June 24, 1952 H. F. H. SHIELDS 2,601,228

HOIST

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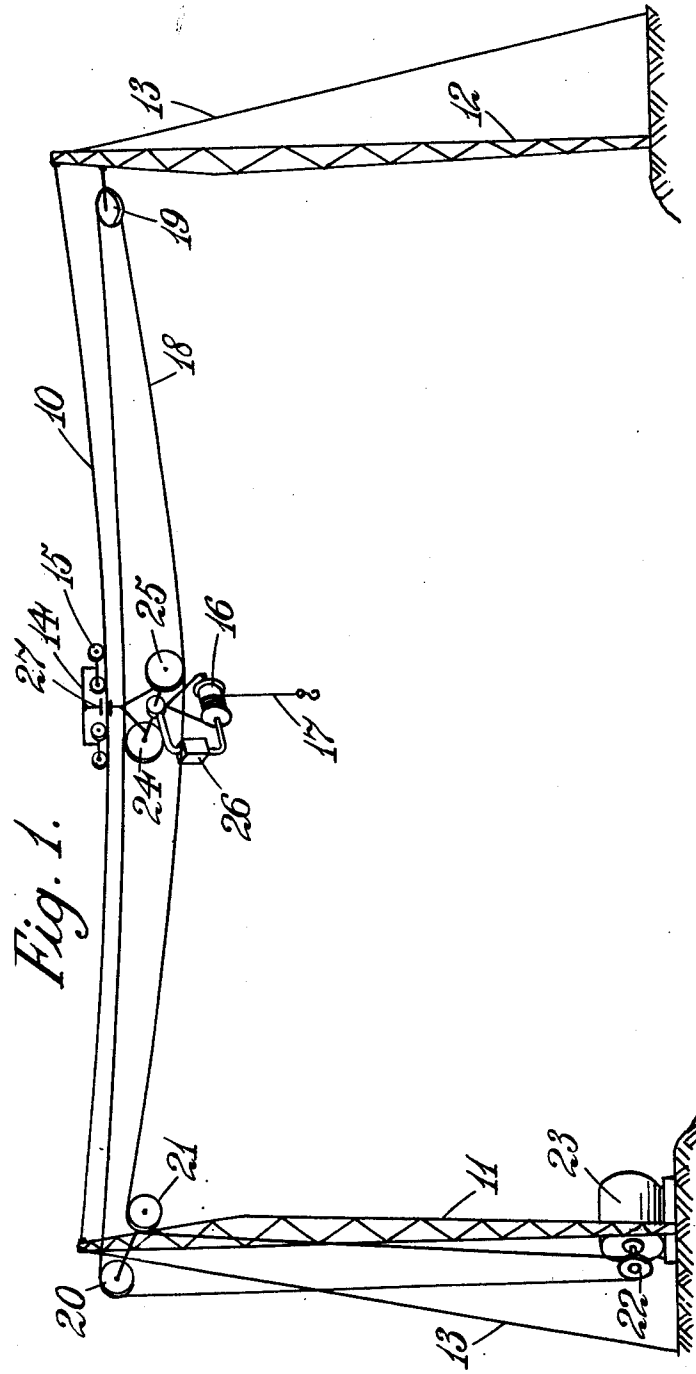


Fig. 1.

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Fig. 2.

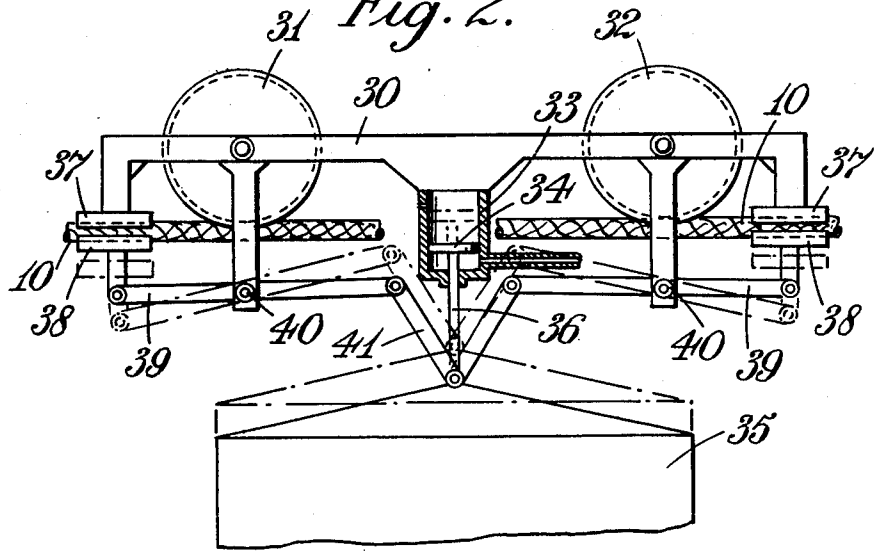
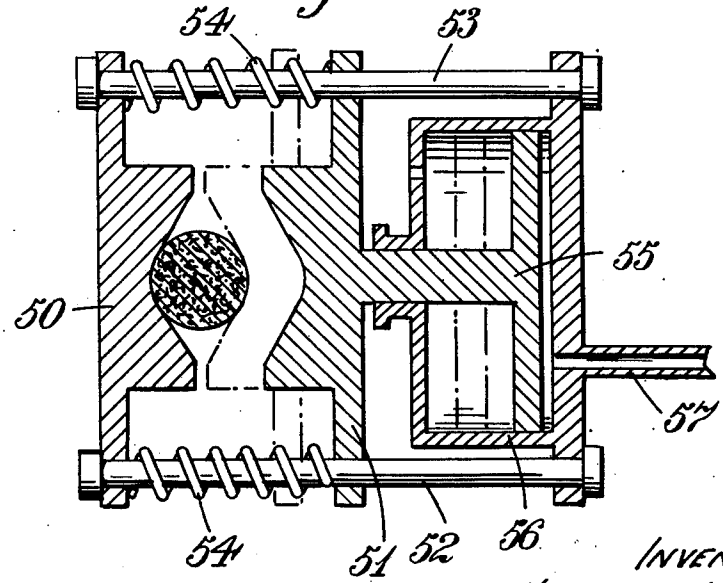


Fig. 3.



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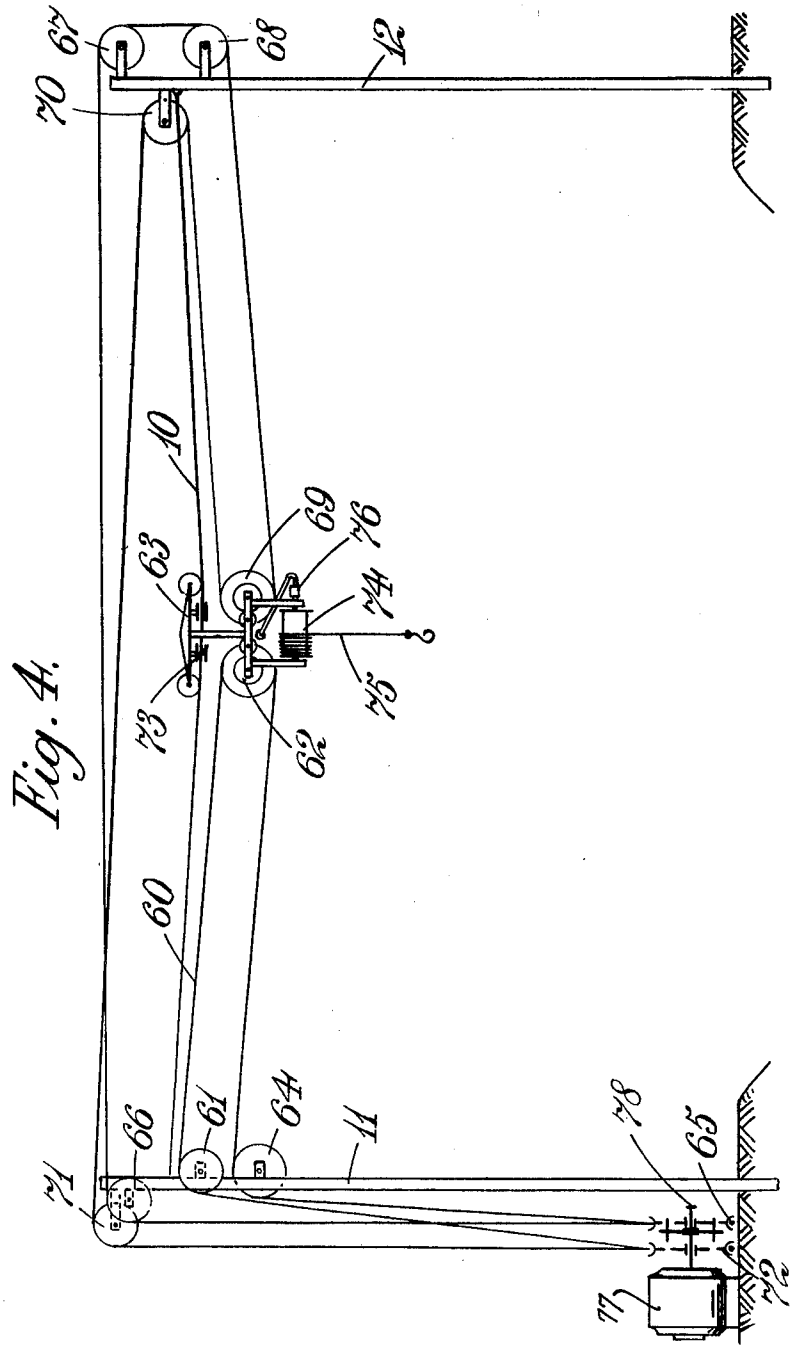


Fig. 4.

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Patented June 24, 1952 2,601,228

UNITED STATES PATENT OFFICE

2,601,228

HOIST

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Application January 23, 1950, Serial No. 140,061
In Great Britain January 27, 1949

8 Claims. (Cl. 212—99)

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This invention relates to cableways, cable cranes, telphers or the like apparatus of the kind in which a travelling carriage carried by an overhead track is provided with hoisting mechanism for raising or lowering a load. Such apparatus will hereinafter be called apparatus of the kind referred to.

Heretofore it has been the usual practice to provide an endless driving rope for traversing the carriage along the track and to provide a separate hoisting rope for the hoisting mechanism. Both ropes are usually driven from one end of the track which may, for example, be a cable span and it will be appreciated that the length of hoisting rope between the carriage and the end of the span will vary as the carriage is traversed. In such cases difficulties are experienced in supporting the hoisting rope which sags considerably when unloaded and it is usual to provide a number of supports known as fall rope carriers which support the hoisting rope upon the cable and which have to be collected as the carriage is moved towards the end of the span and spaced apart as the carriage is moved away from that end. To avoid the use of these fall rope carriers it has been known to employ a first endless rope for traversing the carriage and a second endless rope to operate separately a hoisting winch barrel on the carriage. In this case both the endless ropes are usually operated from one end of the span, both ropes extending across the span.

It is an object of the present invention to eliminate the necessity to use separate driving ropes for traversing the carriage and hoisting the load.

According to the present invention in apparatus of the kind referred to there is provided an endless driving rope extending along the track and arranged to be driven continuously, means for selectively coupling the rope drive either to the carriage to traverse it along the track or to the hoisting mechanism to raise or lower the load and means on the carriage for engaging the track to restrain the carriage from undesired movement during operation of the hoisting mechanism.

The driving rope may be so arranged upon sheaves on the carriage that by restraining the rope at one point in its length the load carriage is traversed along the supporting track.

In one arrangement the driving rope has two stretches extending continuously along the supporting track, each stretch passing over a sheave on the load carriage, and means are provided for

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restraining the driving rope on the carriage so that the carriage is made to move with the stretch of rope that is restrained.

In an alternative arrangement the driving rope is arranged as an endless rope having two stretches extending respectively from each end of the supporting track over a sheave on the carriage and returning to the same end of the track and means are provided at a fixed point for restraining the driving rope to cause the carriage to be traversed. In both these arrangements the hoisting mechanism would be operated when the traversing motion ceases by releasing the restraint on the driving rope and gripping the track.

The following is a description of two embodiments of the invention, reference being made to the accompanying drawings in which:

Figure 1 is a diagrammatic perspective view of a cableway;

Figure 2 is a diagrammatic view of a gravity operated rope grip on the carriage.

Figure 3 is a cross sectional view of a second form of rope grip, and

Figure 4 is a diagrammatic view of a second form of cableway.

Referring to Figure 1, the cable 10 is stretched between two masts 11, 12 which are supported by guy-ropes 13. The carriage indicated diagrammatically by 14 is supported on the cable 10 by the wheels 15 and carries a hoisting winch comprising a barrel 16 and a hoisting rope 17. The driving rope comprises the endless rope 18 which is carried upon a deflection sheave 19 on the mast 12 and at the mast 11 passes over the sheave 21, to the driving sheave 22 which is driven by the motor 23. The two stretches of the driving rope extending across the cable span are arranged to lap the sheaves 24, 25 on the carriage in such a manner that when the carriage is held stationary and the driving rope is in motion the two sheaves 24, 25 will rotate in the same direction. These two sheaves 24, 25 are provided with brakes so that if a brake is applied on one or other of these sheaves the carriage will be traversed in one or other direction across the span. To operate the hoist mechanism there is provided a variable speed gear indicated diagrammatically at 26, which is driven by the two sheaves 24, 25 and which is coupled to drive the winch barrel 16. A rope grip 27 is provided for securing the carriage in a fixed position on the cable 10.

The variable speed gear on the carriage may be arranged to control the speed and torque applied

to the barrel whilst the driving rope speed is maintained constant. Alternatively, means may be provided for automatically adjusting the speed of the driving rope in accordance with the driving torque in the known manner.

One form of rope grip suitable for this purpose is shown diagrammatically in Figure 2, in which there is illustrated a carriage frame 30 supported on the cable 10 by means of wheels 31, 32. On the carriage frame there is mounted a hydraulic cylinder 33 containing a piston 34 and the load car 35 is attached to the piston rod 36. The rope grip comprises the jaws 37, 38, the jaw 37 being fixed to the carriage frame 30, and the jaw 38 being carried on the lever arm 39 which is appended at 40 to the carriage frame. The end of the lever arm 39 remote from the jaw 38 is connected by the link 41 to the top of the load car. When oil under pressure is supplied to the lower side of the piston 34, the load car 35 is lifted by the raising of the piston in the cylinder and the resultant movement of the lever 39 opens the jaws of the rope grip as shown by the chain dotted lines. When the oil pressure is released or fails, the weight of the car causes the piston to move to the bottom of the cylinder 33 and as a result the jaws 37, 38 are closed, so gripping the cable 10 as is illustrated by the full lines. It will be noted that this rope grip is gravity-operated, the force of engagement between the jaws being dependent on the load in the car.

An alternative construction of rope grip is illustrated in Figure 3 in which is shown a pair of jaws 50, 51 mounted on guides 52, 53 and maintained apart by the springs 54. A piston 55 in a cylinder 56 is arranged to move the jaw 51 towards the jaw 50 when oil under pressure is applied through the inlet 57 so causing the jaws to grip the rope as indicated by the chain dotted lines. Although the two rope grips illustrated in Figures 2 and 3 are hydraulically operated it will be appreciated that other forms of power operated rope grips may be employed.

The mode of operation of the cableway illustrated in Figure 1 will have been clear from the foregoing description. The rope 18 is driven continuously and when the carriage is to be traversed the brakes are applied to one or other of the sheaves 24, 25 according to the direction of traverse required.

When a load is to be raised or lowered the brakes on the sheaves 24, 25 are released and the rope grip 27 is applied to secure the carriage at a fixed point on the cable 10. The two sheaves 24, 25 will now rotate and drive the variable speed gear 26 which in turn drives the winch barrel 16 to raise or lower the load. Provision may be made for operating all the controls from an operator's platform on the carriage, such a position providing the operator with a clear view of the work. Alternatively however, the operation may be controlled either by a wire rope extending from the carriage to an operator on the ground who is able by pulling on the rope to control the movement and hoisting of the carriage and load or by a wireless remote control system operated from the ground.

Another construction of cableway is shown in Figure 4 in which the cable 10, as before, is stretched between the masts 11, 12. In this arrangement the driving rope 60 is in the form of an endless rope which extends from the sheave 61 on the mast 11 over a sheave 62 on the load carriage 63 and thence back over a second sheave 64 on the mast 11 and down to a driving sheave 65. From the driving sheave 65 the driving rope passes over a sheave 66 at the top of the mast 11 across the span over the sheaves 67, 68 on the mast 12, and thence around the sheave 69, on the load carriage. From the sheave 69 the rope passes back over another sheave 70 on the mast 12 thence across the span and around a sheave 71 on the mast 11 down to a second driving sheave 72 around which it passes back to the sheave 61. The load carriage 63 is provided with rope grips 73 as before for securing it in a fixed position on the cable 10 and carries a winch barrel 74 on which is wound the hoisting rope 75. The barrel 74 is driven as before by a variable speed drive 76 from the two sheaves 62, 69.

The two driving sheaves 65, 72 are driven from a motor 77 through a clutch mechanism 78 which is arranged so that one or other or both of the sheaves are rotated. The driving rope 60 is kept in constant motion in the same direction and by disengaging one or other of the sheaves 65, 72 from the drive and holding it stationary the carriage 63 is traversed in a direction depending on which of the sheaves 65 or 72 is stationary. When it is required to raise or lower the load, the two driving sheaves 65, 72 are rotated together and the carriage 63 is held stationary by the rope grips 73. The driving rope 60 causes the sheaves 62, 69 on the carriage to be rotated together in the same direction and the operation of the hoisting winch is controlled by the variable speed gear 76 as in the first described embodiment of the invention.

It will be noted that in the arrangement both of Figure 1 and Figure 4 the driving motor drives the driving rope continuously in one direction and the movement of the carriage is controlled by applying a brake to one or other of two sheaves according to the direction of movement required. Furthermore, the same driving rope is used to supply power to the hoisting winch on the load carriage to raise or lower the load.

Although the embodiments of the invention described with reference to the drawings relate to single span cableways having two supporting towers, it will be appreciated that the invention is not restricted to such a cableway but is equally applicable to other similar apparatus such as, for example, ropeways in which the rope runs over a number of trestles and telphers in which the carriage is carried by a rigid track. The carriage need not be suspended from the track but might run above the track which might, for example, comprise a pair of parallel rails.

I claim:

1. Apparatus of the kind referred to comprising an overhead track, a carriage adapted to travel along said track, a hoisting mechanism on said carriage, two sheaves on said carriage, an endless driving rope having two stretches extending from end to end of said track and arranged with the two separate stretches passing respectively around the two sheaves on the carriage, means for driving said rope continuously, means for constraining the rope alternatively at points on said separate stretches, means on the carriage operable to couple the sheaves to the hoisting mechanism to operate said mechanism, and means on the carriage for engaging the track to

restrain the carriage from movement during operation of the hoisting mechanism.

2. Apparatus of the kind referred to comprising an overhead track, a carriage adapted to travel along said track, a hoisting mechanism on said carriage, two sheaves on said carriage, an endless driving rope having two stretches extending directly from end to end of said track and arranged with the two stretches passing respectively around the two sheaves on the carriage, means for driving said rope continuously, brake means on the carriage for alternatively constraining one or the other of the two sheaves, means on the carriage operable to couple the sheaves to the hoisting mechanism to operate said mechanism, and a track grip on the carriage for engaging the track during operation of the hoisting mechanism.

3. Apparatus of the kind referred to comprising an overhead track, a carriage adapted to travel along said track, a hoisting mechanism on said carriage, two sheaves on said carriage, an endless driving rope having two stretches extending from end to end of said track, each stretch including a bight extending from one end of the track to the carriage and back to the same end of the track, the two bights extending from opposite ends of the track and passing respectively around the two sheaves on said carriage, means for driving said rope continuously, means at a fixed point for constraining alternatively the two separate stretches of the rope, means on the carriage operable to couple the sheaves to the hoisting mechanism to operate said mechanism, and a track grip on the carriage for engaging the track during operation of the hoisting mechanism.

4. Apparatus of the kind referred to comprising an overhead track, a carriage adapted to travel along said track, a hoisting mechanism on said carriage, two sheaves on said carriage, an endless driving rope having two stretches extending from end to end of said track and arranged with the two stretches passing respectively around the two sheaves on the carriage, means for driving said rope continuously, means for constraining the rope alternatively at points on said separate stretches, a variable speed gear on the carriage coupling the sheaves to the hoisting mechanism, and means on the carriage for engaging the track to restrain the carriage from movement during operation of the hoisting mechanism.

5. A cableway comprising a cable forming an overhead track, a carriage suspended from and adapted to travel along said cable, a hoisting mechanism on said carriage, two sheaves on said carriage, an endless driving rope having two stretches extending from end to end of said track and arranged with the two stretches passing respectively around the two sheaves on the carriage, means for driving said rope to traverse the two stretches continuously in opposite directions from end to end of the track, means for constraining the rope alternatively at points on said separate stretches, means on the carriage operable to couple the sheaves to the hoisting mechanism, a gravity operated cable grip on the carriage for engaging said cable, and means for releasing the cable grip while the carriage is being traversed.

6. Apparatus of the kind referred to comprising an overhead track, a carriage adapted to travel along said track, a hoisting mechanism on said carriage including a barrel and a hoisting rope, two sheaves on said carriage, an endless driving rope having two stretches extending from end to end of said track and arranged with the two stretches passing respectively around the two sheaves on the carriage, means for driving said endless rope to traverse the two stretches continuously in opposite directions, means for constraining the endless rope alternatively at points on said separate stretches, means on the carriage operable to couple the sheaves to the barrel of the hoisting mechanism, control means for controlling the speed and torque applied to the barrel while the driving rope speed is constant, and a track grip on the carriage for engaging the track during operation of the hoisting mechanism.

7. Apparatus of the kind referred to comprising an overhead track, a carriage adapted to travel along said track, a hoisting mechanism on said track, two sheaves on said carriage, an endless driving rope having two stretches extending directly from end to end of said track and arranged with the two stretches passing respectively around the two sheaves on the carriage, drive means for driving the rope to traverse the two stretches continuously in opposite directions, brake means on the carriage for alternatively constraining one or other of the two sheaves, a variable speed gear on the carriage coupling the sheaves to the hoisting mechanism, and a track grip on the carriage for engaging the track during operation of the hoisting mechanism.

8. Apparatus of the kind referred to comprising an overhead track, a carriage adapted to travel along said track, a hoisting mechanism on said carriage, two sheaves on said carriage, an endless driving rope having two stretches extending from end to end of said track, each stretch including a bight extending from one end of the track to the carriage and back to the same end of the track, the two bights extending from opposite ends of the track and passing respectively around the two sheaves on said carriage, a driving motor at one end of the track, means for coupling the driving motor selectively to one or other or both of the stretches of the rope, brake means for constraining the undriven stretch of the rope, means on the carriage operable to couple the sheaves to the hoisting mechanism, and a track grip on the carriage for engaging the track during operation of the hoisting mechanism.

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