensure that line breakages are avoided. These traction cables are elastomeric and depending on the layout can have various spring characteristics in the trailing cable system. In addition, each cable
15 carriage can have a damper for the traction cable, the damper absorbing energy during sudden loading and unloading, so as to avoid too large a stress on the traction cable. Inelastic steel cables which naturally sag in the unloaded condition of the traction cable, are arranged parallel to these traction cables in order to sufficiently limit the full extension of the elastomeric traction cables, so that they cannot jerk.

A disadvantage with this trailing cable device is that very long rubber cables
20 and even longer steel cables must be used. Therefore, in the unstressed condition of the rubber cables, three different bights of cable sag between each two cable carriages, namely the bight of the rubber cable, the bight of the actual power line and the bight of the steel cable. There is a danger of these bights becoming entangled and tied up with
25 each other. As well, the additional rubber cables cannot be retrofitted into existing installations, since the existing cable carriages lack appropriate retainers for the rubber cables.

German Patent Specification No. DE 32 36 992 A1 describes a trailing cable device, in which the traction device between the cable carriage is designed in the form
30 of chains, whereby each chain contains a spring or damping element, which consists of a curved flexible socket through which one part of the chain runs. This device has the disadvantage that the flexibility of the rubber socket is not high enough for many requirements and an almost rigid connection is the result.

Therefore the aim of the present invention is to further develop a trailing cable
35 device of that kind so that it operates largely trouble-free and also can be retrofitted in old installations.

In accordance with the present invention there is disclosed a trailing cable device with several cable carriages (1, 1', 11) guided along a platform girder (2), at least one cable (3, 3') being guided over the cable carriages, and spring-mounted train

connections (4, 4') extending between the cable carriages, said trailing cable device having each train connection (4, 4') with at least one series arrangement of an essentially inelastic traction mechanism (5, 5') and an elastic traction mechanism (6), characterised in that in the or each series arrangement has an inelastic connection (7), the length of which exceeds the length of the unstressed elastic traction mechanism (6) and the maximum extension of which is predetermined, the inelastic connection (7) being arranged in parallel with the elastic traction mechanism (6), and wherein the inelastic connection (7), together with the inelastic traction mechanism (5, 5'), is designed as a chain or cable one portion of which is connected with one end of the elastic traction mechanism (6).

A method of damping interconnected cable carriages is also disclosed.

One embodiment of the present invention is further described below with reference to the accompanying drawings, in which:

Fig. 1 is a side view of a section of the trailing cable device of the preferred embodiment with two cable carriages with one of these cable carriages illustrated in two different positions;

Fig. 2 is an enlarged representation of the left hand portion of Fig. 1; and

Fig. 3 is a plan view of the portion illustrated in Fig. 2.

In the trailing cable device diagrammatically represented in Fig. 1, several cable carriages 1, 1' and 11 run on a platform girder 2. Two cable carriages 1 and 11 are shown, while one of the cable carriages 1 is shown in two positions 1 and 1' respectively. All dotted reference lines apply to Position 1' of the first cable carriage 1. Guidance of the cable carriages 1 and 11 is carried out via pairs of rollers known in the art, which run, for example, in standard beams used as the platform girder 2. Each cable carriage 1 and 11 has a retainer 8 (Fig. 2) for at least one cable 3 which stretches between the two cable carriages 1 and 11 and to additional cable carriages (not shown). Electrical power is fed to the cable 3 at one end of the platform girder 2.

A spring-mounted train connection 4 parallel to the cable 3 stretches between the two cable carriages 1 and 11 as well as all additional cable carriages. This train connection 4 consists essentially of an inelastic traction mechanism 5, for example a chain or steel cable, and an elastic traction mechanism 6, for example a rubber cable, which is arranged in series with the inelastic traction mechanism 5. Alternatively the rubber cable 6 can be replaced by a helical spring or can include an interior helical spring extending along the cable 6 and located within a rubber sleeve.

One form of the series arrangement of elastic traction mechanism 6 and inelastic traction mechanism 5 is best shown in Figs. 2 and 3 which respectively show a part of Fig. 1 in two different views. In this form, a metal chain 5 is used as an inelastic traction mechanism, which extends to the next cable carriage 11 (Fig. 1). In

the area of the cable carriage 1, the chain 5 runs to a bolt arrangement 9, to which it is attached, with the bolt of the bolt arrangement 9 being fed through a chain link and screwed tight. As best seen in Fig. 3, connections extend from the bolt arrangement 9 to the cable carriage 1, namely to join the extension of the chain 5 which is used as an inelastic connection 7 and which serves as an inelastic traction mechanisms. All three connections are firmly coupled to the cable carriage 1 by a bolt arrangement 10. The two elastic rubber cables 6 run symmetrically one on each side of the inelastic connection 7.

The unstressed condition of the train connection 4 is best shown in Fig. 2. The elastic rubber cable 6 is unstressed in this situation, and the inelastic chain 7 sags down. The train connection 4 assumes this condition with stationary or retarded cable carriages or when the cable carriages are pushed back. This case is shown in dotted lines in Fig. 1. Both the cable 3 and the train connection 4 sag down in the form of cable bights 3' and train connection bights 4' respectively.

The trailing cable device operates as follows:

As soon as the cable carriages 1, 11 etc are pulled apart from each other, each train connection 4 changes from the situation shown in dotted lines in Fig. 1 to the situation shown in solid lines, and is thus slowly tensioned. As soon as a certain force, which is dependent on the spring characteristic of the rubber cable 6, is exceeded in the train connection 4, the rubber cable 6 stretches, which cushions the jolt of the drive on the following cable carriage 11. Should the rubber cable 6 be very severely stretched during high acceleration, the elongation is limited by the length of the inelastic connection 7 arranged parallel to it. This situation is not shown in the drawings but will be clear to those skilled in the art.

The trailing cable device according to the invention has, with regard to known systems, the advantage that it also can be retrofitted in existing installations and depending on damping requirements of the train connection 4, one or more banks comprising elastic and inelastic traction mechanisms can be provided. A further advantage of the device exists, in that fewer bights sag down, as a result of which fouling and tangling are largely avoided.



CLAIMS

The claims defining the invention are as follows:

1. A trailing cable device with several cable carriages (1, 1', 11) guided
5 along a platform girder (2), at least one cable (3, 3') being guided over the cable
carriages, and spring-mounted train connections (4, 4') extending between the cable
carriages, said trailing cable device having each train connection (4, 4') with at least
one series arrangement of an essentially inelastic traction mechanism (5, 5') and an
elastic traction mechanism (6), characterised in that in the or each series arrangement
10 has an inelastic connection (7), the length of which exceeds the length of the unstressed
elastic traction mechanism (6) and the maximum extension of which is predetermined,
the inelastic connection (7) being arranged in parallel with the elastic traction
mechanism (6), and wherein the inelastic connection (7), together with the inelastic
traction mechanism (5, 5'), is designed as a chain or cable one portion of which is
15 connected with one end of the elastic traction mechanism (6).
2. A trailing cable device according to Claim 1, characterised in that the
elastic traction mechanism (6) includes at least one elastomeric cable.
3. A trailing cable device according to Claim 2, characterised in that the
elastic traction device (6) includes two elastomeric cables arranged in parallel.
- 20 4. A trailing cable device according to Claim 1 or 2 characterised in that
the elastomeric cables are fabricated from rubber.
5. A trailing cable device according to any one of the previous claims,
characterised in that the elastic traction device (6) includes a helical spring.
6. A trailing cable device according to any one of the previous claims,
25 characterised in that only one bank per train connection (4, 4') is provided.
7. A trailing cable device substantially as herein described with reference
to the accompanying drawings.
8. A method of damping interconnected cable carriages of a trailing cable
device, said method being substantially as herein described with reference to the
30 accompanying drawings.

ABSTRACT
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The present invention discloses a trailing cable device in which several cable
5 carriages (1, 11) are guided along a platform girder (2). At least one cable (3) is
guided over the cable carriages and spring mounted train connections (4) extend
between the cable carriages (1, 11). Each train connection (4) has at least one series
arrangement of an essentially inelastic traction mechanism (5) and an elastic traction
mechanism (6). The or each series arrangement also has an inelastic connection (7) the
10 length of which exceeds the length of the unstretched elastic traction member (6). The
maximum extension of the inelastic connection (7) is fixed or predetermined and the
inelastic connection (7) is arranged in parallel with the elastic traction mechanism (6).
Both the inelastic connection (7) and the inelastic traction mechanism (5) are arranged
as a chain or cable, one portion of which is connected with one end of the elastic
15 traction mechanism (6).

Fig. 2

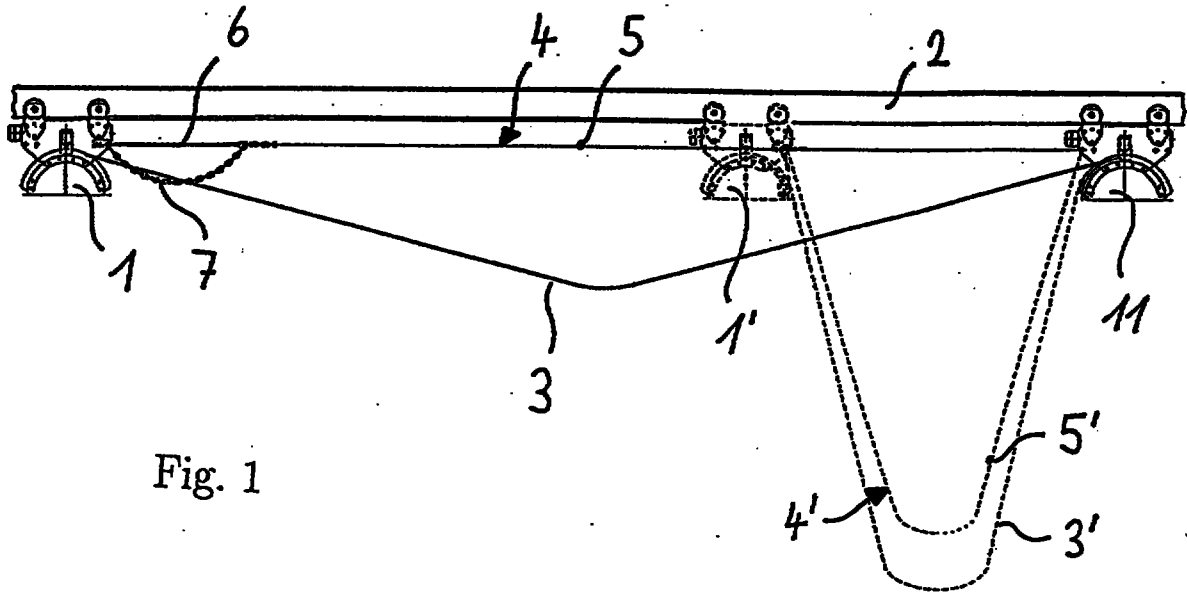


Fig. 1

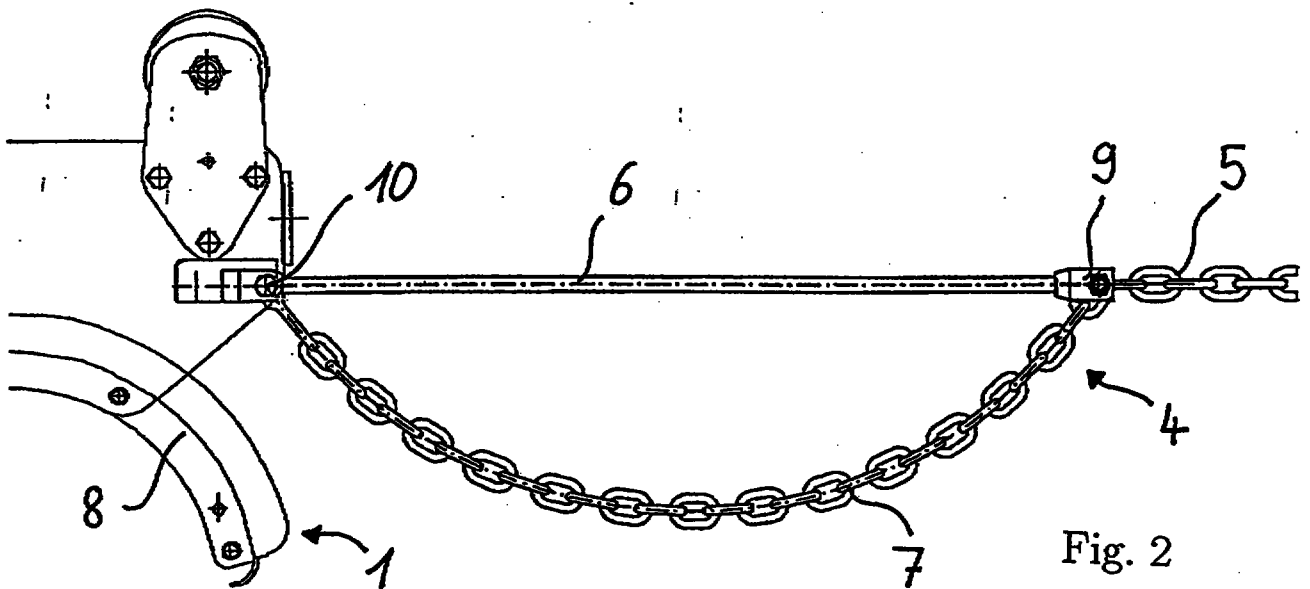


Fig. 2

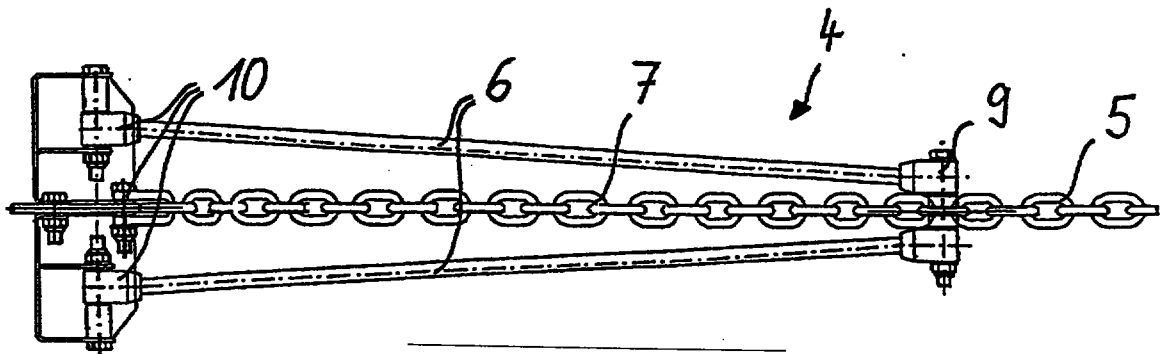


Fig. 3



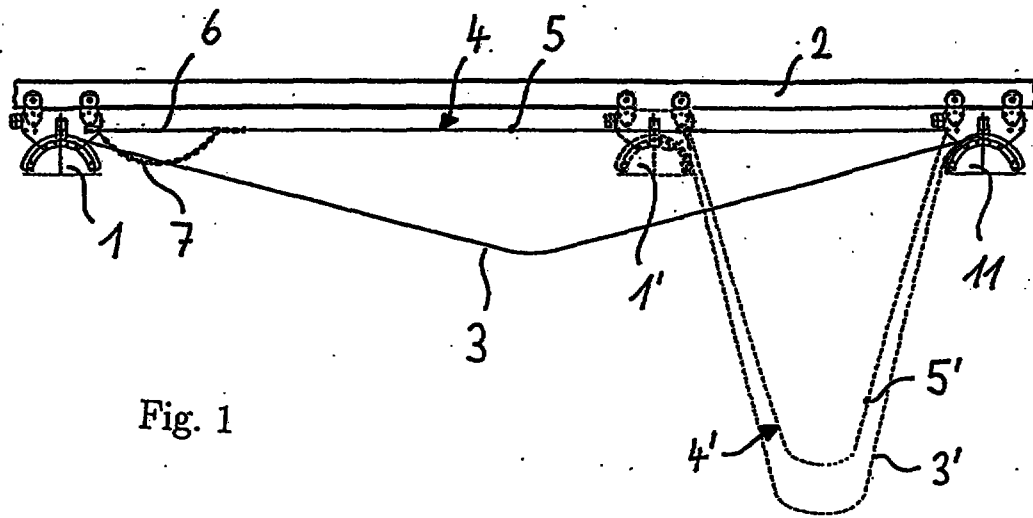


Fig. 1

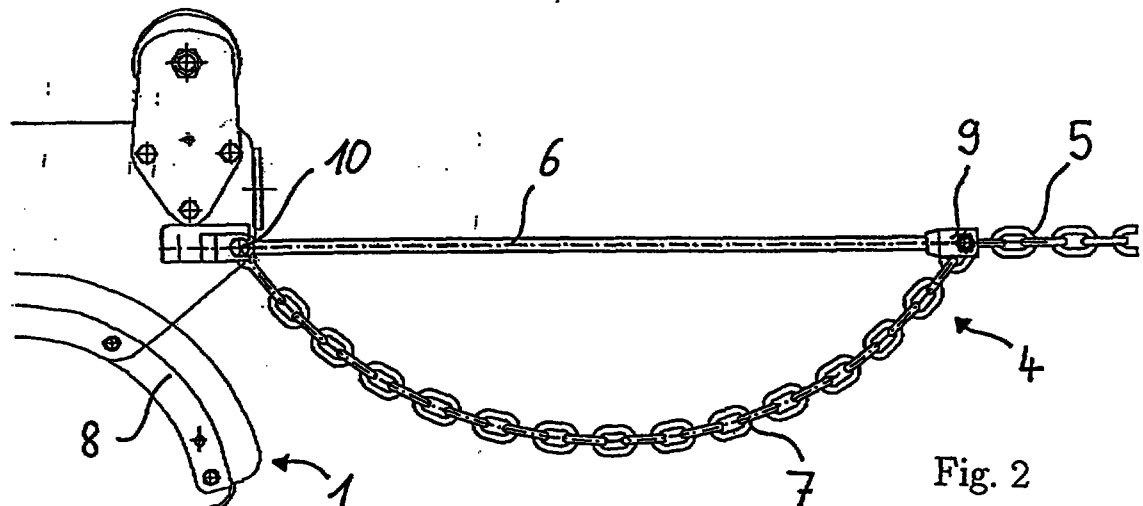


Fig. 2

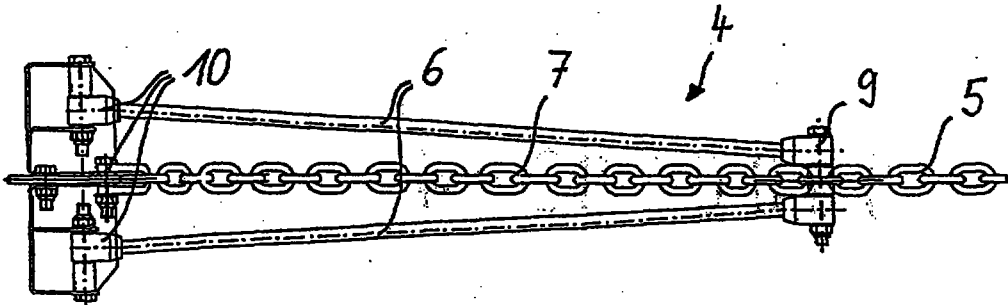


Fig. 3