Oct. 28, 1947. P. JEAN-MARIE T. ALLARD 2,429,908

ELECTRIC CONTROL MEANS FOR SELF-ACTING BUCKETS

Filed May 15, 1945 2 Sheets-Sheet 1

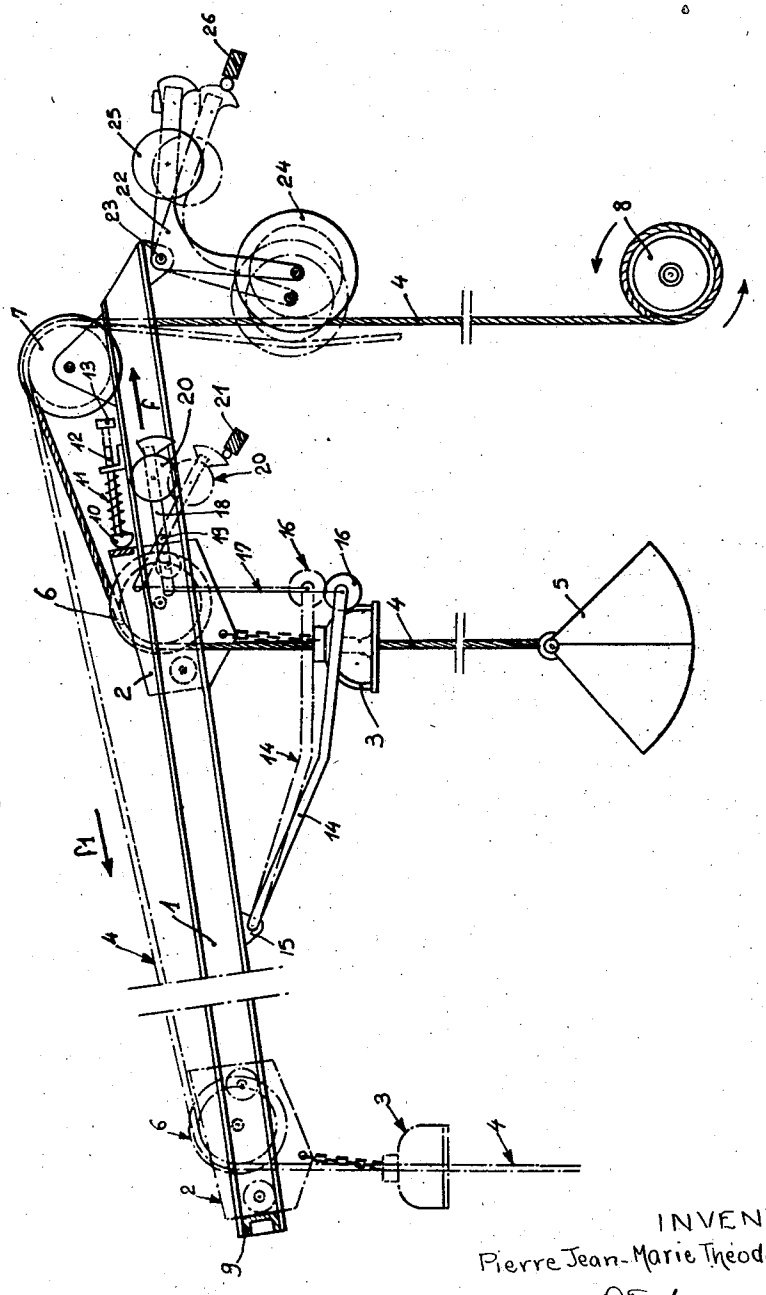


Fig. 1

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Fig. 2

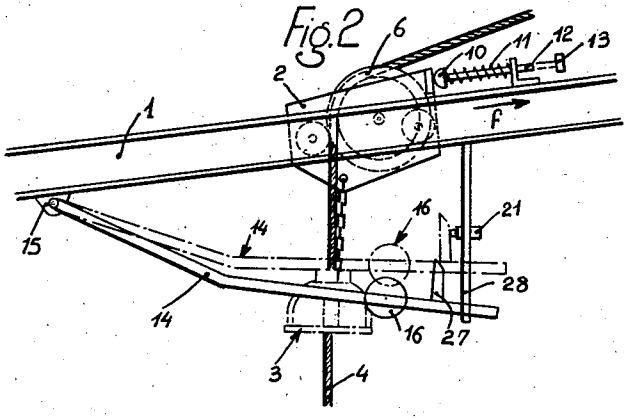
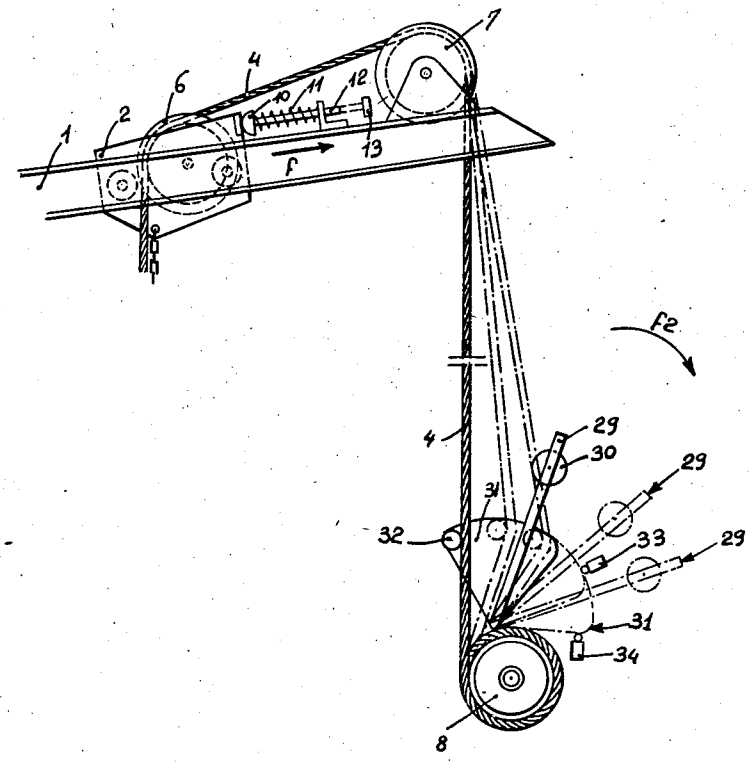


Fig. 3



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2,429,908

ELECTRIC CONTROL MEANS FOR SELF-ACTING BUCKETS

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6 Claims. (Cl. 212—84)

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This invention is concerned with arrangements for the electric control of self-acting grab buckets operated by a single hoisting cable or rope and an opening head or crown; the invention refers more particularly to self-acting buckets, in which the driving mechanism of the plant is operated by electric means which are acted upon by two lever systems or the like, respectively actuated by the bucket head or crown and by the slack of the hoisting rope or cable.

In the known arrangements of this kind, said lever systems both operate a common reversing switch disposed in the vicinity of the end of the bucket runway adjacent to the winch and the lever system operated by the bucket opening head or crown is connected by a rope or chain to said head or crown and to the lever system operated by the hoisting rope or cable.

However, difficulties are encountered in providing a joint action of the two lever systems on a common electric reversing switch which will be satisfactory and reliable. On the other hand, the filling station of the bucket is often situated a long distance away from the end of the guide-runway which is adjacent to the reversing switch; this calls for a mechanical connection of great length between the bucket head or crown and the reversing switch; such connection is, in certain cases, difficult to devise.

This invention has for its object to devise a control arrangement of the type referred to which is of a much simpler construction and avoids the defects above indicated.

The arrangement according to the invention comprises two distinct reversing switches, one being controlled by the slack of the hoisting rope or cable and the other being operated by the opening head or like.

Further features of the invention will be apparent from the following description, with reference to the accompanying drawings, which show, by way of example, three embodiments of the invention, and in which:

Fig. 1 is a diagrammatic elevational view showing an embodiment of the invention as applied to a self-acting grab bucket, the trolley of which travels on an inclined guide-runway;

Fig. 2 shows a modification in the system of levers operated by the bucket opening head or crown.

Fig. 3 shows a modification in the lever system operated by the hoisting rope or cable.

Referring to Fig. 1, the hoisting apparatus comprises an inclined guide-runway 1, on which travels a trolley 2 carrying a bucket head or crown

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3 of any suitable design, through which passes the hoisting rope or cable 4 of the grab bucket 5. The rope 4 passes over a sheave 6, carried by trolley 2, and around another sheave 7, mounted at the higher end of the guide-runway 1, and is then wound around the drum of a winch 8 operated by a suitable electrical motor (not shown).

At its lower end, runway 1 is provided with an abutment 9, located above the dumping station for stopping trolley 2, and a resilient abutment 10 for stopping the trolley 2 above the filling station, the spring 11 of said abutment being of such tension as to yield to an abnormal overload; in this case, the rod 12 of abutment 10 is moved in the direction of arrow *f*, under the traction exerted on trolley 2 by hoisting rope 4, and opens a switch 13 adapted to cut off the supply of electric current to the whole plant.

The control arrangement according to the invention comprises a lever 14, pivoted at 15 to runway 1, and provided at its free end with a counterweight 16. This lever 14 is adapted to bear on the bucket head or crown 3, when trolley 2 is above the filling station, and it is connected by a rope or chain 17 to a second lever 18, pivoted at 19 to the guide-runway 1. This second lever 18 is adapted to rock down under the action of the counterweight 20 when rope 17 is slack, and to act on a reversing switch 21, for reversing the direction of rotation of the motor operating winch 8.

A right-angular lever 22, pivoted at 23 to the higher end of guide-runway 1 and provided at one end with a sheave 24, bearing on the hoisting rope 4, and at the opposite end with a counterweight 25, is adapted to rock when the rope 4 is slack and to act on a second reversing switch 26 for again reversing the direction of rotation of the motor operating winch 8.

The operation is as follows:

Trolley 2 being in the position shown in Fig. 1 and bucket 5 being filled, winch 8 is operated in such a direction as to raise bucket 5 and cause it to engage bucket head 3. Continued traction on cable 4 has for its effect to raise head 3 and lever 14, whereby rope 17 becomes slack and lever 18 rocks down, thus actuating switch 21 and reversing the direction of rotation of winch 8.

Trolley 2 then travels down along the runway 1, under the action of its weight and the weight of the filled bucket 5. At the lower end of runway 1, trolley 2 is stopped by abutment 9, and, while the winch continues to unwind rope 4 in the direction of arrow f^1, the bucket opens, rope 4 becomes slack and lever 22 is rocked and again

reverses the direction of rotation of winch 8, through switch 26.

Now, trolley 2 and bucket 5 suspended from crown 3 and open, are towed along by rope 4 and travel up runway 1 until trolley 2 engages abutment 16; head 3 being then in its raised position again comes into contact with lever 14, which had resumed its lower position, and is raised again. Lever 18 once more operates switch 21, whereby the direction of rotation of winch 8 is reversed, bucket 5 gets loose from head 3 and drops down, whereby head 3 and lever 14 resume their lower inoperative position. When bucket 5 reaches the goods to be taken in, rope 4 becomes slack and, through the medium of sheave 24 and switch 26, the direction of rotation of the winch is again reversed; the whole apparatus is then ready for a further cycle.

Fig. 2 shows a modification in which lever 14 directly acts on switch 21 through a projection 27 (the lever 18 being dispensed with). The free end of lever 14 may be guided in a support 28 carried by runway 1.

In the modification of Fig. 3, right-angular lever 22 is replaced by a lever 29, located in the vicinity of winch 8 and having a counterweight 30. Said lever is secured to a swinging sector 31, which carries a roller 32, adapted to bear on rope 4. When rope 4 becomes slack, sector 31, lever 29 and counterweight 30 swing bodily in the direction of arrow f^2, about their pivot axis and sector 31 operates a reversing switch 33, (similar to switch 26 of Fig. 1) so as to reverse the direction of rotation of winch 8. If, for any accidental reason, switch 33 fails to operate, rope 4 continues to yield and sector 31 swings on in the direction of arrow f^2 and operates a switch 34 which cuts off the supply of current to the whole plant.

Obviously, the invention is not limited to the embodiments described and shown, which have been selected merely by way of example.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a hoisting device, a runway, a trolley adapted to travel along said runway, a bucket, a hoisting cable for said bucket adapted to be guided on said trolley, a winch for said hoisting cable, a head suspended from said trolley and adapted to be raised by said bucket, abutments for stopping said trolley at the filling and dumping stations, two distinct reversing switches adapted to control rotation of said winch, means responsive to the tension of said hoisting cable for actuating one of said switches and means responsive to upward movement of said head for actuating the other of said switches.

2. A device as claimed in claim 1, wherein said tension responsive means comprises a counterweight lever and a sheave carried by said lever and urged against said cable by said counterweight.

3. A device as claimed in claim 1, wherein said tension responsive means comprises a counterweight sector and a roller carried by said sector and urged against said cable by said counterweight.

4. A device as claimed in claim 1, wherein said upward movement responsive means comprises a counterweight lever pivoted to said runway.

5. A device as claimed in claim 1, wherein said upward movement responsive means comprises two counterweight levers, pivoted to said runway, one of said levers engaging said head and the other lever controlling said first named switch, and a flexible connection between said levers.

6. A device as claimed in claim 1, further comprising a cut off switch adapted to be operated by said tension responsive means when the slack of said cable exceeds a predetermined limit.

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