C. G. ARMSTRONG.

ELEVATOR SAFETY MECHANISM.

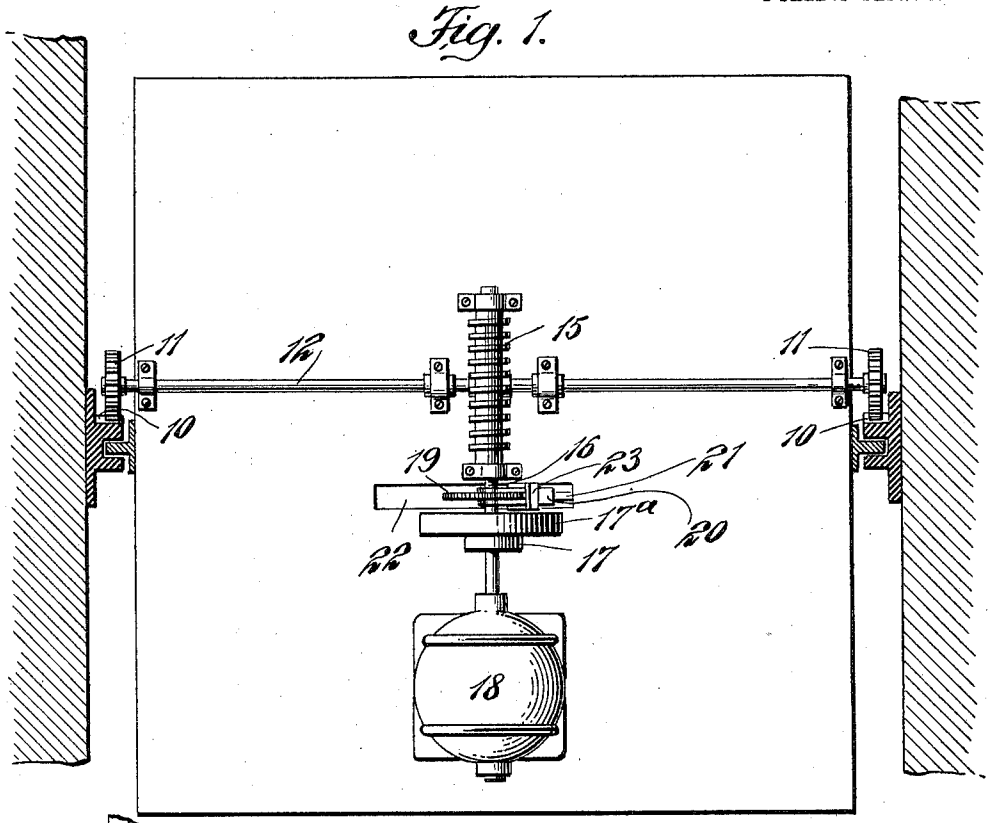
APPLICATION FILED NOV. 8, 1907.

1,032,320.

Patented July 9, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



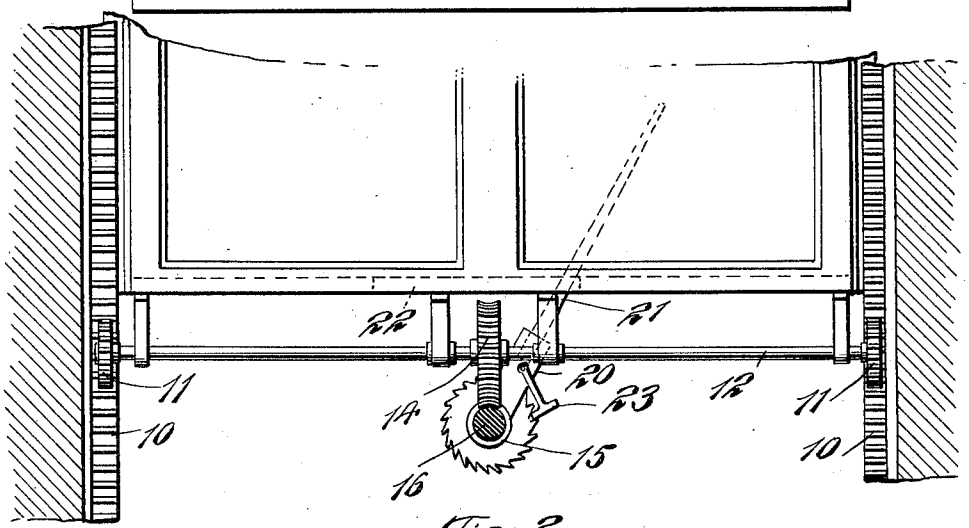


Fig. 2.

WITNESSES

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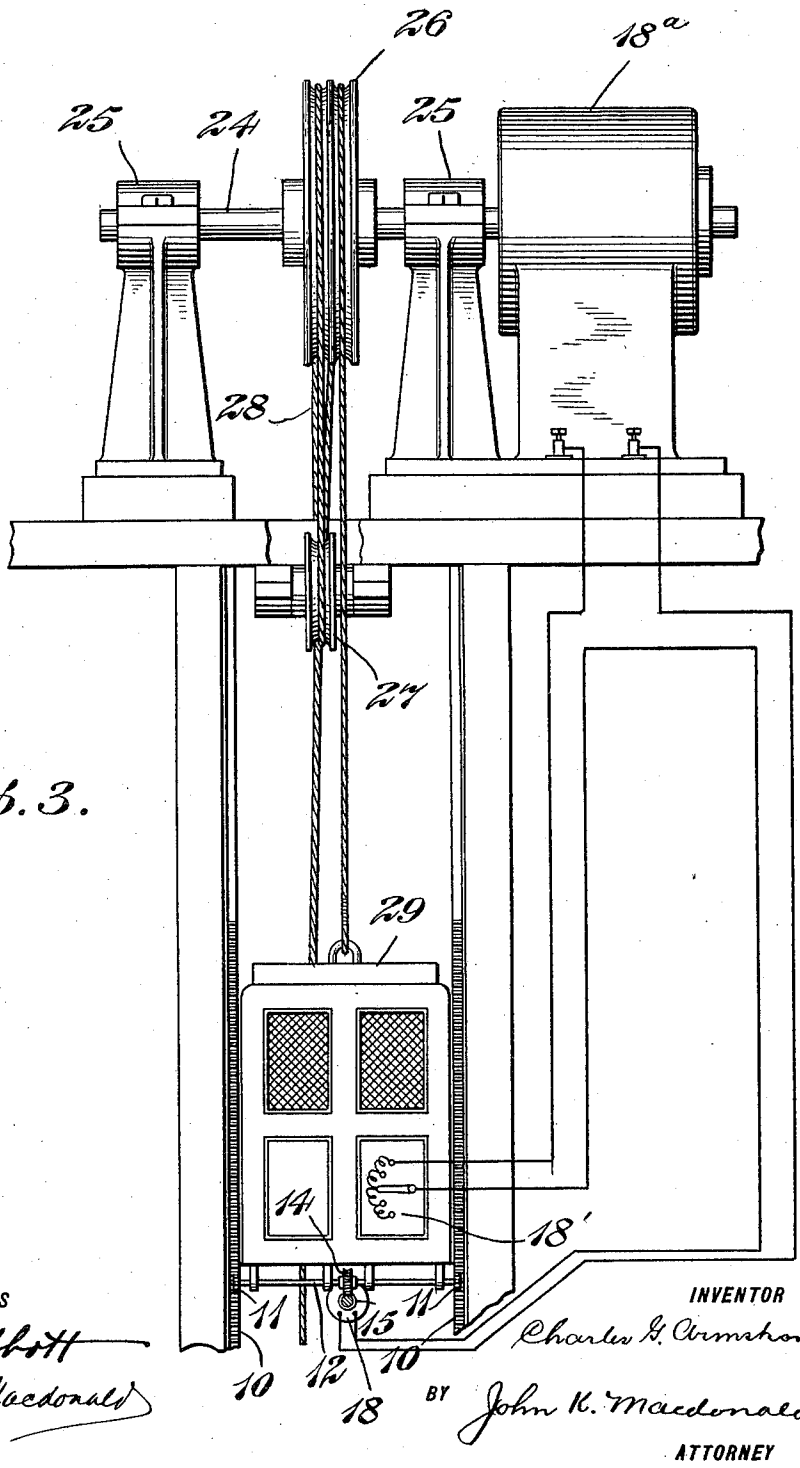

Fig. 3.

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ELEVATOR SAFETY MECHANISM.

1,032,320. Specification of Letters Patent. Patented July 9, 1912.

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To all whom it may concern:

Be it known that I, CHARLES G. ARMSTRONG, of the city of Orange, Essex county, and State of New Jersey, have invented certain new and useful Improvements in Elevator Safety Mechanism, of which the following is a full, clear, and exact specification, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of my invention is to provide a mechanism which will constitute a positive lock, bringing the car gradually to rest, but which, notwithstanding, will, while the elevator is in normal operation, clear itself freely and thus avoid in any way hindering the motion of the car. To this end I employ a worm-gearing or similar device and positively gear the same with a rack on the shaft. This worm-gearing I connect, preferably, by a friction-clutch with a motor which is operated simultaneously, or practically simultaneously, with the driving mechanism of the car. Preferably, the motor and worm-gearing are mounted on the car. When the hoisting mechanism of the elevator operates to raise or lower the car, this motor is simultaneously thrown into action, and it drives the worm-gearing so that it will clear itself and in no way retard the motion of the car during its normal operation. The circuit of the motor is so arranged with respect to the hoisting mechanism of the elevator that, should this mechanism become disarranged, the motor circuit will be broken and the worm-gearing will cease to operate, with the result that it will lock itself and prevent further movement of the car. In this manner the gearing moves freely during the normal operation of the car, and the instant the operation of the car becomes abnormal, the gearing locks and stops the car. Preferably, the worm is provided with a fly-wheel which causes it to come slowly to rest when the worm-operating motor stops, and avoids abruptly stopping the car.

My invention involves various other features of importance, and all will be fully set forth hereinafter and particularly pointed out in the claims.

Reference is had to the accompanying drawings, in which—

Figure 1 is a bottom plan view of an elevator car equipped with my improvement, the view showing the elevator shaft in section; Fig. 2 is a sectional elevation of the same parts; and Fig. 3 is a front elevation of the elevator as a whole.

10 indicates racks extending vertically at the sides of the shaft and in mesh therewith are two spur gears 11 which are fast on a shaft 12 revolubly mounted on the bottom of the car. To this shaft is secured a worm wheel 14 and in mesh therewith is a worm 15 secured to a shaft 16 which is suitably mounted on the bottom of the car and connected by a friction clutch 17 with the armature shaft of a motor 18. This motor is also suitably mounted on the bottom of the car and will have a speed sufficient to enable the gears 11 to clear the teeth of the rack 10 during the normal movements of the car. Preferably, the friction-clutch embodies a fly-wheel 17^a, which is secured to the shaft 16.

In Fig. 3, 18^a represents the hoisting motor, 18′ the rheostat, 24 the main shaft supported in bearings 25; 26 the grooved pulley over which, and the idler 27, the cable 28 passes, one end of said cable being attached to the car 29 and the other end to a counter-weight not shown.

The worm motor is arranged to be automatically started and stopped with the operation of the main elevator mechanism. For example, assuming that the elevator is operated by an electric motor, the circuit of the motor 18 will, for example, be in series with the elevator motor, as shown in Fig. 3, so that when the elevator motor is started, the motor 18 will also be started, and when the elevator motor is stopped, the motor 18 will be stopped. It will, therefore, appear that during the normal operation of the car, the motor 18 drives the worm gearing so that it will not lock and prevent the movement of the car. Should, however, any accident happen to the elevator operating motor, the operation of the motor 18 will instantly cease owing to the consequent disarrangement of its operating circuit. Should the car acquire abnormal speed, from the breaking of the cable, or any other cause (by which I mean a greater speed than is provided for by the motor 18), the worm-wheel 14 will lock with the worm 15, which will in turn cause the gears 11 to lock with the rack 10. The friction clutch 17 is employed, by preference, and, while it holds sufficiently to rotate the worm during the normal opera-

tion before described, it will give, upon the application of severe strain, and, should there be any inequality between the rotation of the worm wheel and the operation of the motor 18, the friction-clutch will compensate for this inequality of motion. The fly-wheel turns with the shaft 16 and when the motor 18 stops, the fly-wheel brings the worm 15 gradually to rest, thus avoiding bringing the car to a violent stop.

In the operation as hereinbefore described, the motor 18, through the worm 15, worm-wheel 14, and shaft 12, furnishes to the gears 11 a speed sufficient to clear the teeth of the rack 10 during the normal speed of the car. It is obvious, however, that the speed of the motor 18, and the worm-wheel connected therewith, may be so arranged that, instead of operating to positively clear the gears 11 from the teeth of the rack 10, the gears 11 may be allowed to be operated by the movement of the car, in which event the worm 15, will normally run idly, so as to clear the worm-wheel 14, but will control and brake the latter whenever any abnormal speed is developed in the car.

When the car is brought to a stop by this mechanism, should it stop between landings, it may be moved to the nearest landing by manually rotating the worm. For this purpose various devices may be employed. I have shown a ratchet 19 connected to the shaft 16 and co-acting therewith a swinging socket arm 20 having a reversible pawl 23. By inserting a bar such as 21 in the socket arm the pawl and ratchet may be operated and the worm rotated in either direction desired. Preferably, the floor of the car has an opening 22 through which the bar may be operated from within the car.

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

1. In an elevator, the combination of a car and mechanism for driving the same, a stationary part, a system of gearing incapable of being driven by the action of the car and connecting the car with the stationary part, and means other than the car driving mechanism and incapable of being actuated by the movement of the car for driving the gearing during the normal operation of the car only.

2. In an elevator, the combination of a car and means for driving the same, a stationary part, a system of gearing incapable of being driven by the action of the car and connecting the car with the stationary part, and a prime mover incapable of being actuated by the movement of the car to drive the gearing.

3. In an elevator, the combination of a car and means for driving the same, a stationary part, a shaft carried by the car, gearing connecting the shaft with the stationary part, a worm and worm-wheel connected to said shaft, and a motor, arranged to drive the gearing by means of the worm and worm-wheel during the normal operation of the car only.

4. In an elevator, the combination of a car and mechanism for driving the same, a stationary part, a system of gearing connecting the car with the stationary part and so arranged as to be incapable of being driven by the action of the car, a fly-wheel connected with the gearing, and means, other than the car-driving mechanism, for driving the gearing during the normal operation of the car only.

5. In an elevator, the combination of a car and mechanism for driving the same, a stationary part, gearing connecting the car with the stationary part, and so arranged to be incapable of being driven by the action of the car, means, other than the car-driving mechanism, for driving the gearing during the normal operation of the car only, and a friction-clutch connecting said means with the system of gearing to yield to inequalities in the motion of the parts.

6. In an elevator, the combination of a car and mechanism for driving the same, a rack extending along the line of travel of the car, a system of gearing incapable of being driven by the action of the car and connecting the latter with the rack, and means other than the car driving mechanism and incapable of being actuated by the movement of the car adapted to drive the gearing during the normal operation of the car only.

7. In an elevator, the combination of a car and mechanism for driving the same, a rack extending along the line traveled by the car, a system of gearing connecting the car with the rack and so arranged that the gearing cannot be driven by the action of the car, a motor, adapted to drive the gearing during the normal operation of the car only, and a friction-clutch connecting said motor with said system of gearing to yield to inequalities in the motion of the parts.

8. In an elevator, the combination of a car and mechanism for driving the same, a rack extending along the line of travel of the car, a shaft carried by the car, gearing connecting the shaft with the rack, a worm and worm-wheel connected to the shaft, a motor to drive the worm, and a friction-clutch connecting the motor with the worm, whereby the gearing may be driven during the normal operation of the car only.

9. In an elevator, the combination of a car, a motor and mechanism connected therewith for driving the car, a rack extending along the line of travel of the car, gearing incapable of being driven by the action of the car and connecting the latter with the

rack, a second motor remote from the stationary part and means connected therewith for driving said gearing during the normal operation of the car only.

10. In an elevator, a car, a motor and mechanism connected therewith for driving the car, a rack extending along the line of travel of the car, a shaft carried by the car, gearing connecting the shaft with the rack, a worm and worm-wheel connected with said shaft, a second motor and mechanism connected therewith for driving said worm during the normal operation of the car only, and a friction-clutch connecting the worm and the mechanism of the second motor.

11. In an elevator, a car, a motor and mechanism connected therewith for driving the car, a rack extending along the line of travel of the car, a shaft carried by the car, gears connecting said shaft with said rack, a worm and worm-wheel connected with said shaft, a second motor and mechanism connected therewith for driving the said worm during the normal operation of the car only, a friction-clutch connecting the worm and the mechanism of the second motor, and a fly-wheel connected with the worm.

12. In an elevator, the combination of a car, a motor for raising and lowering the car, a stationary part, a system of gearing incapable of being driven by the action of the car connecting the car with the stationary part, and a second motor remote from the stationary part acting simultaneously with the first mentioned motor and adapted to drive the gearing during the normal operation of the car.

13. In an elevator, the combination of a car, a motor and mechanism for raising and lowering the car, a stationary part, a system of gearing connecting the car with the stationary part and so arranged as to be incapable of being driven by the action of the car, a second motor located upon the car and acting simultaneously with the first named motor and adapted to drive said gearing during the normal movement of the car, and a rheostat also upon the car arranged to control both motors.

14. In an elevator, the combination of a car, a motor and mechanism for raising and lowering the car, a stationary part, a system of gearing connecting the car with the stationary part and so arranged as to be incapable of being driven by the action of the car, a second motor located upon the car and acting simultaneously with the first named motor and adapted to drive said gearing during the normal movements of the car, a rheostat also upon the car arranged to control both motors, and a friction-clutch connecting the second motor with said system of gearing.

15. In an elevator, a car, a motor and mechanism connected therewith for driving the car, a rack extending along the line of travel of the car, gearing connecting the car with the rack and so arranged as to be incapable of being driven by the action of the car, a second motor and mechanism connected therewith for driving said gearing during the normal operation of the car only, and means for manually operating the gearing.

16. In an elevator, the combination of a car and mechanism for driving the same, a stationary part, gearing connecting the car with the stationary part and so arranged as to be incapable of being driven by the action of the car, means other than the car-driving mechanism for driving the gearing during the normal operation of the car only, and a yielding member connecting said means with the system of gearing.

17. In an elevator, the combination of a car, a motor and mechanism for raising and lowering the car, a stationary part, a system of gearing connecting the car with the stationary part and so arranged as to be incapable of being driven by the action of the car, a second motor located upon the car and acting simultaneously with the first named motor and adapted to drive the gearing during the normal movements of the car, a rheostat also upon the car arranged to control both motors, and a yielding member connecting the second motor with said system of gearing.

18. In an elevator, the combination of a car and mechanism for driving the same, a stationary part, a system of gearing at all times incapable of being driven by the action of the car and connecting the car with the stationary part, and driving mechanism not dependent for its operation upon the movement of the car to drive the gearing.

19. In an elevator, the combination of the car, a motor and mechanism connected therewith for driving the car, a rack extending along the line of travel of the car, gearing at all times incapable of being driven by the action of the car and connecting the latter with the rack, and a prime-mover not contacting with the stationary part for driving said gearing.

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

CHARLES G. ARMSTRONG.

Witnesses:
EUGENE S. MACDONALD,
ISAAC B. OWENS.