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[54] **HAULAGE GRIP FOR RELEASABLY GRIPPING A TRACTION CABLE**

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[51] **Int. Cl.** **B61b 7/20**

[58] **Field of Search** 104/202, 204, 205, 206, 104/209, 217; 188/65.1, 67, 166; 267/57, 154; 269/225, 93, 94, 238, 254, 31; 81/302, 346, 350, 351

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[57] **ABSTRACT**

A haulage grip for releasably gripping a traction cable by which a vehicle provided with that grip is moved. The haulage grip comprises two pivotally mounted levers each lever being biased by a torsion bar into a closing position for gripping the cable and each lever being provided with a roller to cooperate with stationary cam rails which control the opening and closing of the grip. Toothed segments connect mechanically the two levers which pivot together symmetrically.

4 Claims, 4 Drawing Figures

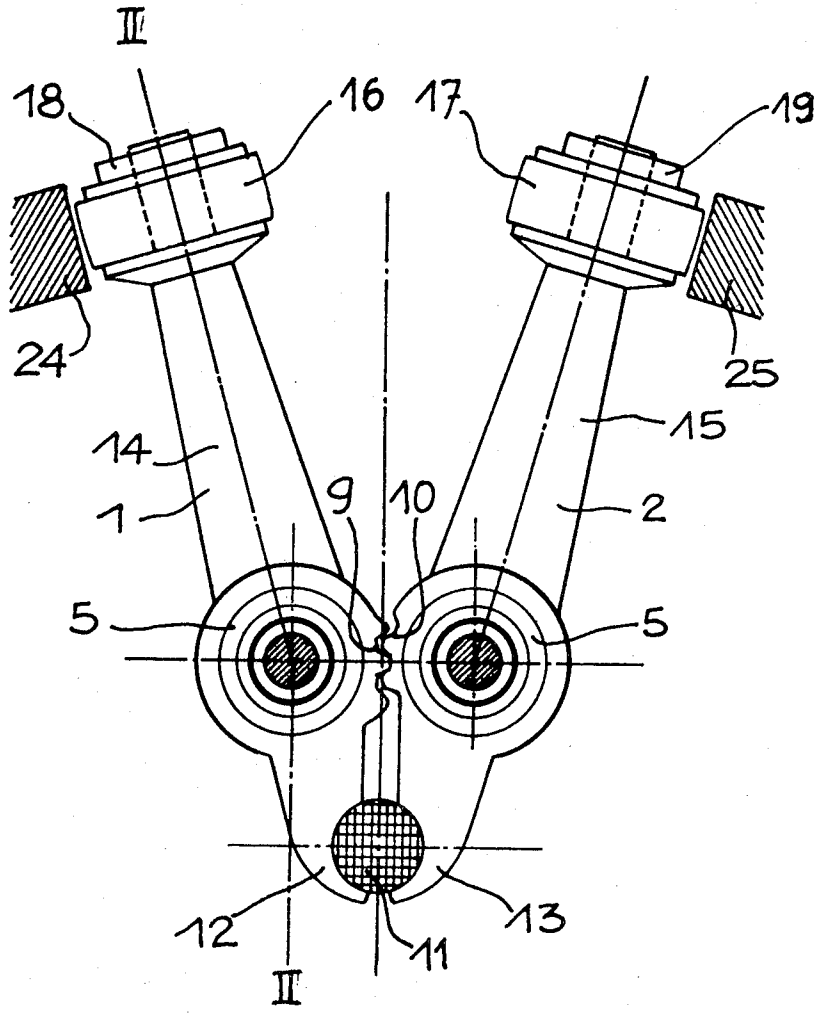
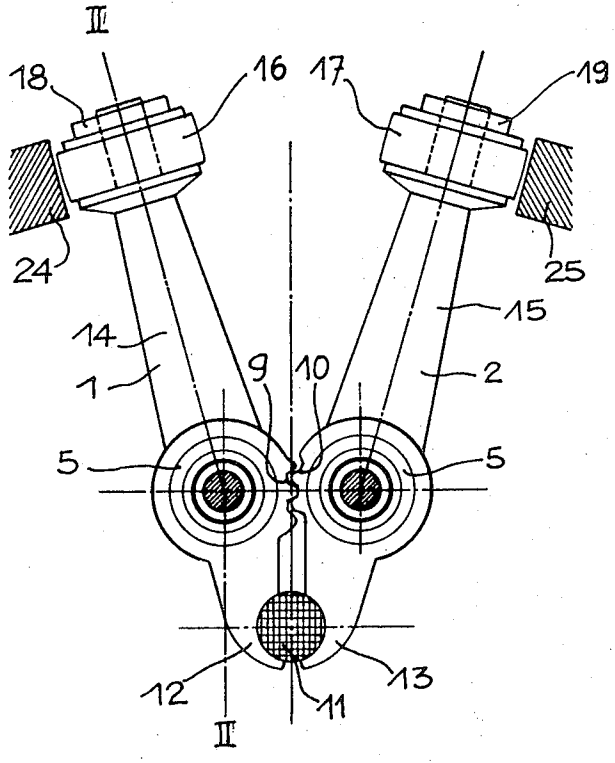


Fig. 1



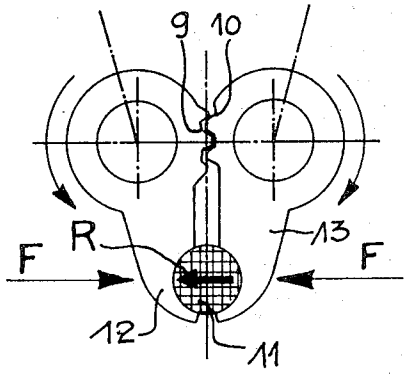
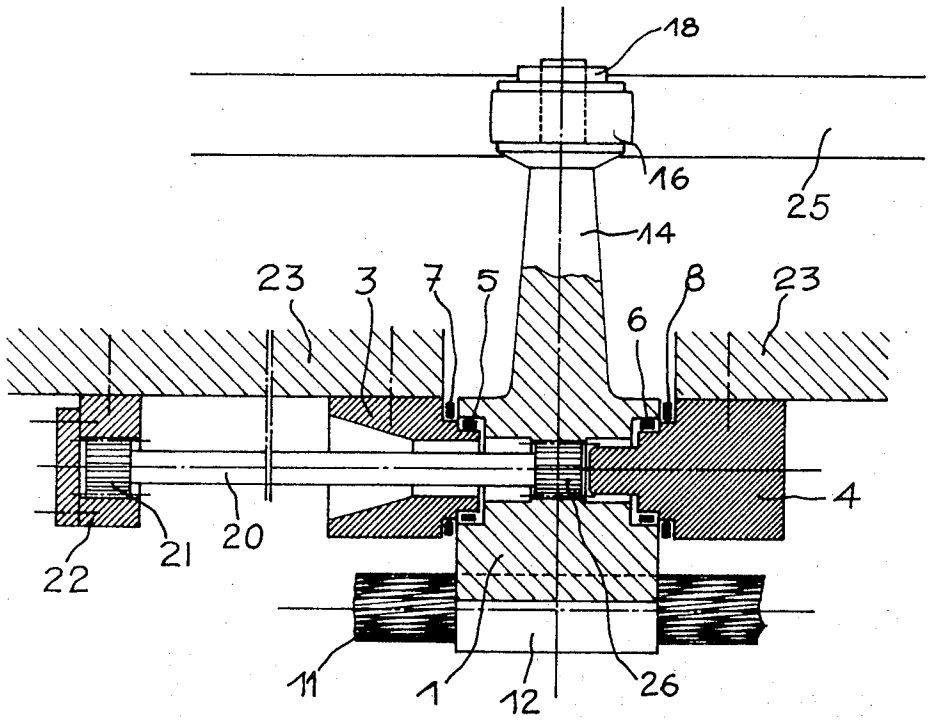


Fig. 2

Fig. 3



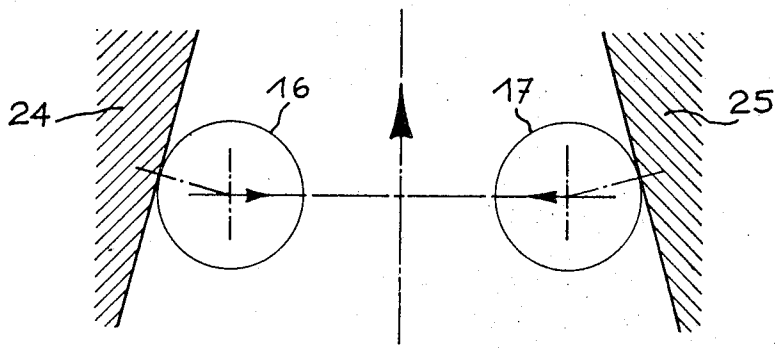


Fig. 4

HAULAGE GRIP FOR RELEASABLY GRIPPING A TRACTION CABLE

The invention relates to a detachable grip for coupling a vehicle capable of moving along a track extending over a predetermined trajectory, to a haulage cable moving continuously at a high speed, one side of which is parallel with said track, comprising a coupling clamp with two mobile levers held elastically in the closed position, and equipped with jaws for gripping the cable.

Grips of the kind indicated are known and are used in particular in installations known as gondola lifts, such grips permit the coupling and uncoupling of the gondolas on and from an overhead cable moving continuously at a relatively low speed of 2 or 3.5 meters per second for example.

The grips or clamps known are of complicated design and have great inertia in operation which necessitates a considerable time for their functioning. Thus there is required coupling and uncoupling stations which are longer in the degree in which the speed of the cable and the associated gondolas is high if incomplete opening of the grips or excessive stresses on the control equipment are to be avoided.

A need was felt for the availability of detachable grips capable of coupling loads on to a traction cable moving at a high speed, for example, greater than 10 meters per second. The load hauled may be a vehicle moving on a track, in particular a rail installed on the ground, or on towers, or on an overhead cable track.

An object of the present invention is to remedy the above disadvantages and to permit the realization of a lightweight grip with a low operating inertia making possible rapid coupling and uncoupling of the grip on a cable moving at high speed.

The detachable grip according to the invention comprises two levers disposed symmetrically in relation to a plane containing the cable in an active position and each lever is fitted so as to pivot on a fixed spindle fixed on the vehicle. One arm of the levers carries the clamping jaw and the other a feeler capable of acting in conjunction with stationary guide rails installed along the track in order to control during the passage of the vehicle the opening and closing of the jaws. A mechanical linkage between the levers necessitates a symmetrical movement of these and the levers are advantageously interconnected at their articulation point by means of toothed segments.

Another object of the invention is to provide a grip with a low resistance to motion to effect gripping or releasing.

The mobile parts of the grip may be summarized as two pivoting levers the articulations of which are advantageously equipped with needle or ball bearings and thrusts in order to limit the resistance to motion. The symmetrical opening of the two levers permits the limiting of their travel and displacement for a predetermined opening of the grip.

Still another object of the invention is to provide a grip with biasing means of low inertia which limits the reaction exerted on the pivot pin of the lever. The clamping force exerted by the grip may be obtained by means of torsion bars coaxial with the articulations of the levers, which necessitate no system of transmission of stress influencing the inertia of the grip. The low inertia of the torsion bars and of the levers and the low friction resistance permit high speed of motion to open or close the grip, for instance in one-sixteenth sec.

A further object of the invention is to provide a grip adapted to be automatically opened or closed with entire safety, and adapted to withstand lateral traction.

The presence of two symmetrical rails or cams assures a double action avoiding assymmetrical stresses on the fixing spindles of the levers while palliating any possible failure in the transmission by toothed segments. In the case of a sinuous circuit, the transversal stress exerted by the cable on the inner lever on the curve is transmitted via the toothed segments to the outer lever, in such manner that the two torsion bars contribute to the clamping of the cable.

A constructional example illustrating the invention will now be particularly described with reference to the accompanying drawings wherein :

FIG. **1** is a profile view of the mechanism of a grip according to the invention, the support not being shown;

FIG. **2** is a detailed view of FIG. **1**, showing the clamping jaw;

FIG. **3** is a section along the dotted line III—III of FIG. **1**;

FIG. **4** is a plan-view of the mechanism of FIG. **1**, showing the operating rails.

On FIGS. **1** and **3** a grip in the form of tongs has two symmetrical levers **1** and **2** which are fitted, at an intermediate point, on pivots **3** and **4** which are parallel with the direction of travel and rigidly fixed to a vehicle of which only part **23** is shown in FIG. **3**. Pivots **3** and **4** are equipped with bearings **5** and **6**, and ball or needle thrusts **7** and **8** ensuring free rotation of the levers **1** and **2**. Each lever **1** and **2** is a simple lever one arm of which is in the form of a jaw **12** and **13**, and the other **14, 15** as an operating component carrying a wheel **16, 17**, held by a nut **18, 19** screwed on the end of arm **14, 15** which acts as the axle on which the wheel rotates. Jaws **12, 13** are face to face and are capable of clamping on to the quasi-totality of the circumference of the traction cable of which only a section is shown on the figures.

Cable **11** is driven by a drive terminal (not shown) and extends along the track, passing over support sheaves (not shown). Chassis **23** of the vehicle, hauled by cable **11**, can for example be equipped with rollers for running on a fixed or overhead track.

Levers **1** and **2** are provided at the level of their hubs and coaxially with their articulations with toothed segments **9, 10**, the teeth of which are meshed. A rotary movement of one of the levers implies a symmetrical movement of the other lever in the opposite direction and involves the separation or the approach of jaws **12, 13**, that is the opening or closing of the grip.

Pivot **3** is hollow to allow the passage of a torsion bar **20** coaxial with the articulation pivot, and one end **26** of which is housed in a housing provided in the body of lever **1, 2** and the other end **21** is a fixing block **22** integral with chassis **23**. Each lever **1, 2** is equipped with a torsion bar **20** so disposed as to exert a stress on jaws **12** and **13** in the direction in which they are clamped on cable **11**. A second torsion bar (not shown) could be fitted on the opposite side, in which case pivot **4** would also be hollow, should the clamping force be insufficient. The torsion bar could be made of telescoping tubular sections.

The housing of ends **21, 26** of the torsion bar **20** could be effected by means of splines (not shown) or

a similar method, to avoid any relative angular movement, and fixing block **22** is preferably provided with a system (not shown) for the initial tensioning of the bar.

In the operating zones **1, 2** of the grip, for coupling or uncoupling of the vehicle **23** on or off cable **11,** and at the level of wheels **16, 17** are installed operating rails **24** and **25** which extend along a section of the trajectory of the vehicle, so as to act on wheels **16** and **17** during the passage of the vehicle. Rails **24** and **25** are inclined, in relation to the direction of travel of the vehicle so as to impose an inward movement of wheels **16** and **17,** carried by arms **14** and **15** of the grip, in opposition to the elastic force of torsion bars **20,** this opening the jaws **12** and **13,** or inversely so as to permit the closing of the grip by the separation of wheels **16, 17** by the above-mentioned elastic force. The movement of rapprochement of jaws **12, 13** is limited by the meeting of the lower lips of jaws **12, 13** in the absence of cable **11** and the closing of the grip.

The device according to the invention functions in the following manner :

During travel, vehicle **23** is coupled to traction cable **11** by the grip which is integral with the vehicle. Jaws **12** and **13** of the grip clamp on to the cable with a force which is sufficient to avoid any slipping of the cable, and which is provided by torsion bars **20.** The connection furnished by toothed segments **9, 10,** balance the force P exerted by each jaw (see FIG. **2**). In the case of skew traction, due for example to a sinuous circuit, the force exerted by the cable on the grip presents an applied lateral component R, in the example illustrated in FIG. **2,** on jaw **12,** tending to move lever **1** towards the position in which the grip is open. The toothed segments **9, 10** involve a symmetrical moving of lever **2** and the two torsion bars **20** withstand such movings.

In a station wheels **16, 17** come into contact with converging rails **24, 25** (see FIG. **4**) which cause the pivoting of levers **1, 2** and the freeing of the cable **11.** Vehicle **23** uncoupled from cable **11** is of course braked or propelled on to sidings or on to a running track in some manner the grip being able to close once more after the freezing of the cable and outside the section equipped with rails **24, 25.** The coupling of vehicle **23** on moving cable **11** is accomplished by the opening of the grip by converging rails **24, 25** during the travel of vehicle **23** and after insertion of cable **11** between open jaws **12, 13,** for example by a guide wheel (not shown), closing of the grip during travel of the vehicle **23** over a section equipped with diverging rails. The speed of the vehicle must obviously be near that of the cable in order to avoid excessive wear of the parts coming into contact.

It should be noted that the symmetrical opening of the jaws makes it possible to limit the travel of the levers **1, 2** to half that of a grip with one mobile jaw, thus providing reduction of the time of manoeuvre and a diminution of the overtension in the torsion bars during the opening.

The direct transmission of operating forces to levers of low inertia and low resistance to motion allows the rapid operation essential for high speed travel. The mechanism is of remarkable simplicity and safety in operation.

What is claimed is:

1. A releasable grip for coupling a vehicle to a traction cable running continuously along a trajectory, comprising a pair of levers, each lever having one end in the form of a jaw and an opposite end provided with a means of operation, pivot means integral with the vehicle for each said lever and having pivot axes substantially parallel with the trajectory, each said lever being fitted at an intermediate point of said lever so as to pivot on one of said pivot means, at least one torsion bar extending over the length of one of said pivot means axes and having one end fixed to the vehicle and the other end rigidly fixed to one of said levers, mechanical means of connection between said levers to impose symmetrical and simultaneous pivoting of said levers on their pivot means, said levers being fitted face to face, so as to clamp, when in their normal position, said cable between said jaws under the elastic action of the torsion bar, stationary guide rails installed along said trajectory so fitted as to act on said means of operation of each lever during the passage of the vehicle, said guide rails and means of operation cooperating so as to pivot said levers to an open position against the action of the torsion bar in order to bring about the pivoting of said levers and the release of the cable.

2. A grip according to claim **1** wherein said pivot means of each lever includes at least one bearing and a ball thrust, said one bearing being hollow to permit the passage of said torsion bar therethrough.

3. A grip according to claim **1** wherein said mechanical means of connection comprises toothed segments integral with each of said levers and coaxial with said pivot means.

4. A grip according to claim **3** further comprising a second torsion bar extending over the length of the other of said pivot means axes and having one end fixed to the vehicle and the other end rigidly fixed to the other of said levers.

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