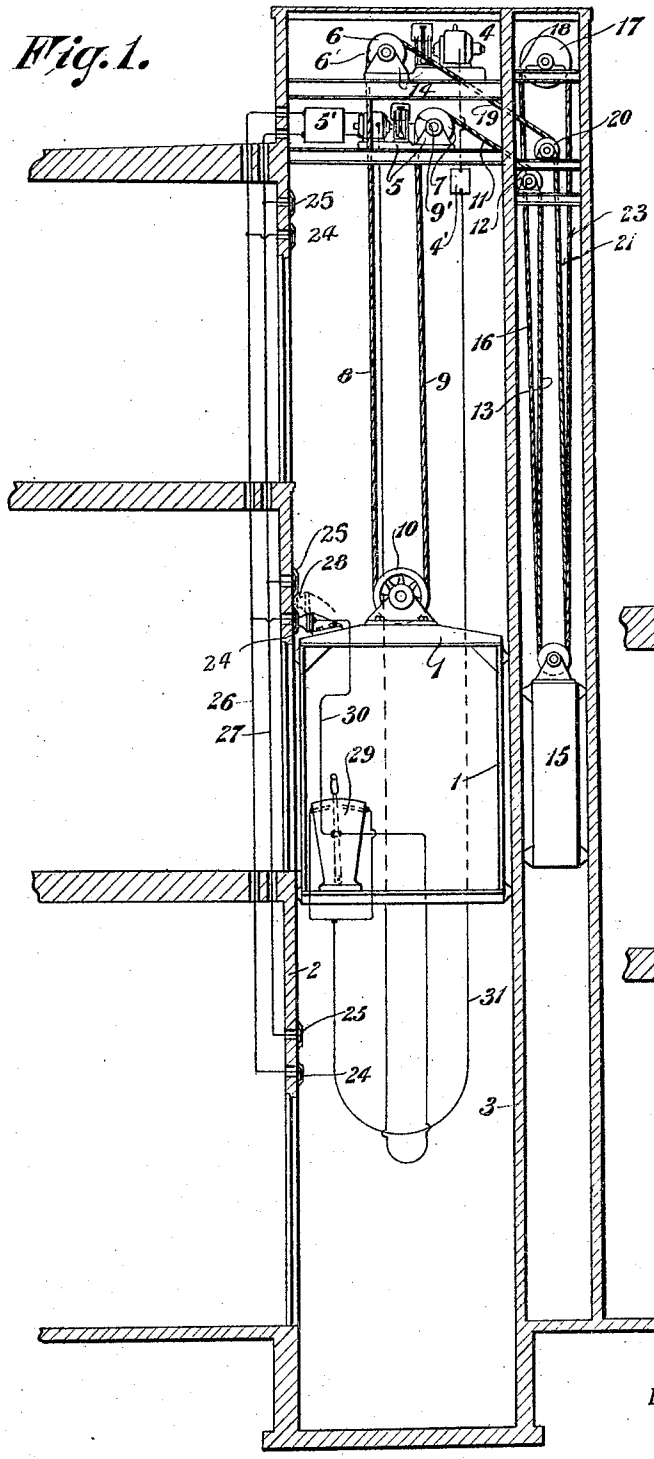
N. P. JULIEN.

HOISTING MECHANISM FOR ELEVATORS.

APPLICATION FILED FEB. 10, 1920.

1,419,783. Patented June 13, 1922.

Fig. 1.



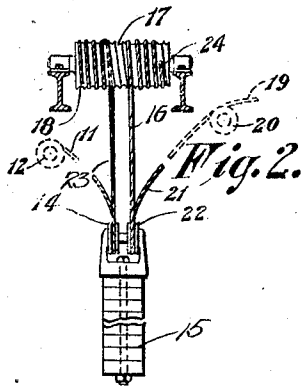
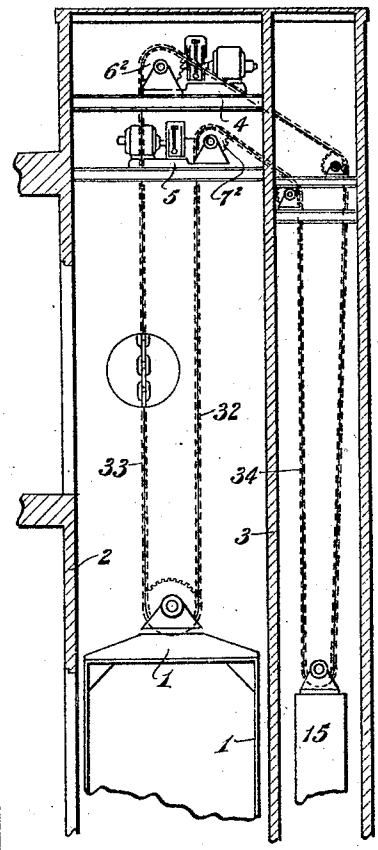


Fig. 2.

Fig. 3.



INVENTOR,
Napoleon P. Julien,
BY Harry W. Bowen.
ATTORNEY.

UNITED STATES PATENT OFFICE.

NAPOLEON P. JULIEN, OF SPRINGFIELD, MASSACHUSETTS.

HOISTING MECHANISM FOR ELEVATORS.

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To all whom it may concern:

Be it known that I, NAPOLEON P. JULIEN, a subject of the King of Great Britain, residing at Springfield, in the county of Hampden and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Hoisting Mechanism for Elevators, of which the following is a specification.

This invention relates to improvements in hoisting mechanisms or devices for elevators, and particularly to elevators which are operated, or raised and lowered, by means of electrically controlled motors, and having cable connecting means between the car and the motors.

An object of the invention is, in general, to provide a plurality of hoisting motors and direct connecting means between the motors and the car for the purpose of automatically stopping the car so that the floor of the car will be in exact alignment with the floor, or floors, of the building in which the elevator is installed. It is important, especially in the operation of freight elevators, that the floor of the building and the car platform should register or lie in the same horizontal plane when the car comes to rest. Such registration is necessary for the purpose of permitting a loaded truck to be easily moved from the car to the floor, or vice versa, without having the wheels of the loaded truck strike either the edge of the floor landing or the edge of the car's platform. Frequently either the truck or the edges of the floors or car are seriously damaged when they are not in registration.

It is a well known fact, at the present time, in the operation of elevators that it is almost impossible for the operator to bring the car to rest so that its platform and the floor line of the building are in the same plane, without it being necessary for him to resort to several trials to stop the car before the desired position or stopping point is obtained. Such a condition is not only wasteful of time, but is decidedly injurious to the operating mechanism, due to the sudden stopping and starting of a heavily loaded elevator car. My present invention is designed, therefore, to automatically overcome the above objections by employing a plurality, preferably two, electric hoisting motors, and so connected to the lifting cables, and counterweights, that one motor is normally used to raise or lower the car until it is brought to a point nearly in alignment with the floor, and at which point this motor is automatically stopped and the second motor is automatically started to slowly move the car so that it will be automatically stopped with its floor in exact alignment with the floor landing, as will be fully described in the body of the specification, illustrated in the drawings, and particularly pointed out in the claims.

Referring to the drawings:

Fig. 1 is an elevational view showing the car, the two hoisting motors, the cable connected to the motors, car, counter weight, and take up and release drum; also, conventional electrical connections for controlling the operation of the car and motors.

Fig. 2 is a detail side elevational view of the cable take up and release drum and the sheave wheels on the counter weight, and

Fig. 3 is an elevational view of a modification in which the take up and release drum is omitted and an endless chain or cable is employed.

Referring to the drawings in detail: 1 designates the elevator car, either for freight or passenger service, 2 and 3 the vertically arranged guide rails in which the car travels. 4 and 5 designates two electrically operated hoisting motors which may be of the same size, and which are provided with the usual cable traction drums 6 and 7. 8 and 9 designate the strands of the lifting cable which extend downward from each of the traction drums 6 and 7, and pass under the sheave wheel 10 on the car. Extending from the drum 7 is a strand 11 which passes over a supporting or guiding wheel 12, thence downward as shown at 13, under the left hand sheave wheel 14 on the counterweight 15, then upward at 23 to the cable take up and release drum 17 where one end of the cable is attached to one side and at the left hand end of this drum, as shown at 18. Extending from the traction drum 6 of the motor 4 is a strand 19 of the cable, which passes down over the supporting wheel 20, thence downward, as shown at 21, and under the right hand sheave wheel 22 on the counterweight 15, then upward at 16, to and around the right hand end of the take up and release drum 17, where the other end of the cable is attached to the opposite side and end of

the take up and release drum 17, as shown at 24 in Fig. 2. The two ends of the cable are therefore wound around the opposite ends of the drum 17 and in opposite directions. It will be seen from Fig. 2 that the strands 16 and 23 depend from the take up and release drum 17 from its opposite sides and are arranged adjacent to each other, so that as this drum is revolved to take up and pay out the opposite ends of the cable, the strands 16 and 23 will follow each other along the grooves of the drum in either a right or left hand direction, depending upon the direction of rotation of the drum and according to whether the car is rising or falling, as will be described.

Arranged along the sides of the elevator shaft are contact strips 24 and 25 located adjacent each floor of the building. These strips are electrically connected by means of the wires 26 and 27 to a controller box 5′ of the hoisting motor 5. A contact shoe 28 engages the strips 24 and 25, which is connected to the controller box 29 in the car, by means of the wire 30. It is understood that this box is connected to a suitable source of electrical energy. A wire 31 leads to a controller box 4′ of the main hoisting motor 4, in the well known manner.

Referring now to the operation of the apparatus, as shown in Figs. 1 and 2. Consider the levelling motor 5 at rest. The main lifting motor 4 is started to raise the car. The strand of cable 9 is held against movement by the idle motor 5; the point 9′ being considered the "dead end" of the part 9 of the cable. As the car rises, the strand 8 moves upward onto and off from the traction drum 6, then downward and over the supporting wheel 20. The downward movement of the strand 21 permits the counter weight 15 to fall. As it falls, the strand 16 moves upward and is wound onto the right hand end of the take up and release drum 17 (see Fig. 2). At the same time the strand 23 on the other end and side of the take up and release drum 17 unwinds from the same and permits the turns of the strand 16 to fall into the grooves of the drum 17 that are left open by the turns of the strand 23 as it leaves this drum. The counter weight 15 will fall at the same speed that the car 1 rises, since the strand 13 is fixed by the idle drum 7.

As the car approaches a landing, or stopping floor, the contact shoe 28 engages one of the contact plates 24. The current is now automatically shut off from the main operating motor 4 and switched onto the levelling or second motor 5 which operates the car at a much slower speed until the landing is reached, and automatically stops when the car reaches the level of the floor as the circuit is then opened by the shoe 28 leaving either one of the contacts 24 or 25 (see Fig. 1). Motor 4 is now idle, and motor 5 is operating. The operation and movement of the cable is now reversed. The cable strand 8 is now held fixed by the traction drum 6; 6′ being the "dead end" of the cable. Strand 9 is now drawn upward by the traction drum 7 and moves downward over the wheel 12, under the sheave wheel 14, upward as shown by the strand 23 and onto the take up and release drum 17. The opposite strand 16 is now leaving or unwinding from the drum 17, and the strand 23 falls into the grooves left open by the strand 16. This operation continues until the shoe 28 leaves the contact 24, when the circuit to the second or levelling motor 5 is opened and the elevator comes to rest with its platform exactly in line with the landing floor. It should be particularly observed that the drum 17 in addition to furnishing a means for securing the ends of the cable, is merely a take up and release drum for the slack or surplus length of cable which takes place as the car rises or falls, which is its only function. It is desirable that the leveling motor operate at lower speed than the lifting motor, in order to move the car at a lower speed and therefore bring the car to rest without shock or jar.

It will be seen from this construction or elevating system that when the car is within a short distance of the floor landing the shoe 28 on the car engages either one of the levelling contacts 24 and 25, depending upon the direction the car is travelling, thus cutting out or switching off the current to the main motor 4, and automatically cutting in the current to the levelling motor 5. This operation is effected by the operator placing the handle of the box 29 in the desired position. The motor 5 now slowly moves the car until the shoe leaves the contact, when the car is automatically stopped in exact alignment with the floor since the supply of current is now shut off. If the car should overrun its stopping position the shoe 28 would engage the other contact, again start the motor 5, and bring the car back to its correct stopping position. Should the car settle while being unloaded, the same operation would take place and the car be automatically brought back again by the slower moving motor 5.

It is also obvious that both motors may be used or operated together to lift the load at a speed equal to the sum of the speeds of both traction drums. That is to say, if the motor 5 operates the traction drum 7 at fifty feet per minute, and the motor 4 operates the traction drum 6 at two hundred feet per minute, it is obvious that if both drums are in operation to raise or lower the car, the cable will travel two hundred and fifty feet per minute.

The reason, therefore, of employing two electricially operated traction drums and

motors of different speeds, is to operate the car over the greater part of its travel at a comparatively high rate of speed per minute, and, as it approaches a landing, to disconnect the rapidly moving motor and its drum, and then connect and operate the slower moving motor and its drum, and thus bring the car to the desired landing without shock or jar. It is understood that the electrical connections are such that the operation is automatically accomplished if desired, but this forms no part of my present invention.

The take up and release drum is necessary because of the difficulty in obtaining an endless cable of sufficient strength, otherwise it may be omitted as shown in Fig. 3, where an endless chain is used. The links of the chain will, it is understood, fit into correspondingly shaped sockets in the traction drums and sheave wheels, indicated at 6^2 and 7^2 respectively. In this arrangement the counter weight 15 will move at the same speed as the car when one of the motors is idle, for example. The strand 32 is held against movement by the traction drum 7^2 as before, and the weight 15 will move at the same speed as the car. When 33 is held by the motor 4 against movement the strand 34 lengthens as fast as the strand 32 shortens. This would be a two to one lift, which is to say, the surface distance through which the drum moves is twice the distance through which the car moves. When both motors are operating together it would be a one to one lift, and the car speed or travel would be equal to the speed or travel of the drums. The weight 15 would fall as fast as the car rises. This arrangement does not require the use of a take up and release drum and possesses the advantage that an endless cable or chain can be used in performing the levelling operation already described. It is to be understood that the same electrical arrangement is to be used as already described in connection with Figs. 1 and 2, the principal object in both cases being the use of two independently operated motors to raise and lower the car and so connected that either one or both motors may be used for the purpose intended, namely to automatically bring the car to rest so that its platform is in registration with the floor or landing.

It is to be understood that while only one or a single cable connection is shown, in practice several cables would be used in order to carry and support the load.

It is to be understood by the term "cable" or "cable connections between the car, drum, and counterweight," that it is intended and understood to include the chain connections shown in Fig. 3—one is clearly the equivalent of the other in operation and function.

It is to be understood by the term "cable" used herein that it also includes the use of a chain construction for the connecting means between the car counter weight and hoisting drums.

What I claim is:

1. In an electric hoisting mechanism, the combination, of a car and a counterweight, a plurality of hoisting motors designed to move the car at different speeds, when one motor only is operated, a hoisting drum for each motor, cable connections between the car, counterweight, and said drums, said connections being so arranged that when one of said motors is inoperative the strand of the cable which is connected to the drum of the inoperative motor is held against movement while the drum of the other motor is in operation to operate the car at its speed, and vice versa, when the said inoperative motor is in operation and the said operative motor is inoperative, said car will be operated or lifted at a different speed by the said first mentioned inoperative motor, whereby the speed of the car can be varied as it approaches or leaves a landing.

2. In an elevator hoisting mechanism, the combination of a plurality of motors, for operating the car, cable traction sheaves connected to the motors, a counterweight, cable connections between the sheaves, the car and counterweight and so arranged that when either one of the motors is idle it will maintain that portion of the cables which are connected to said idle sheaves against movement during the time that the other motor is operating the car, and said cable connections also permitting both motors to be operated together.

3. In an elevator hoisting system, the combination, of a plurality of lifting motors, a car, a counter weight, a take up and release drum, and cable connection between the same, said connection permitting either one of the motors to operate while the other is idle, and the said drum to take up the slack in the cable as the car and counter weight are operated.

4. In an elevator hoisting system, the combination, of a plurality of lifting motors, a car, a counter weight, a take up and release drum, and a cable connection between the same, said connection permitting either one of the motors to operate while the other is idle, and said drum to take up the slack in the cable as the car and counter weight are operated, and said connection also permitting both motors to operate together when the take up drum becomes idle.

5. An elevating system having, in combination with the car, of a plurality of independently operating motors for moving or lifting the car, a counterweight for the car, direct cable connections between said car, motors and counterweight, a take up and release drum to which the ends of the cable are connected, and means for automatically

stopping and maintaining the car stationary at any desired point in its travel, said means being dependent upon the operation of only one of the motors.

6. In an elevating system, the combination, with the car, of two independently operating elevating motors, a counterweight and cable take up and release drum, a cable directly connected to said car, motors, counterweight and drum, as described.

7. In an electrically operated elevator mechanism, two electric motors designed to operate at different speeds, a car, a counterweight therefor, a cable receiving traction drum operated from each motor, and cable connections between the drums, car, and counterweight, said connections permitting each motor to operate independently of the other, and when either one of the motors is idle, for moving the car at different speeds, and said connection permitting both motors to operate to move the car at a speed equal to the combined speed of the cable drums when driven by the two motors.

8. An elevator hoisting mechanism, comprising two lifting motors which operate at different speeds, a traction drum for each motor, a car, a counterweight, and cable connections between the drums, car, and counterweight, said connections permitting one motor to operate the car in either direction and at comparatively high speed between the landing, while the other motor is idle and the cable on the idle drum becomes stationary, and when said high speed motor is idle, and the other, or slow speed motor is operated, to slowly move the car to the landing desired.

9. An elevator hoisting mechanism, comprising two lifting motors which operate at different speeds, a traction drum for each motor, a car, a counterweight, and cable connections between the drums, car and counterweight, said connections being continuous permitting one motor to operate the car in either direction and at comparatively high speed between the landings, while the other motor is idle and the cable on the idle drum becomes stationary, and when said high speed motor is idle and the other, or slow speed motor is operated, to slowly move the car to the landing desired.

NAPOLEON P. JULIEN.