D. L. LINDQUIST.

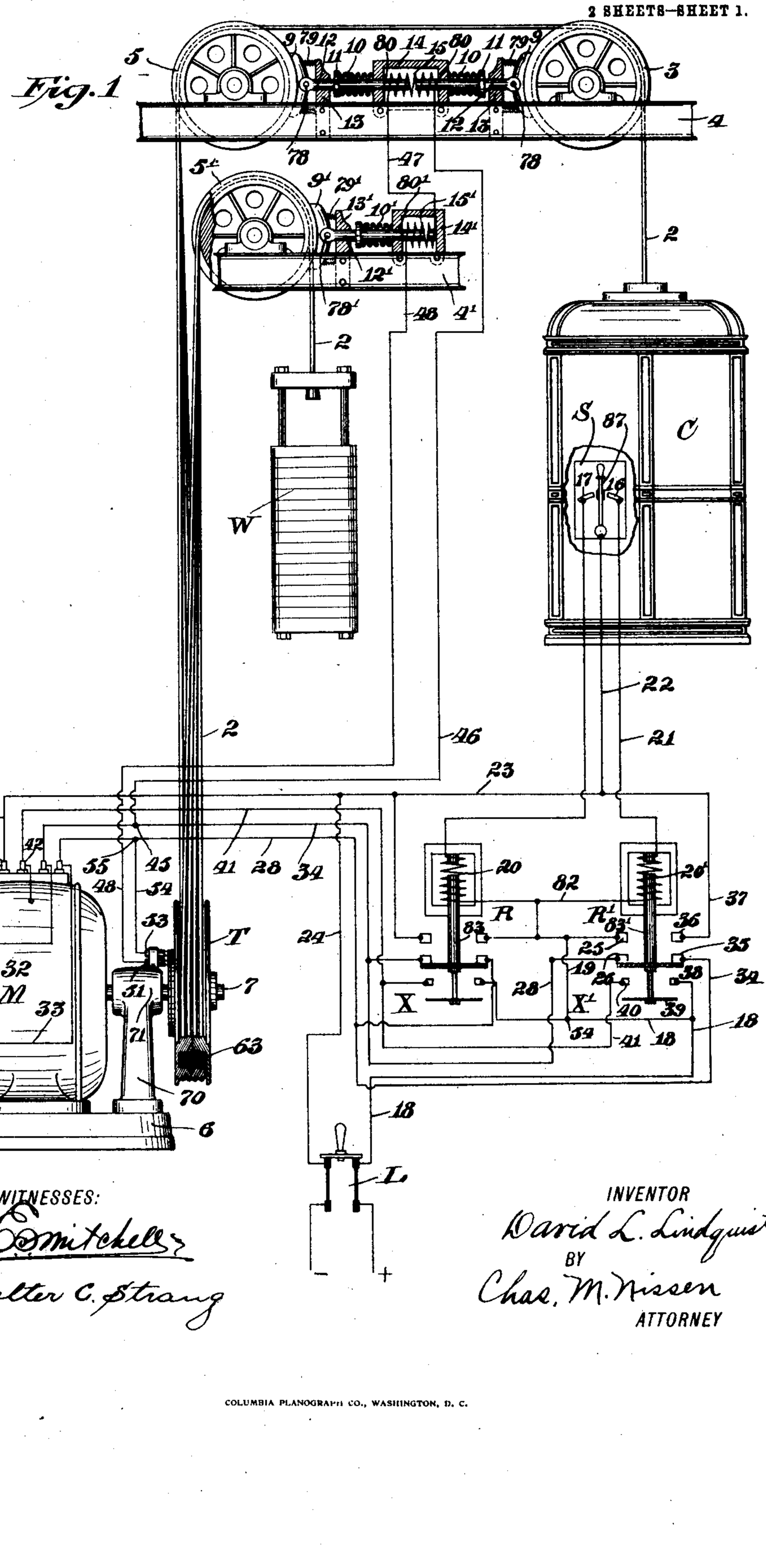
MAGNETIC TRACTION WHEEL DRIVE ELEVATOR.

APPLICATION FILED DEC. 16, 1905.

996,933. Patented July 4, 1911.

2 SHEETS—SHEET 1.

Fig. 1



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2 SHEETS—SHEET 2.

Fig. 2.

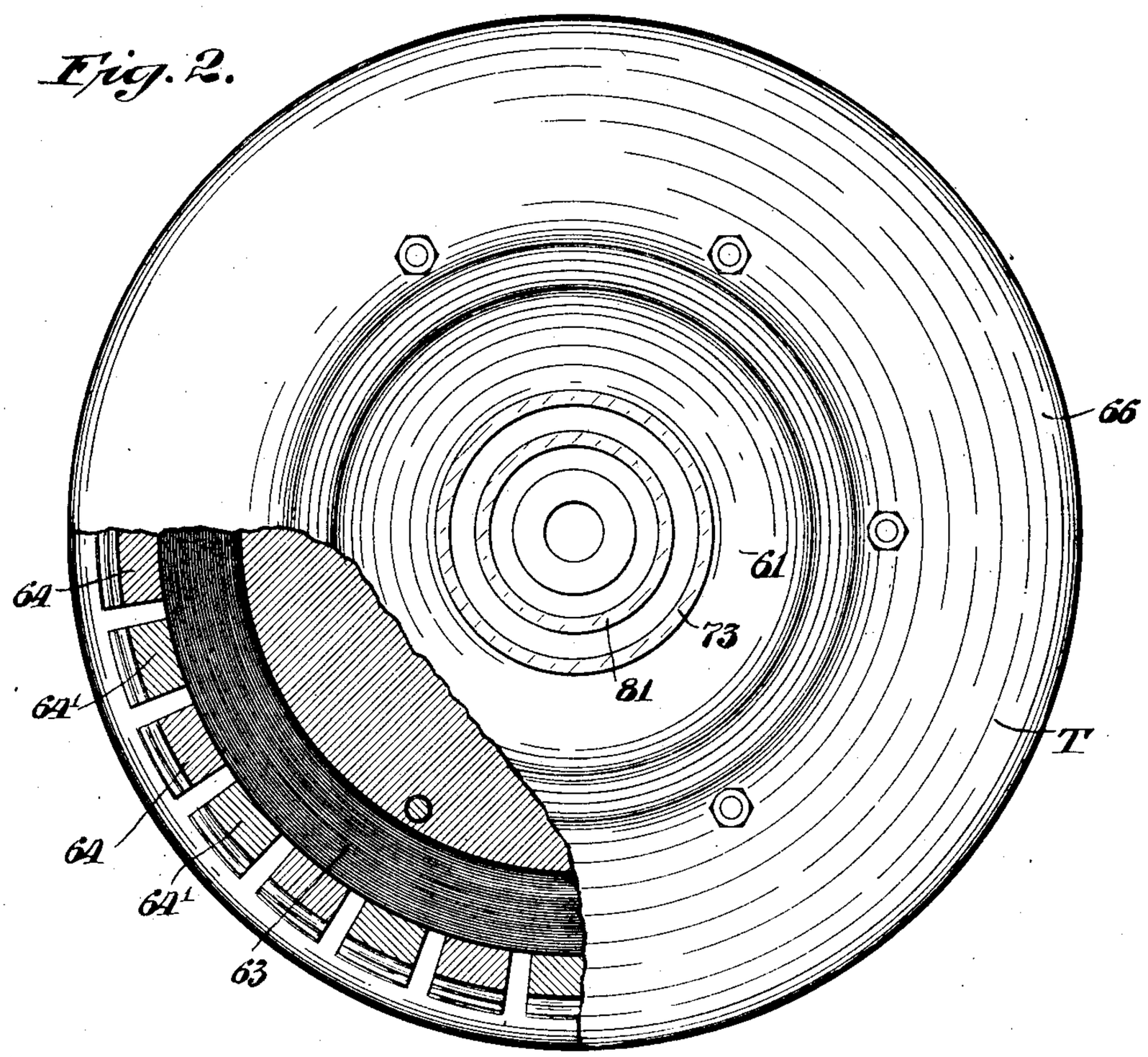
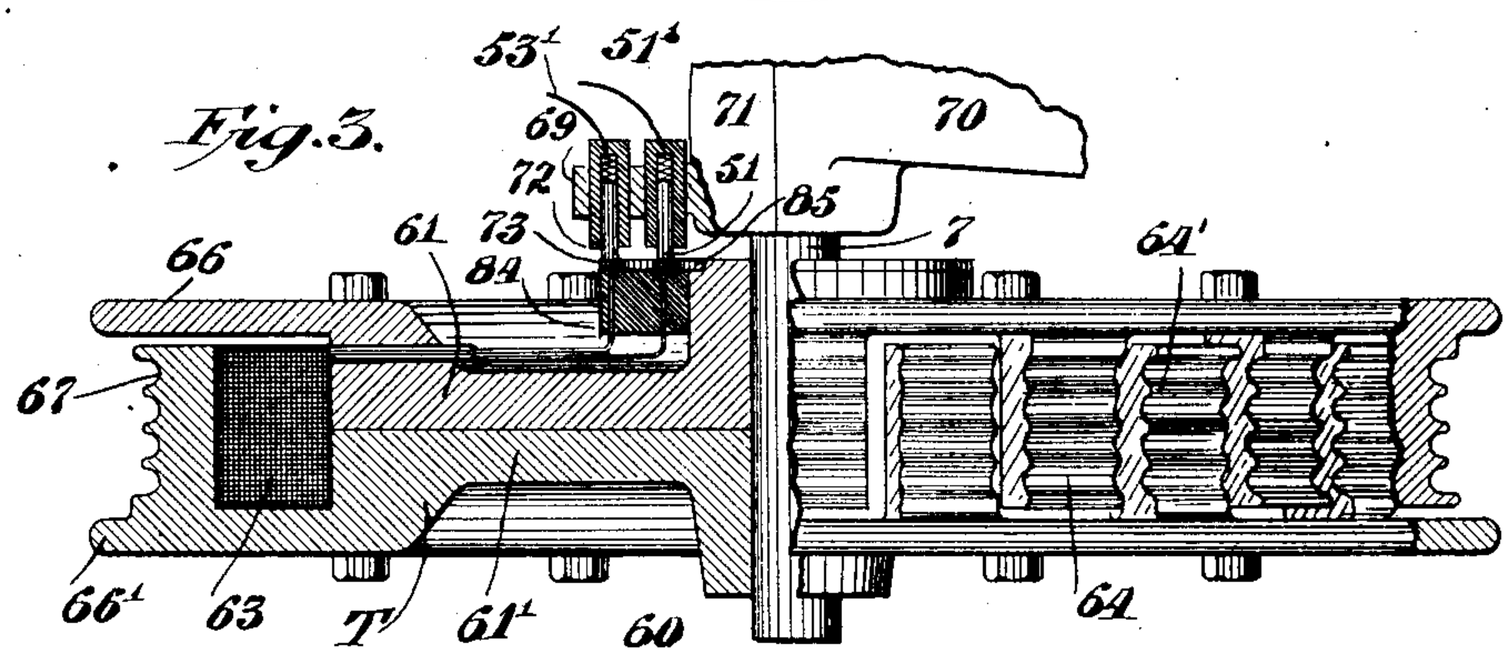


Fig. 3.



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UNITED STATES PATENT OFFICE.

DAVID L. LINDQUIST, OF YONKERS, NEW YORK, ASSIGNOR TO OTIS ELEVATOR COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MAGNETIC-TRACTION-WHEEL-DRIVE ELEVATOR.

996,933. Specification of Letters Patent. Patented July 4, 1911.

Application filed December 16, 1905. Serial No. 291,979.

To all whom it may concern:

Be it known that I, DAVID L. LINDQUIST, a subject of the King of Sweden, residing in the city of Yonkers, in the county of Westchester and State of New York, have invented a new and useful Improvement in Magnetic-Traction-Wheel-Drive Elevators, of which the following is a specification.

My invention relates to traction drive elevators, and one of its objects is the provision of a simple and efficient magnetic driving sheave.

A further object of the present invention is the provision of brake apparatus in connection with the guiding sheaves of a traction elevator system.

Other objects of my invention will appear hereinafter, the novel combinations of elements being pointed out in the claims.

In the accompanying drawings, Figure 1 represents more or less diagrammatically an elevator system with my invention applied thereto; Fig. 2 shows a side view, partly in section, of the magnetic traction drive wheel; and Fig. 3 is a plan view, partly in section, of said wheel.

Referring to Fig. 1, it will be seen that I have illustrated an elevator car C connected by one or more ropes or cables 2 to a counterweight W, said ropes passing over the sheaves 3 and 5, thence downwardly under the traction wheel T, and upwardly to and over the sheave 5′. The arrangement of the sheaves and their number may be varied as desired and any type of car or counterweight suitably guided may be used. The sheaves 3 and 5 are in this instance supported by the overload beam 4, and sheave 5′ is mounted on beam 4′. The beams 4 and 4′ may be in the same plane or the sheaves 5 and 5′ may be supported on opposite sides of the beam 4.

M designates a shunt-wound motor which is here shown only for the sake of illustration, as any other source of power for driving the traction wheel or sheave T may be employed.

I do not desire to restrict myself to an electric motor, as my invention may be operated independently of the motor circuits if desired. The motor M is mounted on a bed-plate 6 as also is the standard 70 which supports the bearing 71.

7 designates the armature shaft to which is rigidly secured the traction drive wheel T. The shaft could also be provided with a brake pulley and brake mechanism connected to be electrically released in any well-known way. Brake apparatus could also be used on the car or counterweight or both, but I preferably use brake apparatus only in connection with the overhead sheaves. This brake apparatus can be so constructed that it can be depended upon in connection with the sheave T for retarding and stopping the elevator. In this instance, I have shown brake shoes 9, 9 pivotally connected at 78, 78 to the rods 12, 12 the inner ends 80, 80 of which form the cores of an electromagnet having the solenoid 15. This solenoid 15 is placed in a casing 14 which is fastened to the beam 4. The brake springs 10, 10 encircle the outer ends of the cores 80, 80 between the casing 14 and the collars 11, 11 which are rigidly connected to the rods 12, 12. These rods are suitably guided in the supports 13, 13 which are secured to the beam 4 and springs 79, 79 may be inserted above and below the rods 12, 12 between the supports 13, 13 and the shoes 9, 9 to maintain the latter in proper position.

The brake apparatus for the sheave 5′ is similar to that already described, like parts being designated by the same reference characters with prime marks added thereto. The electromagnet for releasing the brake shoe, however, is shown with only one core.

S designates a manual electric switch in the car for controlling the electric reversing switches R, R′ and auxiliary switches X, X′. When the lever 87 of the switch S is moved onto the contact strip 16, a controlling circuit is closed from the positive main by way of main line switch L to and through wires 18, 19 and 82, solenoid 20′, wire 21, contact strip 16, lever 87, wires 22, 23 and 24, main line switch L to the negative main. The solenoid 20′ will therefore be excited to effect the closure of the switch R′ by lifting the core 83′. The motor circuit will thus be closed from the positive main by wires 18, 19, to and through contacts 25, 26, wires 28, 33, armature brush 31, armature 32, brush 30, wire 34, contacts 35, 36, wires 37, 24, to the negative main. The shunt field is closed by means of the auxiliary switch X′ from wire 18 and by way of contact 38, bridge piece 39, contact 40, wire 41, motor terminal 42, shunt field, motor terminal 43, wires 44,

24 to the negative main. If the lever 87 is moved in the opposite direction, the solenoid 20 would be excited and the circuits to the motor reversed. When the armature circuit is closed a shunt circuit is also closed from the point 45 by way of wire 46, magnet winding 15, wire 47, solenoid 15′, wire 48, terminal 51, winding 63 of the traction wheel T, terminal 53, wire 54, to point 55. It will therefore be seen that the solenoids 15, 15′ and winding 63 are connected in series with each other in a circuit connected across the armature. These solenoids and winding may be otherwise connected if desired, as, for example, in parallel with each other or even in circuits entirely independent from the motor circuits but controllable from the car. The traction wheel T which is shown in detail in Figs. 2 and 3, in this instance comprises two circular sections or halves which may be bolted together after the winding 63 has been placed in position. Each section or half is provided with a plurality of lateral projections near the periphery and at a predetermined distance from each other.

In Fig. 3, 61, 61′ designate the web portion of the wheel 66, 66′ the flanges of the rims, and 64, 64′ the lateral projections. A suitable recess is provided in each section for the reception of the winding 63. When this winding is in place, the sections are so adjusted before being bolted together that the projections of one section do not touch the projections of the next section. The two sections then appear to be dovetailed into each other with air-gaps between the projections, or said gaps may be filled with some non-magnetic material for the purpose of making a stronger and better wearing wheel. The purpose of the lateral projections is not only to obtain a strong attraction between the sheave when energized and the magnetic cables but also to prevent wear of the ropes as would be the case if the sections were separated circumferentially by one or more slots filled with non-magnetic material. The sections need not necessarily be rectangular or square as other zig-zag connections could be used without damaging the ropes or cables; for example, the poles could be triangular or semi-circular in shape, instead of rectangular. Preferably the poles are cast integral with the web sections, but they may be made separately and secured in proper position, or any other change requiring only mechanical skill could be made without departing from the spirit and scope of my invention. Now when the solenoid 63 is excited with current the wheel becomes an electromagnet, and the projections are in effect alternate north and south poles. The ropes 2 should be of magnetic material, as well as the sections of the traction wheel so that the ropes or cables will be strongly attracted by the wheel and thus prevent any slipping and materially increasing the power which may be transmitted from the motor M through the traction wheel T to said ropes to lift and lower the car C.

Various means could be used for directing the current to the winding 63. I have shown a ring of insulation 84 secured to the hub 60 and carrying circular contact strips or slip rings 73 and 85 which are connected to the terminals of the coil 63. Stationary brushes 72 and 51 suitably insulated from each other and spring-pressed, if desired, are mounted in the bracket 69 which extends upwardly from the journal bearing 71. 51′ and 53′ designate leads which correspond respectively with the terminals 51 and 53 of Fig. 1.

It should be noted that when the elevator is first started, much more power is required than when the car is under way and although as shown the winding 63 receives more current as the motor increases in speed, it can be designed to receive sufficient current at starting to prevent slipping and to obtain so great a tractive power that additional sheaves for securing the necessary friction are not necessary. The use of the traction drive sheave therefore not only increases the power that can be transmitted but also lessens the number of operating sheaves necessary and greatly lengthens the life of the ropes as less bending of the same is required when a magnetic sheave is used and intermediate sheaves omitted. If the car lever 87 had been moved to the left onto contact strip 17, the solenoid 20 would have been excited and the switches R and X closed to reverse the motor M but energizing the traction wheel and releasing the overhead sheave brakes as before.

I am aware of the co-pending application of August Sundh, filed Dec. 16, 1905, Serial No. 291,986, and I do not herein claim anything disclosed in said application.

Without limiting myself to the exact construction of details and arrangement of parts herein shown and described, what I claim as my invention and desire to have protected by Letters Patent of the United States is:

1. In a traction elevator, the combination with a car, counterweight and connecting magnetic cables, of one or more sheaves for directing said cables, brake apparatus for said sheaves, electric means for releasing said brake apparatus, a magnetic traction sheave associated with said cables, a motor for driving said traction sheave, motor controlling means, and a single controlling device within the car controlling the electric circuit for the magnetic sheave and also permitting the said electric-releasing-means and said motor-controlling-means to be operated at will from the car.

2. In a traction elevator, the combination with a car, of one or more hoisting cables, one or more directing sheaves for said cables, brake mechanism arranged to be applied to said sheaves to assist in stopping the car, an electro-magnetic traction sheave, a motor for driving said sheave, and electric releasing means for said brake mechanism, said electric releasing means being in circuit with said electro-magnetic sheave.

3. In a traction elevator, the combination with a car, counterweight and cable, of one or more directing sheaves, brake apparatus for said sheaves, an electro-magnetic traction sheave, a motor for driving the traction sheave, and a device for controlling said brake apparatus and the electric circuit for said electro-magnetic sheave.

4. In a traction elevator, the combination with a car, counterweight and connecting cables, of one or more directing sheaves for the cables, electro-magnetic brake apparatus for said sheaves, an electro-magnetic traction sheave, an electric motor connected to said traction sheave, and a controller for the circuits of the brake apparatus, electro-magnetic sheave and motor.

5. In a traction elevator, the combination with a car, counterweight and cable, of brake mechanism, an electro-magnetic traction sheave, and means for simultaneously releasing the brake mechanism and magnetizing the traction sheave, and a motor for driving the traction sheave.

6. In a traction elevator, the combination with a car, counterweight and cable, of a plurality of electro-magnetic brakes located at different points in the path of travel of the cable, an electro-magnetic driving sheave, said brakes and sheave being in the same electrical circuit, a motor for driving said sheave, and a controller for said circuit.

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

DAVID L. LINDQUIST.

Witnesses:
CAMPBELL SCOTT,
CHARLES M. NISSEN.