Jan. 7, 1936. C. BENDER 2,026,860

GRIP MECHANISM FOR CABLEWAYS

Filed June 14, 1933

Fig. 1.

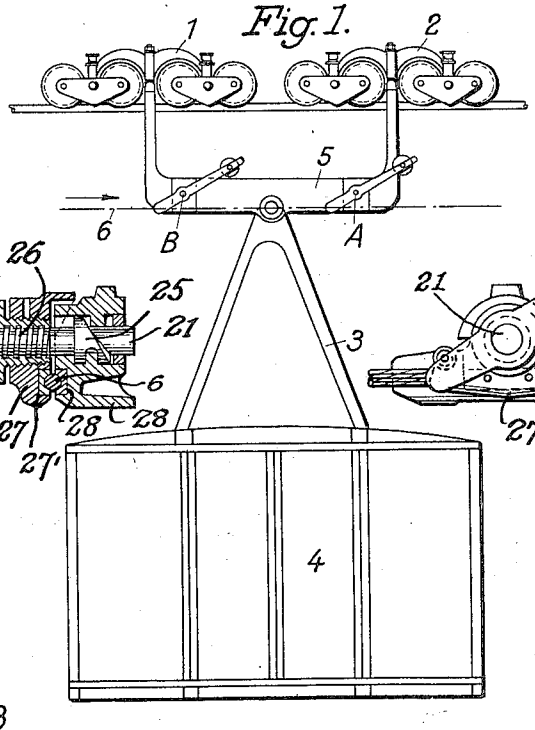
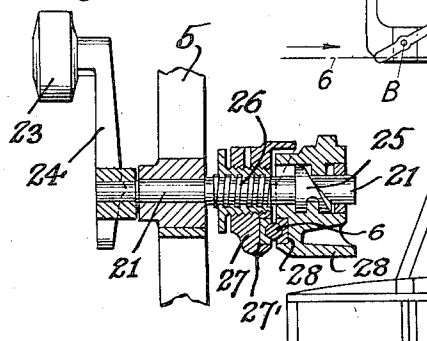


Fig. 5.



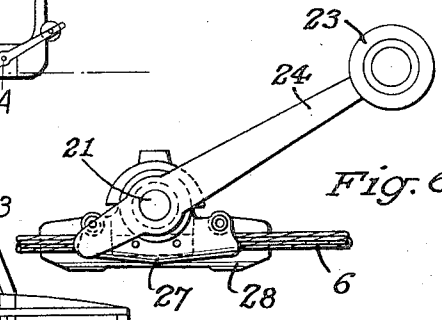


Fig. 6.

Fig. 3

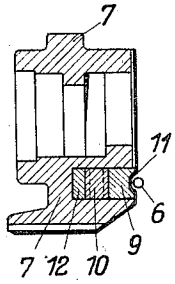


Fig. 2

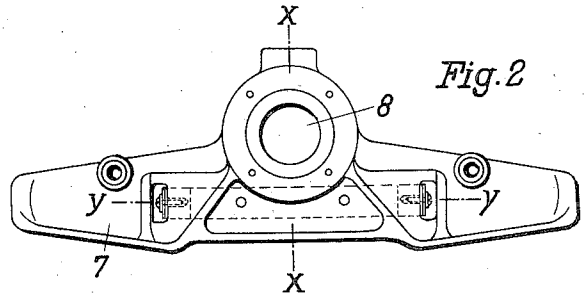
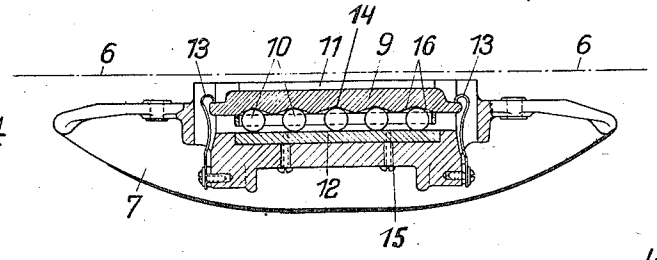


Fig. 4



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GRIP MECHANISM FOR CABLEWAYS

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3 Claims. (Cl. 104—202)

My invention relates to improvements in grip mechanism for cableways, the object thereof being to readily clamp the traction rope and avoid any slipping of the grip mechanism upon the traction rope.

For transmitting the traction force of the traction rope to the car or bucket in aerial ropeways, grip mechanisms for the pulling or traction rope are used, the jaws of which are drawn together and thereby pressed against the traction rope by means of a spindle. It is necessary to adjust the clamping force according to the greatest slope of the ropeway but it need not be so violent that the traction rope will be damaged in any way. On account of the specific weight of the traction rope and the weight of the car on the line, the tension of the traction rope is greater at the mountain station than at the valley station, and, on account of this fact, the diameter of the traction rope is a little smaller on the mountain than in the valley. It sometimes happens that a grip which clamps the traction rope tightly in the valley does not do so higher up and consequently slipping occurs, the rope here being thinner. In order to avoid this inconvenience the clamping force must be made stronger than would otherwise be necessary for the transmission of the traction force of the rope. But this causes another inconvenience because, by this excessive squeezing, the life of the traction rope is reduced. In order to avoid all these drawbacks it has been proposed to use, besides the usual rope grips, separate rope grips which are provided within their clamping jaws with additional clamping parts consisting of eccentric friction pawls, adjusting keys or wedges, toggle joint levers or the like, which work in both longitudinal directions. In the case of a slackening between grip and rope, that is in the case of slipping, the clamping force will be automatically increased by a rotating movement of the pawls or by shifting of the wedges in one of the longitudinal directions.

However, these known grips with additional clamping mechanism have the drawback that their correct working will only occur in the case when the clamping of the grip (the additional clamping mechanism of which is in the ineffectual or neutral inoperative middle position) ensues at the very moment when the speed of the car with its grip mechanism is exactly the same as the speed of the traction rope. This fact, which is decisive for the correct working of a grip mechanism with additional clamping mechanism without any slipping, is not accomplished by any of the known devices. In all of them differences occur between the velocity of the car and of the traction rope at the moment of clamping, which are unavoidable, so that the additional clamping will ensue already at the moment when any shifting movement occurs between the car and the rope, so that the clamping force is already consumed at the moment when it is really needed. This incorrect clamping causes great inconvenience also in the case when the car after passing a support, runs down upon a sloping part of the track cable, because the clamping device is compelled to shift out of one clamping position across the non-clamping central position into the second clamping position, whereby not only a heavy jerk is caused in the traction rope but also there is a danger of slipping.

The object of this invention is now to produce a variable grip mechanism which can accommodate itself automatically according to the variation in the section of the rope, and to warrant a correct and non-slipping coupling between the gripping device and the rope. This problem has been solved by me by combining two different traction rope grip devices which, taken separately, may already be known. I use one of the well known grip devices containing two clamping jaws movable against one another by a spindle and combine this grip by rigid connection with a grip device of special construction containing, besides the two usual clamping jaws, an additional clamping mechanism which comes into operation when a shifting ensues between the grip and the rope. These two combined and rigidly connected grip devices are in such a manner dependent on one another that the additional clamping mechanism can leave its ineffectual central position only in that case when, under the influence of the first grip device, the traction rope and the car have gained the same velocity. When the first grip device is clamping the traction rope, the second grip device with the additional clamping mechanism is at rest, and at the same time its additional clamping mechanism under all circumstances, is in its neutral central position. Thus I have attained by this combination that, as soon as any action ensues which raises the clamping force even by the slightest slipping, the effect is that the additional clamping mechanism will be moved automatically and put into operation with absolute reliability. Consequently the safety of the cableway especially for passenger service is considerably raised.

Two embodiments of the invention are illus-

trated by way of example in the accompanying drawing in which:

Fig. 1 is a side view of the whole arrangement, showing the combination and rigid connection of the two grip devices A and B.

Fig. 2 is a detached view of the grip device B with the additional clamping mechanism on an enlarged scale, seen from behind.

Fig. 3 shows a vertical section of the grip device B shown in Fig. 2 according to line x—x.

Fig. 4 shows a horizontal section of the same according to line y—y in Fig. 2.

Figs. 5 and 6 show a detached view of the usual grip device A of the vice type, Fig. 5 being a vertical section, Fig. 6 is a side view of it.

1 and 2 are the two pendant heads each consisting of four trolley sheaves which support the car 4 by means of the carrying yoke 3. 5 is an intermediate suspension tackle between the pendant heads 1 and 2 and the carrying yoke 3. This suspension tackle 5 also bears the two grip devices A and B which both continually clamp the endless traction rope 6 in the direction of the arrow. The first rope grip device A, being the foremost in the circulating direction, is of the usual construction. The second or back clamping device B is provided with an additional clamping mechanism of special construction acting in both directions.

The first grip device A, illustrated on an enlarged scale in Figs. 5 and 6, is of usual construction. It contains a spindle 21 rotatably mounted within the forepart of the suspension tackle 5 and this spindle carries at its one end an oscillating lever 24 provided at its upper end with a balance weight in the form of a roller 23. At its other end the spindle 21 is provided with a right-handed single screw thread 25 of a large pitch surrounded by and gearing with the back part of the clamping jaw 28. At its middle part the spindle 21 is provided with a left-handed fine pitch thread 26 surrounded by and gearing with the clamping jaw 27. When the whole device is in motion, the roller 23 strikes against a coupling point, the lever 24 is moved thereby rotating the spindle 21 and with it the two clamping jaws 27 and 28, so that these are pressed tightly against and clamp the traction rope 6. The right-handed screw 25, on account of its having only one screw thread and gearing with the jaw 28, causes this jaw to grip the rope 6 very rapidly at the very moment when the spindle 21 begins to turn. After the spindle 21 has turned a certain distance the jaw 28 does not move further in axial direction, the clamping jaw 27 being then moved alone by the fine pitch thread 26 gearing with it, and is pressed with great force against the rope 6. Linings 27′ and 28′ respectively are inserted within the clamping jaws 27 and 28. As soon as the roller 23 comes into contact with the stationary guiding rails, the spindle 21 is turned in the opposite direction, whereby the two clamping jaws 27 and 28 are opened, so that the rope 6 is uncoupled.

The rear grip device B is shown on an enlarged scale in Figures 2 to 4. One of its clamping jaws is provided with an additional clamping mechanism whereby it differs from the usual grip device A. The movement of its two clamping jaws is caused by the turning of the spindle 8 which is rotatably mounted at the other end or rear part of the suspension tackle 5 in almost the same manner as described with regard to the spindle 21. Only one jaw 7 of this device is shown, the counter-jaw, being of the usual simple construction, has been omitted in order that the special inner construction of this jaw may be seen. The counter-jaw is applied symmetrically to the axis of the traction rope 6—6, Fig. 4. 7 is the body of the jaw. By turning the spindle 8 it is moved transversely to the axis of the traction rope 6 simultaneously with the counter-jaw not shown, so that both jaws will be drawn together and moved toward or away from one another. 9 is a lining provided with a longitudinal groove 11 on the one side for the reception of the traction rope 6. On the other side it is provided with several small grooves 14 extending in a zigzag line for the reception of rollers 10. The lining 9 is supported upon the bottom plate 12, fastened by bolts 15 to the body of the jaw 7, by means of the rollers 10 rotating in the small grooves 14 and consequently the lining 9 is movable out of its ineffectual central position, in which it is shown, somewhat to the right or to the left. The springs 13 secure the lining 9 in the middle position shown and at the same time prevent it from falling out. If any slipping occurs, the lining 9, within the jaw 7 will be shifted in the one or in the other direction causing the rollers 10 to roll upon the flat bottom plate 12 and move up the oblique plane 16 of the small grooves 14, so that the lining 9 will approach the axis of the rope 6, that is, the clamping force is increased.

Instead of the wedge-shaped lining as shown eccentric friction pawls, toggle levers or the like may be used for the same purpose.

I claim:

1. A grip mechanism for cableways, comprising in combination two rigidly interconnected traction rope grip devices the first of said devices in the direction of travel of the cable comprising two clamping jaws and a spindle adapted to move said jaws against one another, and the second device comprising two clamping jaws, a spindle adapted to move said jaws against one another, one of said last mentioned jaws being recessed on its side adjacent the cable, a liner longitudinally movable in said recess, and means in said recess moving said liner towards the cable and gripping the same.

2. A grip mechanism for cableways, comprising in combination two rigidly interconnected traction rope grip devices the first of said devices in the direction of travel of the cable comprising two clamping jaws and a spindle adapted to move said jaws against one another, and the second device comprising two clamping jaws, a spindle adapted to move said jaws against one another, one of said last mentioned jaws being recessed on its side adjacent the cable, a liner longitudinally movable in said recess, said liner having inclined surfaces on its side remote from the cable, and said recessed jaw having a plane surface at the bottom of said recess, and a plurality of rollers between said liner and the bottom of the recess in said recessed jaw adapted to roll on said plane surface and said inclined surfaces to move said liner towards the cable.

3. A grip mechanism for cableways, comprising in combination two rigidly interconnected traction rope grip devices the first of said devices in the direction of travel of the cable comprising two clamping jaws and a spindle adapted to move said jaws against one another, and the second device comprising two clamping jaws, a spindle adapted to move said jaws against one another, one of said last mentioned jaws being recessed on its side adjacent the cable, a liner longitudinally movable in said recess, said liner

having inclined surfaces on its side remote from the cable, and said recessed jaw having a plane surface at the bottom of said recess, and a plurality of rollers between said liner and the bottom of the recess in said recessed jaw adapted to roll on said plane surface and said inclined surfaces to move said liner towards the cable, and two springs fixed on said recessed jaw and bearing one against each end of said liner tending to maintain said liner in its middle inoperative position.

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