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P. J. DARLINGTON.

OVERLOAD SAFETY APPARATUS.

APPLICATION FILED APR. 26, 1904.

FIG. 1

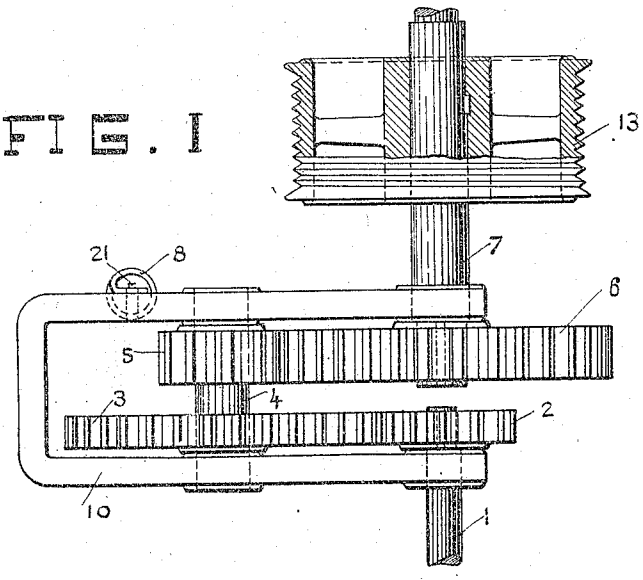
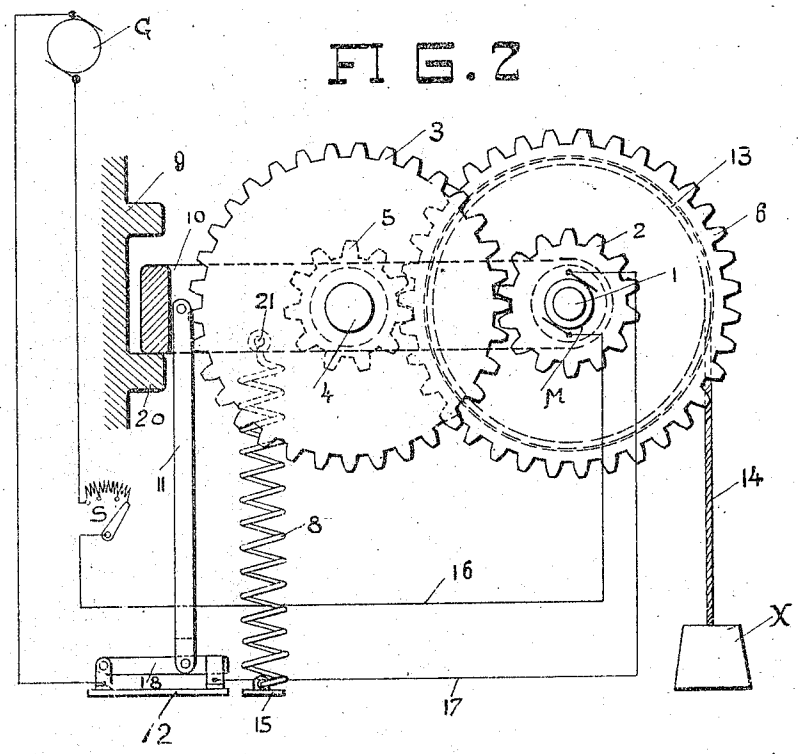


FIG. 2



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OVERLOAD SAFETY APPARATUS.

No. 829,371. Specification of Letters Patent. Patented Aug. 21, 1906.

Application filed April 26, 1904. Serial No. 204,951.

To all whom it may concern:

Be it known that I, PHILIP J. DARLINGTON, a citizen of the United States of America, and a resident of the town of Glenridge, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Overload Safety Apparatus, the principles of which are set forth in the following specification and accompanying drawings, which disclose the form of the invention which I now consider to be the best of the various forms in which the principles of the invention may be embodied.

The invention relates to improvements in overload safety apparatus.

In various kinds of machinery operated by power certain conditions, such as the character of the motor, are such that it is possible for the motor to lift a load of such weight that serious injury may result to some part of the apparatus or motor. This is the case in an ordinary electrically-operated hoisting apparatus, where the electric motor may lift a load several times as heavy as the maximum load which the hoisting apparatus was designed and intended to lift. The lifting of a load exceeding such maximum safe load is extremely liable to result in damage to the hoist or to its supports, to the motor, or even to the load itself.

The object of this invention is to provide power machinery with overload safety apparatus of a compact and efficient type adapted for the purpose of preventing the occurrence of the results above referred to.

Of the drawings, Figure 1 is a plan view of a hoisting apparatus embodying the invention. Fig. 2 is an elevation of the same, showing electric power connections.

In Fig. 1 the power-shaft 1 drives the hoisting-drum shaft 7 by means of the gear-train 2, 3, 5, and 6. The gear or pinion 2 is mounted and keyed on the power or motor shaft 1, and the gear 6 is mounted and keyed on the shaft 7, which shaft carries the hoisting-drum 13. The shaft 7 is arranged in alinement with the shaft 1. The gears 3 and 5 are mounted and keyed on the counter-shaft 4. The ends of this counter-shaft 4 are journaled in the two sides of the movable member or U-shaped frame 10. The separated ends of the frame 10 (shown at the right) are constructed and arranged to serve as journals for the opposing ends of the shafts 1 and 7. The U-shaped end of the frame 10 is movable about the common axis of the shafts 1 and 7 as a center.

Assuming that a load X, Fig. 2, is attached by a suitable connection 14 to the hoisting-drum 13, as shown, and ready to be lifted, the rotation of the power-shaft 1 in an anti-clockwise direction is necessary to lift the load. The effort required to lift the load X, acting through the gear 2, will operate downwardly at the point of engagement of the gears 2 and 3 as a fulcrum to exert an upward pressure at the axis of the gear 3 and tend to move the frame 10 upwardly in a circle about the axis of the shafts 1 and 7 as a center.

The movable member 10 is constructed and arranged in any suitable manner so that it will remain stationary in resistance to the effort required to lift loads of such weight as will not be likely to injure the apparatus. For example, as shown in Fig. 2, a spring 8 is connected at its lower end to a stationary part 15 and at its upper end to a pin 21 in the movable member 10. The spring 8 or its equivalent is so constructed that it will permit the member 10 to move upwardly, but only in case the weight of the load X exceeds a predetermined safe limit. Normally the left-hand end of the member 10 will rest on the stop 20, Fig. 2.

The member 10 is constructed and arranged in any suitable manner so that its movement will stop the application of power to the load X, thus preventing injury to any part of the apparatus, including the motor itself. This stopping of the application of power by the movement of the member 10 may be accomplished in a variety of ways. The particular method disclosed herein consists in causing the movement of the member 10 to stop the operation of the motor itself as distinguished from causing the movement of the member 10 to disconnect the motor from the load, as by moving the gear 3 out of mesh with the gear 2 or by operating any suitable disconnecting device between the motor and the load. For example, as shown in Fig. 2, the power-shaft 1 is driven by an electric motor M, which may be of such character as to have sufficient power to lift a load having a weight several

times that of the maximum load which the apparatus is designed to lift. The operation of this electric motor M is controlled by the switch 12, which is provided with a suitable fixed contact. The pivoted member 18 of the switch 12 is operatively connected with the movable member 10 by a rod 11, so that the upward movement of the member 10 will open the switch 12 and stop the operation of the motor M. A movement of the member 10 beyond that which is required to open the switch 12 is prevented by the stop 9. The motor M is supplied with current from a suitable electric generator G, controlled by a suitable starting-switch S, which switch may be operated at will independently of the switch 12. If desired, the switch 12 may be a rheostatic or starting switch and the switch S merely a circuit-opener. As shown, one of the leads from the generator G is connected with the fixed contact of the switch 12 and the movable switch-blade 18 is connected with the motor-lead 17.

If the load has not been lifted before the switch 12 is opened, the member 10 will move downwardly as soon as the motor M is stopped. If the load has been slightly lifted before the switch 12 is opened, the member 10 will remain in its raised position as long as there is sufficient upward pressure of the teeth of the gear 6 against the teeth of the gear 5 to hold the member 10 in its raised position. As soon as the effect of the excessive load is removed the member 10 will descend to its normal position on the stop 20 to close the switch 12.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an electrically-operated hoisting apparatus, the combination with an electric motor, of a power-shaft driven thereby, a member pivoted concentric with said shaft, a counter-shaft carried by said pivoted member, intermeshing gears on said power-shaft and counter-shaft, a hoisting-drum shaft constructed and arranged to be driven from said counter-shaft, and means controlled by the movement of said pivoted member, to stop the application of the power of the motor to the load.

2. In a hoisting apparatus, the combination with a motor, of a gear-train for transmitting power from the motor to the load to be lifted, means for stopping the application of the power of the motor to the load, and a movable member carrying at least one of the gears of said train, said movable member being constructed and arranged to operate said stopping means by its movement due to a predetermined effort of the motor.

3. In a hoisting apparatus, the combination with a motor, of a gear-train for transmitting power from the motor to the load to be lifted, means for controlling the application of the power of the motor to the load, a pivoted member operatively connected to said controlling means and carrying at least one of the gears of said train, said pivoted member being constructed and arranged to be moved to operate said controlling means, by the effort of the motor required to lift a predetermined load.

4. In a hoisting apparatus, the combination with a power-shaft, of a pivoted member, a counter-shaft mounted in said member and constructed and arranged to be driven from the power-shaft, a hoisting-drum shaft constructed and arranged to be driven from said counter-shaft, and means operated by the movement of said pivoted member to control the application of power to the load.

5. In a hoisting apparatus, the combination with a power-shaft, of a member in which said shaft is journaled, which member is movable about the axis of said shaft as a center, a counter-shaft mounted in said member and constructed and arranged to be driven by said power-shaft, a hoisting-drum shaft constructed and arranged to be driven from said counter-shaft, and means constructed and arranged to be operated by the movement of said member on its center, to control the application of power to the load.

6. In a hoisting apparatus, the combination with a power-shaft, of a member pivoted concentrically therewith, a counter-shaft mounted in said member and constructed and arranged to be driven from said power-shaft, a hoisting-drum shaft constructed and arranged to be driven from said counter-shaft at a speed lower than that of the power-shaft, and means operated by the movement of said pivoted member, to control the application of power to the load.

7. In a hoisting apparatus, the combination with a power-shaft, of a member pivoted concentrically therewith, a counter-shaft mounted in said member, intermeshing gears on said power-shaft and counter-shaft, a hoisting-drum shaft, a second gear on the counter-shaft which is of smaller diameter than the first gear on the counter-shaft, a gear on the hoisting-drum shaft meshing with said second gear on the counter-shaft, and means operated by the movement of said pivoted member, and constructed and arranged to control the application of power to the load.

8. In a hoisting apparatus, the combination with a power-shaft, of a member pivoted concentrically therewith, a counter-shaft mounted in said member and constructed and arranged to be driven from said power-shaft, a hoisting-drum shaft in alinement with said power-shaft and constructed and arranged to be driven from said counter-shaft, and means operated by the movement of said pivoted member to control the application of power to the load.

9. The combination with a power-shaft, of

a counter-shaft arranged to be driven therefrom, a movable member carrying said counter-shaft, a third shaft arranged to be driven from the counter-shaft, and means constructed and arranged to be operated by the movement of said movable member, to control the operation of the third shaft.

In witness whereof I have hereunto set my hand this 22d day of April, 1904.

PHILIP J. DARLINGTON.

Witnesses:
PAUL MULLER,
ROGER H. BUTTERWORTH.