A. SUNDH.

ELECTROMECHANICAL COMPOUND BRAKE.

APPLICATION FILED FEB. 15, 1906.

979,720. Patented Dec. 27, 1910.

FIG. 1.

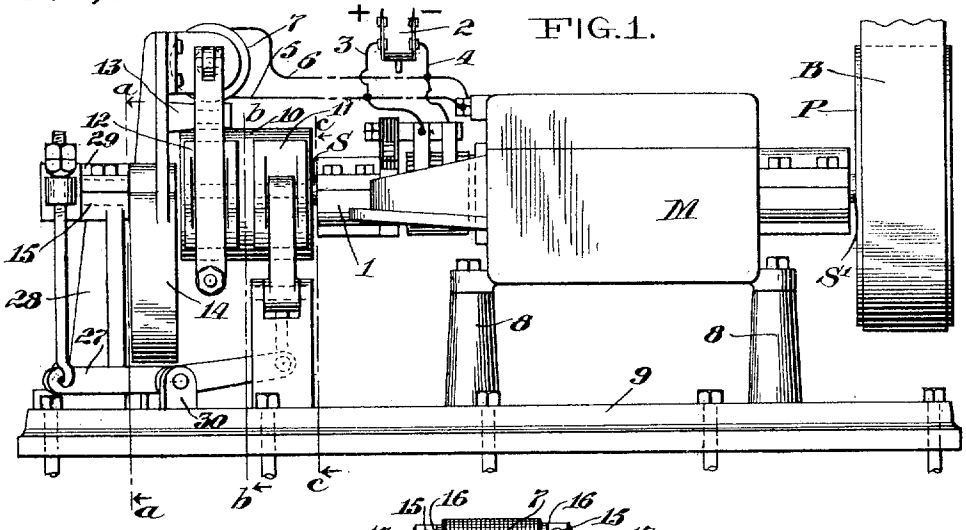


FIG. 2.

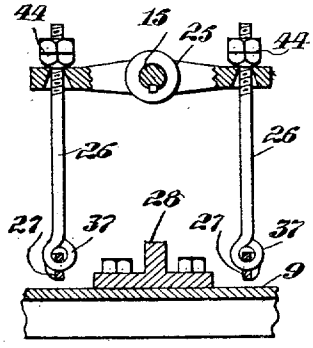


FIG. 3.

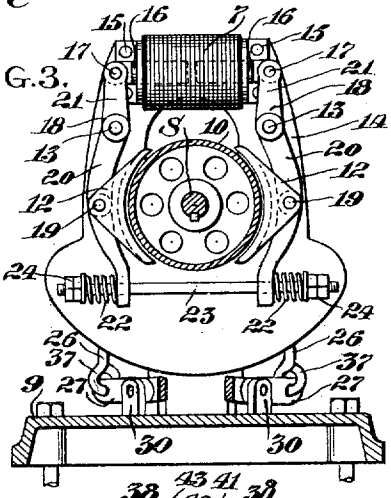


FIG. 4.

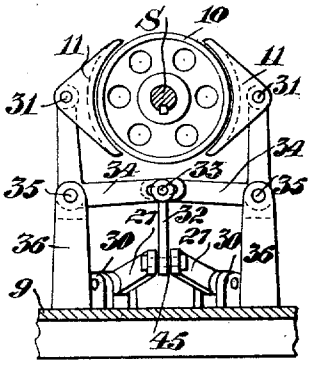


FIG. 5.

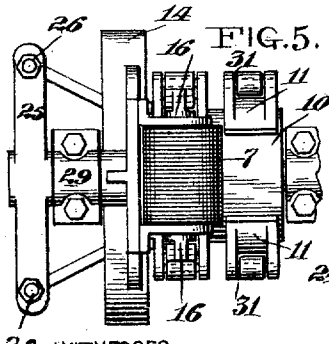


FIG. 7.

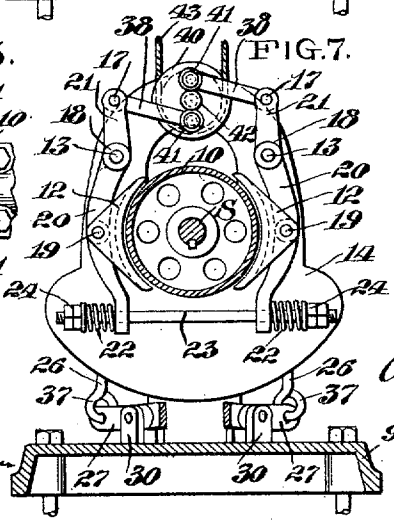
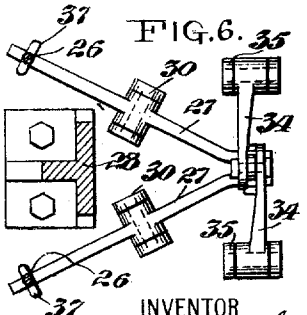


FIG. 6.



WITNESSES:

J. Hall Kinsley

Alexander De Milan

INVENTOR

August Sundh

BY

Chas. M. Nissen

ATTORNEY

UNITED STATES PATENT OFFICE.

AUGUST SUNDH, OF YONKERS, NEW YORK, ASSIGNOR TO OTIS ELEVATOR COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

ELECTROMECHANICAL COMPOUND BRAKE.

979,720. Specification of Letters Patent. **Patented Dec. 27, 1910.**

Application filed February 15, 1906. Serial No. 301,182.

To all whom it may concern:

Be it known that I, AUGUST SUNDH, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented a new and useful Improvement in Electromechanical Compound Brakes, of which the following is a specification.

My invention relates to brake apparatus, and is an improvement on that shown in my pending application, S. No. 240,613, filed January 11th, 1905, for an improvement in elevator brakes. It is particularly adapted to electric motors, which are used for driving elevators.

One of the objects of my invention is the provision of a plurality of pairs of brake-shoes, all applied to the exterior surface of the cylindrical portion of a pulley secured to the motor shaft and one pair of said brake-shoes operating mechanism to apply the other pair.

A further object of my invention is the provision of independently mounted and interconnected pairs of brake-shoes applied to the exterior surface of a brake-pulley.

Another object of my invention is to provide a retarding device applied to the exterior of a brake pulley and connections to an additional retarding device similarly applied, so that upon the application of one retarding device its rotary force received from the motor will be transmitted to the other rotary device.

Other objects of my invention will appear hereinafter, a novel combination of elements being pointed out in the claim.

In the accompanying drawings, Figure 1 represents an electric motor with my improved brake apparatus applied thereto; Fig. 2 is a sectional view of Fig. 1, taken on the line *a*—*a*, looking in the direction of the arrows; Fig. 3 represents a section of Fig. 1, taken on the line *b*—*b*; Fig. 4 is a sectional view of Fig. 4, taken on the line *c*—*c*; Fig. 5 is a plan view of the left-hand portion of Fig. 1 to show the brake apparatus; Fig. 6 is a plan sectional view of the leverage of the brake apparatus and Fig. 7 is a view similar to Fig. 3, but illustrating the modification.

Referring to Fig. 1, M designates a motor which is herein shown as an electric motor, but obviously the same may be a motor driven by any other power. This motor is supported in this instance on the bed plate 9 by means of the standards 8, 8, and has a shaft S to one end of which is connected the driving pulley P and to the other end of which is fastened the brake pulley 10. B designates a belt which connects the pulley P to the parts to be driven, as for sample, elevator apparatus.

1, 1 are the bearings for the motor shaft; 2 designates a main line switch which connects the + and — mains to the motor leads 3 and 4; 7 designates an electro-magnet solenoid which is connected across the motor mains by means of the wires 5 and 6.

Any suitable controlling apparatus may be used for starting and stopping the motor M. That is, any means for admitting and cutting off current on the motor may be used and it should be noted that whenever the current is cut off from the motor it is also cut off from the electro-magnet solenoid 7. In the case of elevator apparatus, there could be a manual reversing switch in the car for controlling the electro-magnet reversing switches so that the current would be admitted to the motor to operate the same in the proper direction to move the car up or down as desired, in a well known manner.

12, 12 designate primary brake shoes which are arranged to be applied to the brake pulley 10 by means of the springs 22, 22 acting on the lever arms 20, 20. These brake shoes are pivoted to the said arms 20, 20 at 19, 19, respectively. To the upper portion of this rocking plate is secured the solenoid 7 which is provided with two movable cores 16, 16 which are pivoted at their outer ends 17, 17 to the upper arms 21, 21 of the levers 18, 18. The latter levers are pivoted to the rocking plate 14 at 13, 13, respectively.

On the bed plate 9 on the left-hand end thereof is secured a standard 28 for supporting the bearing 29 in which is placed a short shaft 15 to the outer ends of which are secured the rocking plate 14 and the double-armed lever 25, respectively. It will therefore be evident that when the springs 22, 22 effect the application of the brake shoes 12, 12 to the pulley 10 while it is in motion the plate 14 will be rocked and with it the lever 25. To the outer ends of this lever are connected the depending links 26, 26. The

upper ends of these links are screw-threaded and provided with adjusting nuts 44, 44, while their lower ends are in this instance shown ring-shaped, as at 37, 37, and passing through holes in the outer ends of the levers 27, 27, respectively. Any suitable connection, however, may be used; that here shown being merely by way of illustration. The levers 27 are pivoted at their central portion or at some point between their ends to the standards 30, 30, secured to the bed plate 9.

The inner ends of the lever 27 converge toward each other and are loosely connected at 45 to the link 32, whose upper end has a slot connection 33 with the bell crank levers 34, 34. These bell crank levers are pivoted at 35, 35 to the standards 36, 36 on the bed plate 9, and their upper arms carry the secondary brake shoes 11, 11, the latter being pivoted at 31, 31 to said upper arms. It is evident from an inspection of Fig. 1 that the secondary shoes 11, 11 are applied to the outside of the pulley 10, as well as the primary shoes 12, 12, and although I have herein shown a single pulley 10, the double pulley may be used, or any other modification made such as would occur to a person skilled in the art.

The operation of my invention is as follows: When it is desired to start the motor the current is admitted to the armature and field of the motor as well as to the magnetic solenoid 7. The latter will thereupon draw inwardly its cores 16, 16 and move the shoes 12, 12 outwardly against the action of the springs 22, 22, which are held in proper position by means of the connecting rod 23 and the adjusting nuts 24, 24. The secondary shoes 11, 11 will at this time be also released by reason of the weighted lower portion of the rocking plate 14 holding the lever 25 in substantially horizontal position, as indicated in Fig. 2. If the connections between the secondary shoes 11, 11 and the lever 25 are symmetrical, or nearly so, it is evident that when the rocking plate 14 is in vertical position, as shown in Fig. 3, and the lever 25 in horizontal position, the secondary shoes 11, 11 will be held off from the pulley 10, as shown in Fig. 4. The motor may now start and be operated at any desired speed, depending upon the operation of the motor controlling apparatus (not shown). When it is desired to stop the motor, the current to the same is interrupted so that the electro-magnet solenoid 7 will be deënergized at the same time. This action will allow the cores 16, 16 to be moved outwardly by means of the springs 22 connecting on the lower ends of the lever arms 20, 20 which are pivoted at 13, 13 to the rocking plate 14. The primary brake shoes 12, 12 being pivoted to the lever arms 20, 20 at 19, 19, respectively, will thus be moved into engagement with the pulley 10. The motor armature at this time is revolving by reason of its momentum, and also by reason of the momentum of the parts connected thereto, as for instance, elevator hoist apparatus, which in this instance may be connected to the motor by means of the pulley and the belt. Upon the engagement of the primary brake shoes 12, 12 with the momentum driven pulley 10, the latter will exert a rotary force to rock the plate 14 in arc and predetermine the distance to tilt the lever 25 in one direction or the other, depending upon the direction of rotation of the motor armature.

Assuming that the motor armature is rotating in a clockwise direction, as viewed from the left-hand of Fig. 1, it is evident that when the brake shoes 12, 12 are applied the rocking plates 14 will be moved also in a clockwise direction, and with it the double-armed lever 25. The left-hand vertical rod 26, as seen in Fig. 2, will therefore be moved upwardly, and with it the outer end of the lever 27. The inner end of the lever 27 which is connected to said rod 26 will be forced downwardly, and with it the link 32 and the bell crank levers 34, 34 connected thereto. This will, of course, move the secondary brake shoes 11, 11 against the pulley 10 and by proper designing of the leverages considerable force may be exerted by this secondary brake. It should furthermore be noted that upon the application of the primary brakes there may be only small retarding force—for the reason that the plate 14 with the parts mounted thereon and connected thereto will be moved freely until the secondary shoes are applied. Upon the application of the secondary brake, however, the rocking plate 14 is held stationary and the amount of braking force of the primary shoes is determined by the tension of the springs 22, 22. The primary brake may be so adjusted that it alone will be sufficient to stop the motor, but in order to more evenly distribute the strains of the brake apparatus and permit moving parts having greater momentum to be stopped, it is preferable that the secondary brake should be relied upon for retarding the motor as well as the primary brake. The apparatus may also be so arranged that by a comparatively small rotary force imparted to the primary brake a much greater braking action may be produced by the secondary brake.

In Fig. 7, I have illustrated a modification in that the primary brake may be released mechanically, as by means of a rope or cable 43 passing around the pulley 40, which is pivoted at 42 to the upper portion of the rocking plate 14 in substantially the same position occupied by the magnetic solenoid 7 in Fig. 3. Instead of the core 16, 16 links 38, 38 connect the lever arms 21, 21, respectively to the pulley 40; said links being

pivoted to said pulley at 41, 41. The pulley therefore acts as a double-armed lever upon being rotated in an anti-clockwise direction to move the levers 18, 18 about their fulcrums 13, 13 against the action of the brake applied springs 22, 22. This will, of course, move the brake shoes 12, 12 out of engagement with the brake pulley 10. Since the secondary brake shoes may be released when the motor is not running, the primary brake should exert sufficient force to hold the motor and the parts connected thereto in stationary position. In some instances, however, upon the application of the primary brake and the consequent application of the secondary brake, the motor and the parts connected thereto may be stopped so as to lift both the primary and secondary brakes applied to hold said motor and connected parts in stationary position. In such case, upon the energization of the magnet solenoid 7 or upon the rotation of the pulley 40 in an anti-clockwise direction, both brakes would evidently be released. The rope 43 illustrated in Fig. 7, when the brake operation is used in connection with an elevator, may be an operating rope running through and used in conjunction with the motor controlling apparatus for starting and stopping the elevator car.

Although, I have herein shown one form of my invention, I wish it to be understood that I do not desire to be limited to the exact details of construction, for obvious modifications will occur to a person skilled in the art.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:

In a compound brake, the combination with a brake pulley, of a rock plate, a primary brake carried by said rock plate, and associated with the outside surface of said pulley, a secondary brake similarly arranged, spring mechanism for effecting the application of said primary brake, and a plurality of link and lever connections between said rock plate and said secondary brake.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

AUGUST SUNDH.

Witnesses:

CHAS. M. NISSEN,

J. HALL KINSLEY.