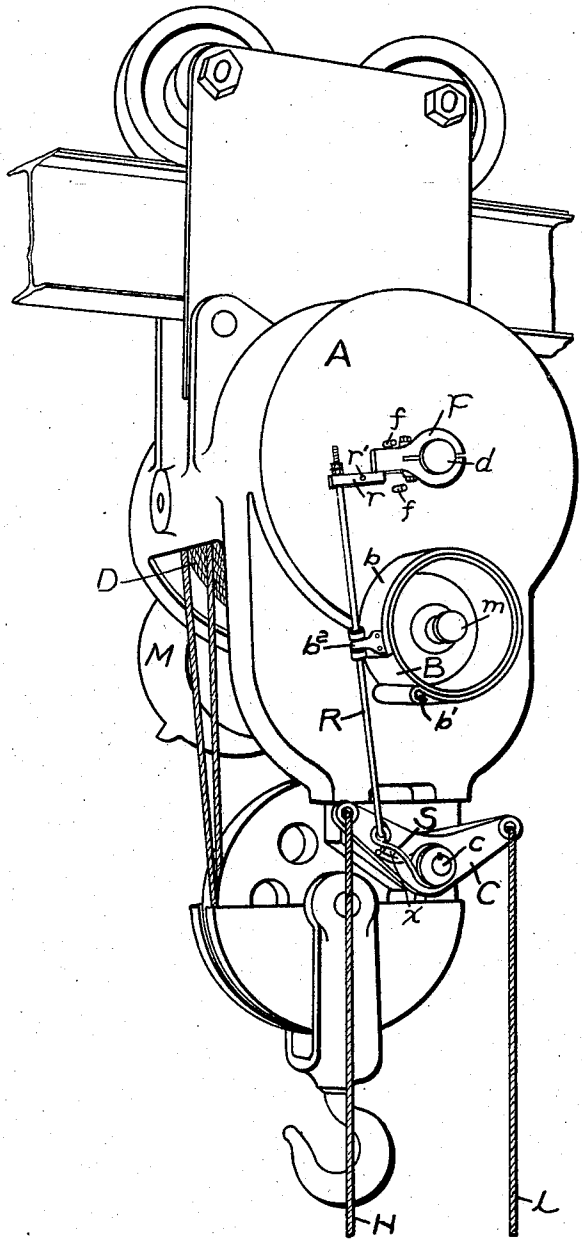
No. 867,484. PATENTED OCT. 1, 1907.

P. J. DARLINGTON.

SPUR GEARED HOIST.

APPLICATION FILED MAY 11, 1904.



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UNITED STATES PATENT OFFICE.

PHILIP J. DARLINGTON, OF GLENRIDGE, NEW JERSEY, ASSIGNOR TO SPRAGUE ELECTRIC COMPANY, A CORPORATION OF NEW JERSEY.

SPUR-GEARED HOIST.

No. 867,484. Specification of Letters Patent. Patented Oct. 1, 1907.

Application filed May 11, 1904. Serial No. 207,375.

To all whom it may concern:

Be it known that I, PHILIP J. DARLINGTON, a citizen of the United States, residing at Glenridge, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Spur-Geared Hoists, of which the following is a specification.

My invention relates to brakes for power-operated hoists, and is particularly applicable to spur-gear motor-driven hoists.

In hoists in which an electric motor is connected through a spur-gear to the hoist drum, it is customary to provide a brake for preventing movement of the drum when the circuit of the motor is opened. This brake should be released when the motor is energized for hoisting, and it has been proposed heretofore to release the brake either by a magnet connected in circuit with the motor or mechanically by the movement of the controller for the motor. When either of these methods is employed, the brake is released at or before the instant current is applied to the motor. In practice, however, when the motor is started and the brake released with a load on the hoist, the load tends to rotate the hoist drum before the motor picks up its load.

The object of my invention is to provide means which shall at all times prevent the load from rotating the drum, except when the motor is rotating with sufficient energy to carry the load, or when it is desired to release the brake for lowering the load.

A further object of my invention consists in providing means for totally releasing the brake after the motor has picked up its load.

My invention will best be understood from the accompanying drawing, which shows a perspective view in elevation of a hoist arranged in accordance with my invention.

D represents the hoist drum carried on the shaft *d*, which is journaled in the casing A.

M represents an electric motor mounted on the shaft *m* and driving drum D through a spur-gear (not shown). Shaft *m* is equipped with a band-brake consisting of a wheel B and a brake-band *b*. The brake-band *b* at one end is secured to the pin *b'* on casing A, and at its other end carries a lug b^2 which is engaged by the rod R. The lower end of rod R is engaged by a spiral spring S mounted on the shaft *c* of the controller for the motor. The details of construction of the controller are not shown in the drawing as this device may be of the form usually used in hoists of this kind. Shaft *c* of the controller may be rotated in one direction or the other by means of the lever C, to which are attached the ropes H and L for moving the controller to hoisting and lowering positions respectively.

With the arrangement as thus far described, it will be seen that if a clockwise direction of shaft *m* drives the drum D in the proper direction for hoisting, the rotation of wheel B during hoisting tends to diminish the braking effect of brake-band *b*, while a tendency to counter-clockwise rotation for lowering produces a tightening of band *b*, so as to prevent the load from dropping. Thus when lever C is in its central position, as shown, and motor M is deënergized, the load will be held stationary. If it is desired to raise the load, rope H is pulled down, rotating lever C and shaft *c* so as to close the motor circuit. At the same time rod R is pulled downward by a spiral spring S, thereby tightening the brake-band and preventing the load from dropping while the motor is starting. As the motor picks up its load, the rotation of wheel B in a clockwise direction relieves the brake-pressure, as has been heretofore explained, the stretching of spring S permitting the loosening of the brake-band *b*. If it is desired to lower the load, rope L may be pulled down, the pin or stop *x* upon the lever C forcing the rod R upward, and the brake-pressure being relieved by the desired amount to allow wheel B to slip and the load to descend. Thus the hoist is prevented from moving except when the motor is rotating with sufficient energy for hoisting, or when it is desired to release the brake-pressure for lowering. If the rotation of wheel B, however, is relied upon for relieving the brake-pressure while motor M is hoisting, a certain amount of energy is wasted. In order to prevent this loss, I provide the following mechanism: Rod R at its upper end is secured to the lever *r*, which is pivoted at *r'* on frame A. F represents a member frictionally mounted on shaft *d*, *i. e.*, fitted thereon so as to tend to follow shaft *d* in its rotation, but to slip more or less easily thereon. The outer end of member F engages the inner end of the pivoted lever *r*, and the movement of member F in either direction is limited by the steps *f f*. The function of this mechanism is as follows: Assume that drum D rotates in a counter-clockwise direction when hoisting; now, if rope H is pulled down, rotating shaft *c* and energizing motor M, drum D will be rotated as soon as motor M picks up its load. The rotation of shaft *d* in a counter-clockwise direction presses member F downwards upon pivoted member *r*, raising rod R against the tension of spring S and totally releasing the pressure of band *b* on wheel B. In this manner the friction loss between brake-band *b* and wheel B while the motor is hoisting is wholly avoided, and a small loss due to the slipping of member F on the slow-speed shaft *d* is substituted therefor. This latter loss may be made practically negligible by the proper adjustment of the fit of member F upon shaft *d*.

I have shown and described a particular form of brake mechanism applied to a particular form of hoist. It will be understood, however, that my invention is applicable to many different types of hoists, and that the brake mechanism may be modified to suit varying

requirements without departing from the spirit of my invention; and I aim in the appended claims to cover all such modifications which are within the spirit and scope of my invention.

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

1. In combination with a hoist, a motor for operating the hoist, a controlling device for said motor, a brake, means operated by the movement of the hoist mechanism for releasing said brake when the hoisting movement has begun, and operative connections between said brake and said controlling device arranged to release said brake when the controlling device is moved to its lowering position.

2. In combination with a hoist, an electric motor for operating the hoist, a controller for said motor, a brake, means operated by the movement of the hoist mechanism for releasing said brake when the hoisting movement has begun, and operative connections between said brake and said controller arranged to release the brake when the controller is moved into its lowering position.

3. In combination with a hoist having a low-speed shaft, an electric motor for operating the hoist, a controller for the motor, a brake, a member frictionally mounted on the low-speed shaft and arranged to release the brake when the motor is raising the hoist, and operative connections between said brake and said controller arranged to release the brake when the controller is moved to its lowering position.

4. In combination with a hoist having a low-speed shaft, a motor geared to said hoist, a controlling device for said motor, a brake independent of the gearing connecting the motor to the hoist, and a member frictionally mounted on the low-speed shaft and arranged to release said brake.

5. In combination with a hoist having a low-speed shaft, a motor geared to said hoist, a brake independent of the gearing connecting the motor to the hoist, and means operated by said low-speed shaft for releasing said brake.

6. In combination with a hoist, a motor geared to said hoist, a controlling device for said motor, a brake independent of the gearing connecting the motor to the hoist, means operated by the movement of the hoist mechanism for releasing said brake when the hoisting movement has begun, and operative connections between said brake and said controlling device arranged to release the brake when the controlling device is moved to its lowering position.

7. In a hoist, a brake adapted and arranged normally to prevent a lowering movement of the hoist and to exert a reduced restraint upon the hoisting movement, and means operated by said hoisting movement for totally relieving said restraint.

8. In a hoist, a high-speed shaft, a brake engaging said shaft and arranged to be tightened by a movement of said shaft for lowering and to be loosened by a movement of said shaft for hoisting, and means operated by the hoisting movement of the hoist for totally releasing said brake.

9. In a hoist, a high-speed shaft, a brake engaging said shaft and arranged to be tightened by a movement of said shaft for lowering and to be loosened by a movement of said shaft for hoisting, manually-controlled means for loosening said brake for lowering, and automatic means for totally releasing said brake when the hoisting movement has begun.

10. In a hoist, a high-speed shaft, a brake engaging said shaft and arranged to be tightened by a movement of said shaft for lowering and to be loosened by a movement of said shaft for hoisting, a low-speed shaft, and a member having a frictional bearing thereon and adapted to engage and totally release said brake upon the hoisting movement of said low-speed shaft.

11. In a hoist, a high-speed shaft, a brake engaging said shaft and arranged to be tightened by a movement of said shaft for lowering and to be loosened by a movement of said shaft for hoisting, a rod engaging said band-brake and adapted by its movement to tighten or release said brake, manually-controlled means for moving said rod to loosen said brake for lowering, a low-speed shaft, and a member having a frictional bearing thereon and adapted to move said rod to release said brake upon a hoisting movement of said low-speed shaft.

12. In a hoist, a high-speed shaft, a brake engaging said shaft and arranged to be tightened by a movement of said shaft for lowering and to be loosened by a movement of said shaft for hoisting, a manually-operated controlling lever for said hoist, connections between said lever and said brake whereby said brake is loosened when said lever is moved for lowering, a low-speed shaft, a member having a frictional bearing thereon, and connections between said member and said brake whereby said brake is released upon a hoisting movement of said low-speed shaft.

13. In a motor-operated hoist, a brake engaging the motor shaft and arranged to be tightened by a movement of said shaft for lowering and to be loosened by a movement of said shaft for hoisting, a controller for said motor, connections between said controller and said brake whereby said brake is loosened when said controller is moved to lowering position, a low-speed shaft driven by said motor, a member frictionally mounted on said shaft, and connections between said member and said brake whereby said brake is released when said low-speed shaft is driven for hoisting.

14. In a motor-operated hoist, a brake adapted and arranged normally to prevent a lowering movement of the hoist and to exert a reduced restraint upon the hoisting movement, a controller for the motor, and connections between said brake and the controller, whereby said brake may be released for lowering by the movement of said controller.

15. In a motor-operated hoist, a brake engaging the motor-shaft and arranged to be tightened by a movement of said shaft for lowering and to be loosened by a movement of said shaft for hoisting, a controller for said motor, and connections between said controller and said brake whereby said brake is loosened when said controller is moved to lowering position.

16. In a motor-operated hoist, a spring-applied brake arranged to normally prevent a lowering movement of the hoist and to exert a reduced restraint upon the hoisting movement, a controller for the motor, and means including a stop on the controller for causing the brake to be released when the controller is moved to lowering position.

In witness whereof, I have hereunto set my hand this 10th day of May, 1904.

PHILIP J. DARLINGTON.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.