A. E. BROCK.

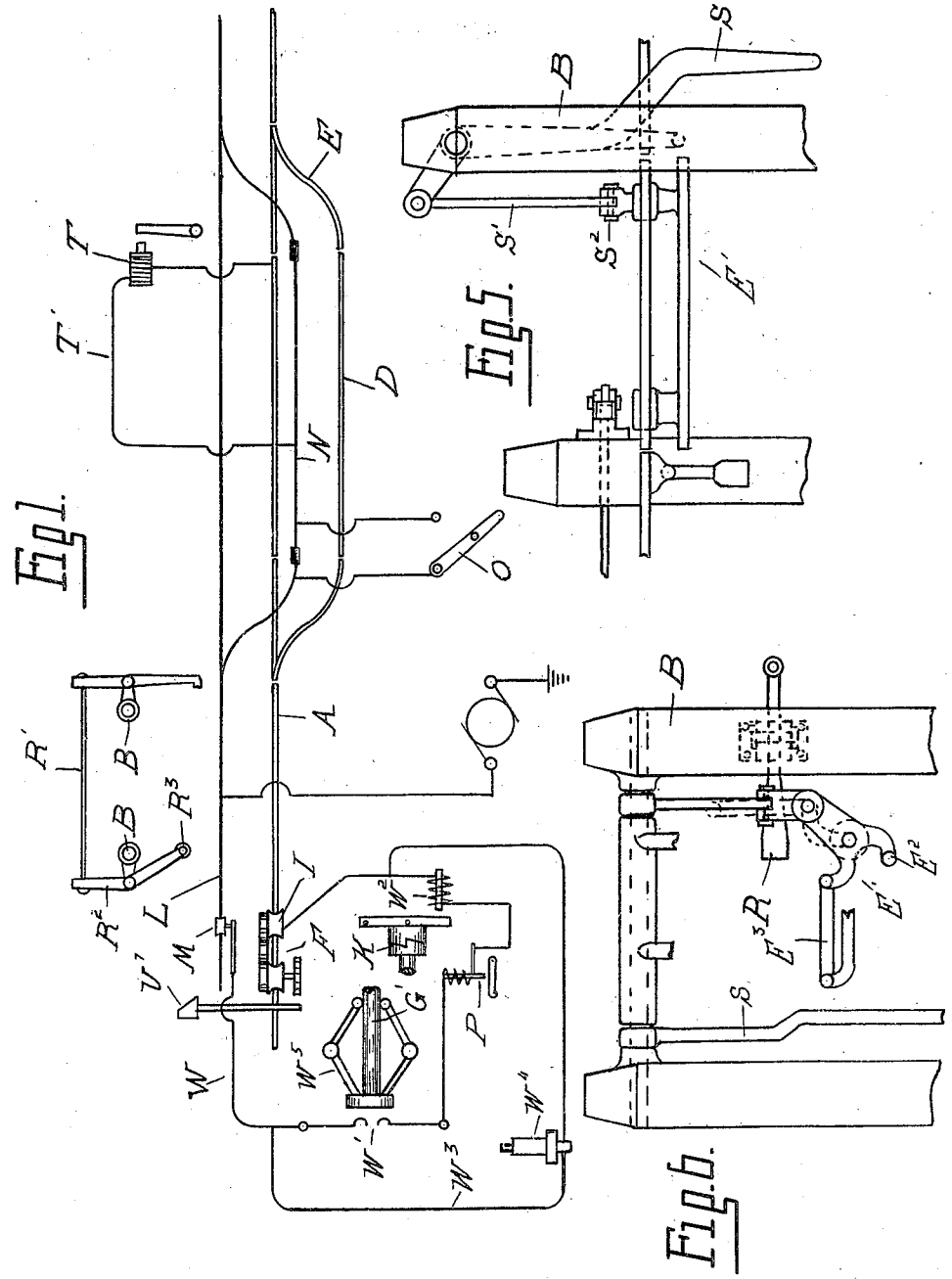
ELEVATED TRANSPORTATION SYSTEM.

APPLICATION FILED SEPT. 17, 1908.

922,662.

Patented May 25, 1909.

3 SHEETS—SHEET 1.



Witnesses

H. C. Ford

J. F. Belknap

Inventor

Arthur E. Brock.

By Whittemore, Hulbert & Whittemore

Attys.

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3 SHEETS—SHEET 2.

Fig. 2.

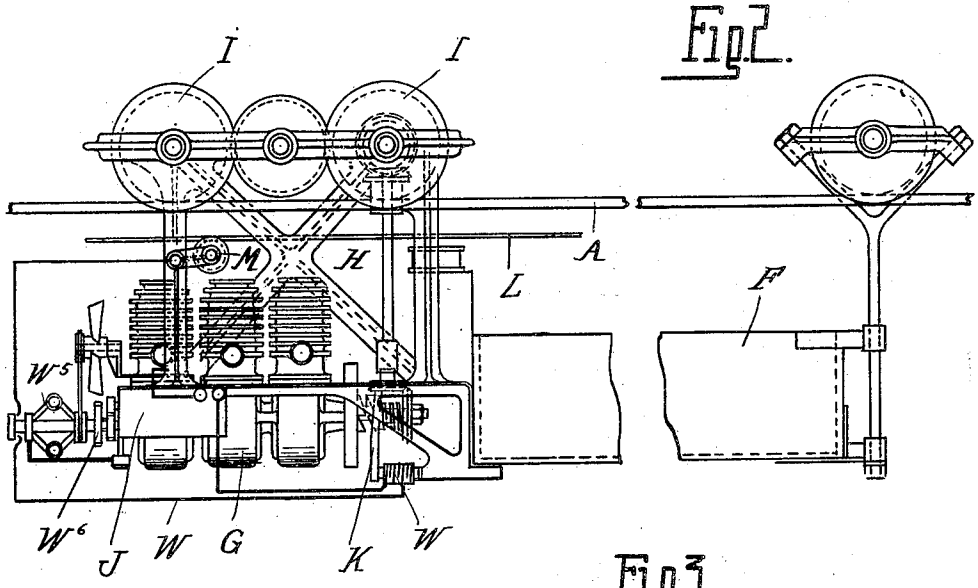
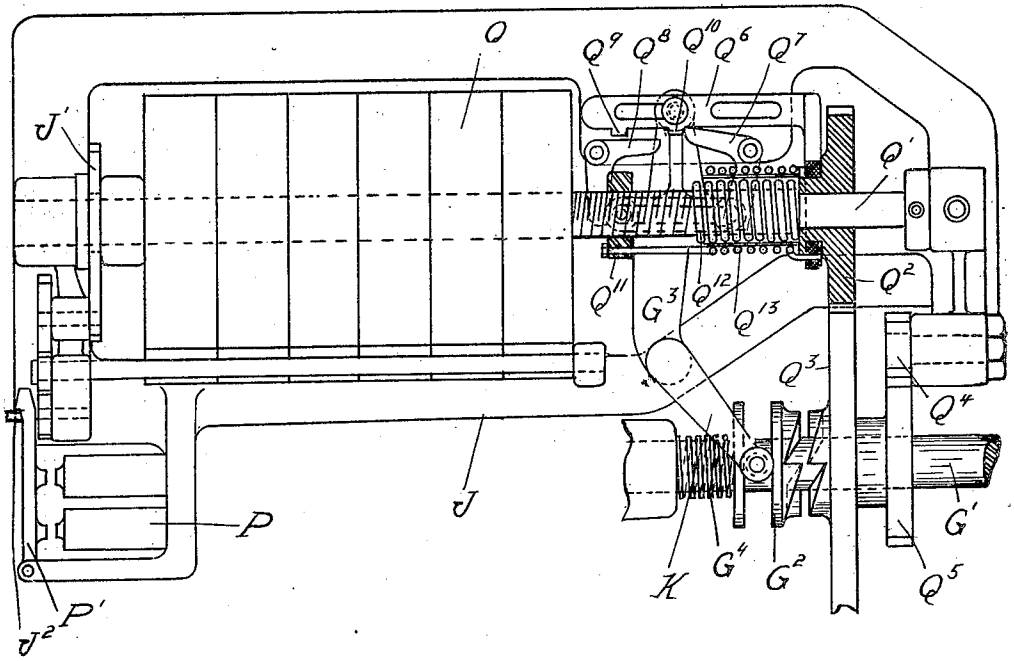


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

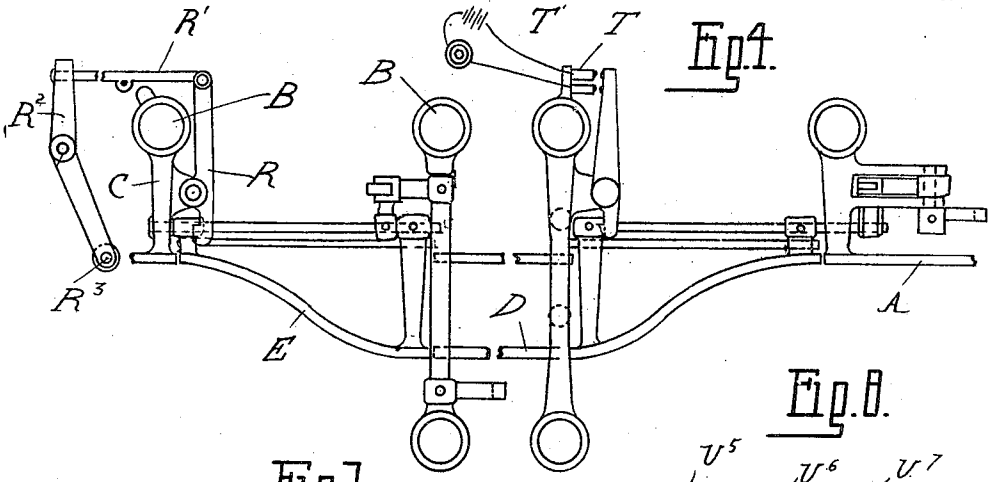

Fig. 7.

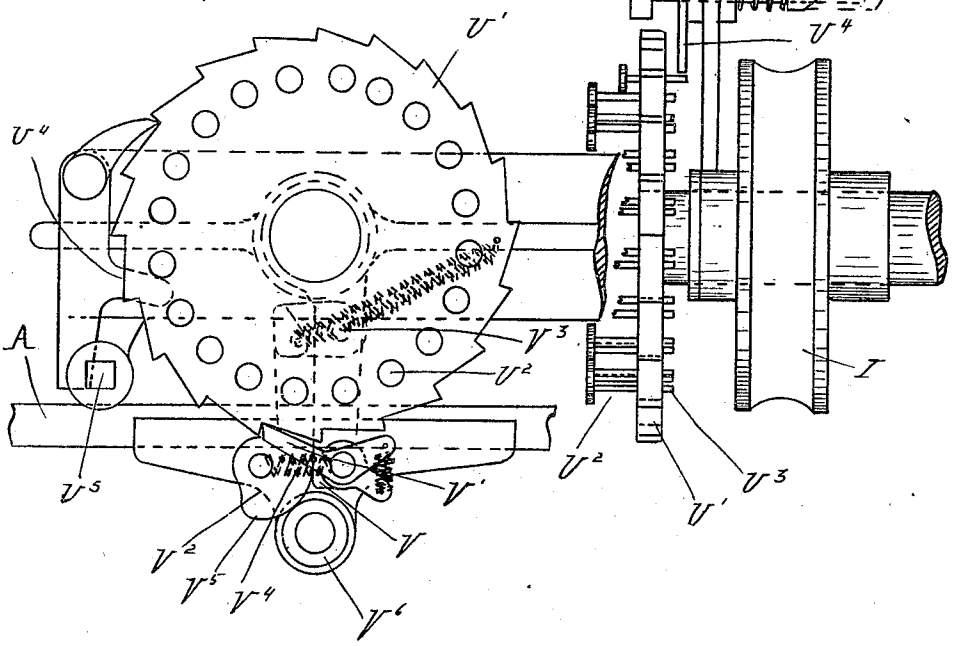

Fig. 8.

Witnesses

F. L. Ford

F. J. Bulknap

Inventor

Arthur E. Brock.

By Whittemore Hulbert & Whittemore

Attys

UNITED STATES PATENT OFFICE.

ARTHUR E. BROCK, OF DETROIT, MICHIGAN, ASSIGNOR OF ONE-HALF TO HENRY P. FOGLESANG, OF SPRINGPORT, MICHIGAN.

ELEVATED TRANSPORTATION SYSTEM.

No. 922,662. Specification of Letters Patent. Patented May 25, 1909.

Application filed September 17, 1908. Serial No. 453,513.

To all whom it may concern:

Be it known that I, ARTHUR E. BROCK, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Elevated Transportation Systems, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to elevated transportation systems and is more particularly designed for use for the transportation of relatively small articles, such as are usually shipped by mail or express.

It is the object of the invention to obtain a system which may be constructed and operated at relatively low cost, and which is adapted for the rapid automatic transportation of goods from any station along the line to any other point desired.

To this end, the invention consists, first—in a system having a cable track and suspension cars traveling thereon; further, in the employment of automatically-controlled motors for the individual cars thereby dispensing with a power system for the entire line; furthermore, in the specific character of the motor cars and the means employed for starting, stopping and otherwise controlling the same; further, in the means employed for automatically switching the cars and the selective mechanism by which said switches are controlled, and, further, in various features of construction as hereinafter set forth.

Figure 1 is a diagram illustrating the general arrangement and organization of the system; Fig. 2 is a side elevation of one of the motor cars; Fig. 3 is a sectional elevation of the starting mechanism for the motor; Fig. 4 is a plan view of the switch; Fig. 5 is a side elevation thereof; Fig. 6 is an end elevation; Fig. 7 is a sectional side elevation of the selective switch-controlling mechanism; and Fig. 8 is a plan view thereof.

My improved system comprises a cable track A, which is supported by a series of posts B and hangers C. This track extends either in a circuit or between terminal stations and at various intermediate points are sub-stations. At each station there is provided a siding D and switches E for connecting said siding into the main line.

The motor cars F are preferably provided with explosion motors G, which, through the medium of a transmission H, operate the drive wheels I engaging the cable track. A starting mechanism J is also provided for setting the motor in operation, this also controlling a clutch K in the transmission by which the load is thrown off the motor when started.

The controlling of the motor is preferably effected through an electric line L from which current is taken through a trolley M, this being used for the electric igniter and also for operating various electro-magnetic switches, as will be hereinafter described. Thus although each car furnishes its own motive power it is partly controlled in its operation by means common to the entire system.

It is necessary to provide means by which the cars started either at the terminals or the sub-stations may be caused to travel continuously therefrom to any desired station predetermined. To this end the track switches along the line are all normally set to direct the cars over the main track and are only changed to direct the cars upon the siding by the operation of the means controlled by the moving cars. The switch-operating mechanism therefore comprises mechanically-operated means which is controlled from the car when passing a point some distance in advance of the switch. Each of the switches is thus constructed, and the cars are provided with a selective switch-controlling mechanism which may be set at the starting point to operate the switch at the point of destination.

From the general description above given, it is apparent that my system comprises essentially the cable track, sidings at the various stations, track switches, cars propelled by individual motors, controlling means for stopping and starting the cars, and operating mechanism for each switch and a selective control for each car coöperating with the switch-operating mechanism, whereby the car is directed on to the siding at the destination point.

The specific construction of the various devices above given is not essential to the present invention, and various modified constructions may be employed, but I shall describe one construction which may be used with the system.

The motor car, as has already been described, is provided with the explosion motor G, the transmission H, track wheels I, and clutch K, while the current used for the igniter is supplied by the line L and is con-

ducted through the trolley M and returned through the track wheels I to the cable. Thus, the car, when in operation, may be stopped by the breaking of the igniter circuit and this is preferably effected by running the trolley M on to a dead section N of the electric line when the car enters the siding. To start the car current is supplied to the section N through the temporary closing of a switch O connecting the same with the main electric line. This will again furnish current for the igniter and will also operate an electromagnet P, which releases the motor-starting mechanism J.

Motor-starting mechanism.—This mechanism, as illustrated, comprises a series of spiral springs Q which normally are under tension and which will exert a torque upon an axially-arranged shaft Q′. This shaft has mounted thereon the slidable gear Q^2, which in one position meshes with the gear Q^3, and in another position with a pinion Q^4, arranged parallel to said gear.

The gear wheel Q^3 is loose upon the motor shaft G′, but is coupled with said shaft through the medium of the clutch G^2. The pinion Q^4 constitutes an intermediate gear between the gear wheel Q^2 and the gear wheel Q^5 which is keyed to the shaft G′. Thus in one position of the slidable gear Q^2 the shafts Q′ and G′ are connected to rotate in the same direction, while in the other position of said slidable gear said shafts are coupled to rotate in opposite directions. The slidable gear Q^2, which is feathered to the shaft Q′, is also connected to a slide Q^6, and this slide is temporarily held in the two extreme positions of its adjustment by latches Q^7 and Q^8 engaging lugs Q^9 and Q^{10} on the slide. The gear Q^2 and slide Q^6 are actuated by a traveling collar Q^{11} having a threaded engagement with the shaft Q′ through the medium of interposed compression and tension springs Q^{12} and Q^{13}. The collar Q^{11} is also provided with a lost motion engagement with a lever G^3 for opening the clutch G^2, said clutch being closed by the tension of the spring G^4.

With the construction just described, whenever the starting mechanism is released the springs Q will actuate the shaft Q′ in a direction to feed the non-rotatable collar Q^{11} along the threaded portion of the shaft Q′. This movement releases the arm G^3, which is normally held by the collar Q^{11} in a position where the clutch G^2 is disengaged and the gear wheel Q^3 is loose upon the shaft G′. As soon, however, as the lever G^3 is released the spring G^4 will cause the automatic engagement of said clutch, coupling the gear wheel Q^3 to the shaft G′. The gear wheel Q^2 is initially in engagement with the gear wheel Q^3 and is rotated by the shaft Q′ so that as soon as the clutch G^2 is engaged this motion will be transmitted through the gear wheel Q^3 to the motor shaft G′. The rotation will be continued for a sufficient period of time to insure the starting of the motor. In the meantime, the collar Q^{11} continues its travel along the threaded portion of the shaft Q′ until it bears against the spring Q^{12} and places the latter under compression. In the further movement of the collar it strikes against an arm of the latch Q^7, which is preferably a bell-shaped lever, disengaging said latch from the lug Q^9 and releasing the slide Q^6 which, actuated by the compressed spring Q^{12}, will be moved together with the gear wheel Q^2 into a position where the latter is in mesh with the pinion Q^4. As soon as this occurs the shaft G′, which is now actuated by the motor, will transmit motion through the pinion Q^4 and gear wheel Q^2 to the shaft Q′, rotating the shaft in reverse direction and rewinding the springs Q. The collar Q^{11} is also caused to travel backward upon the shaft Q′, and during this movement places the spring Q^{13} under tension. Near the end of its return movement, the collar Q^{11} actuates the arm G^3 to disengage the clutch G^2 and just at the end of the return movement of the collar it trips the latch Q^8, which has been in engagement with the lug Q^{10} for holding the slide Q^6 stationary. The tripping of the latch releases the slide and permits the tension of the spring Q^{13} to return the slide and gear wheel Q^2 to their initial positions.

The speed of rotation of the starting mechanism is preferably governed by a gear train J′ operating a fan governor J^2. The mechanism is also controlled in its starting or locking by the magnet P, the armature P′ of which constitutes a latch for engaging the fan governor J^2 and holding the latter from movement.

Track switches.—At the opposite ends of each siding D are arranged track switches E by which the cars may be directed either in or off the sidings, or may be passed through continuously over the main line. These switches E, as shown, consist of a rockable frame E′ carrying a through switch rail E^2 and a siding switch rail E^3, these being respectively thrown into operative position by a partial rotation of the rockable frame E′. In the normal position the through rail E^2 is in alinement with the cable track A and the rail E^3 is thrown upward out of the path of the car. The parts are held in this position by a latch lever R, which engages a bearing on the frame E′, and which itself is fulcrumed upon one of the supporting arms C. The latch arm R is connected by a rod R′ with an actuating rock arm R^2 arranged some distance in advance of the switch and having a roller R^3 in the path of the switch-actuating mechanism on the traveling car. Thus the movement of the lever R^2 will trip the latch R and permit the frame E′ to rock preferably by gravity, so as to throw down the rail E^2 and place in position the siding rail E^3. This

movement will be completed before the car reaches the switch and will thus direct the car upon the siding D.

For returning the switch to its normal position, a lever S is arranged in a position where it will be actuated by the traveling car after the latter has passed the switch onto the siding. This lever S is connected by a link S′ to a rock shaft S^2 on the rockable frame E′, and when the parts are actuated will move said rockable frame to a position for reëngagement with the latch R.

The switch which connects the opposite end of the siding D to the cable line is similar in construction to the one just described, but is operated by different means. Thus the latch R for this switch is actuated by an electro-magnet T, and this is placed in an electric circuit T′, which, as shown, is connected to the normally dead section N of the electric line for the trolley. It is therefore evident that when the switch O is operated to supply the line N with current, the magnet T will be energized, which will trip the latch and throw the switch so that the car starting from the siding will be directed on to the main line. This switch is restored by a similar mechanism, including a lever S, link S′, and rock arm S^2, but the lever S is so arranged as to be actuated after the car is upon the main line.

Selective switch-operating mechanism.—Each of the motor cars carries a selective switch-actuating mechanism U, which, as shown, is of the following construction: U′ is a ratchet wheel mounted upon the motor frame in convenient location, as upon an extension of one of the axles. U^2 are buttons arranged in circular series on the ratchet wheel U′, and having shanks U^3, which, when the buttons are pressed inward, will at one point in the rotation of the wheel contact with a latch lever U^4. This latch lever normally locks a slidable arm U^5, which arm, when released, will be actuated by a spring U^6, and will be projected laterally. The arm U^5 carries at its outer end a cam U^7 which in the projected position of the arm will engage with the roll R^3 on the actuating arm R^2. Thus whenever, by reason of the rotation of the ratchet wheel U′, the shank of one of the depressed buttons U^2 engages with the latch U^4, this latch will be actuated to release the arm U^5, whereupon the cam U^7 will be positioned to strike the roll R^3 to actuate the lever R^2. This will release the latch arm R, and cause the throwing of the switch, as has been previously described.

The ratchet U′ is actuated step-by-step through the medium of a rock arm V which, as shown, is pivoted upon the axle. This rock arm carries a pawl V′ for engaging the teeth of the ratchet wheel. There is also provided an actuating arm V^2 pivotally connected at V^3 to the arm V and further connected to said arm by the spring V^4. The arm V^2 has a cam portion V^5 arranged to engage with a roll or other bearing V^6. These rolls are arranged at stationary points along the line, there being one for each of the sub-stations, and they are so located that the traveling car in passing will strike the roll with the arm V^2. This arm will thus be actuated and through the medium of the spring V^4 will actuate the arm V and pawl V′ so as to turn the ratchet wheel U′ one notch. As each station is passed, the arm V^2 will thus be actuated and consequently the number of intermittent operations of the wheel always corresponds to the number of stations passed. The total number of buttons upon the wheel corresponds to the total number of stations, so that the travel of the cars over the entire line will cause one complete rotation of the wheel U′. Thus by selecting and pushing in the proper button the switch actuating-mechanism of any station desired may be operated by the traveling car, while all other switches remain in their normal position for a through line.

Operation of the system.—In the operation of the system, any motor car can be started from any one of the stations or sub-stations and be directed to any other station desired. Before starting the car, the selective switch-operating mechanism is properly set by depressing the button U^2 in the selective mechanism, which corresponds to the station at which the car is to be stopped. The car is then loaded while upon the siding D and the operator then throws the switch O to send the current into the normally dead section N of the trolley line. This will complete an electric circuit W, which includes a circuit closer W′, an electro-magnet W^2 for controlling the clutch K, and the electro-magnet P for controlling the starting-mechanism J. Current is also furnished through a branch W^3 of the circuit W to the igniters W^4 for the explosion motors. The circuit closer W′ is controlled by a centrifugal governor W^5, which is driven by a suitable gearing W^6 from the motor shaft G′, and the arrangement is such that when said shaft is stationary the circuit will be closed but upon the speeding up of the motor the centrifugal governor W^5 will operate the circuit closer W′ so as to open the circuit.

The first effect of the closing of the switch O is to energize the magnets W^2 and P. The former will actuate the clutch K so as to disconnect the motor from the gearing H and throw off the load from the engine shaft. The magnet P when energized will release the escapement J^2 by withdrawing the latch P′ and will permit the operation of the starting mechanism. Another effect produced by the closing of the switch O is to close the circuit T′, energizing the magnet T and operating the switch E, which leads out of the siding to the main line, so that when the car

reaches this switch it will be directed on to the main line.

As soon as the motor is in full operation, the centrifugal governor W^5 will open the circuit closer W', deënergizing the magnets W and P. This will throw the load on to the motor, causing the latter to propel the car through the medium of the gearing H. The car, when started, will continue to travel until it reaches the station for which it is intended. As each intermediate station is passed, the arm V^2, striking the roll V^6, will actuate the pawl V′ and ratchet wheel U′, and just before the stopping station is reached the depressed button U^2 will trip the latch U^4, releasing the arm U^5 and projecting the cam U^7 so as to be in the path of the roll R^3 on the switch-actuating arm R^2. Thus the switch E will be operated to direct the car on to the siding, and as soon as the trolley strikes the dead section N of the trolley wire the motor will be stopped.

What I claim as my invention is:

1. A transportation system comprising a cable track, a motor car suspended therefrom, a plurality of sidings at different stations along said track, a switch for connecting each siding with the main line, operating mechanism therefor, and an automatic selective control mechanism on said car for causing the operation of a predetermined switch.

2. A transportation system comprising a cable track, a motor car suspended therefrom and adapted to travel thereupon, an explosion motor for said car and controlling means at the several stations for starting and stopping said motor.

3. A transportation system comprising a cable track, a motor car suspended therefrom and adapted to travel thereupon, an explosion motor for said car, a starting mechanism for said motor and an electric control for said starting mechanism operable at the several stations.

4. A transportation system comprising a cable track, a motor car suspended therefrom and adapted to travel upon the same, an explosion motor for said car, starting mechanism for said explosion motor adapted to be automatically reset after each operation, automatic means for stopping said motor, and a selective control for said stopping means.

5. A transportation system comprising a cable track, motor cars suspended therefrom and adapted to travel thereupon, sidings at a plurality of points along said line, switches at said sidings for directing said cars alternatively through or upon the sidings, means upon the car for determining the position of the switch, and means at the sidings for stopping and starting the motor.

6. The combination of a track, a car for traveling thereon, an explosion motor for propelling said car, and means including a starting motor operable from off the car for controlling the operation of said explosion motor.

7. The combination of a track, a car for traveling thereon, an explosion motor for propelling said car, and electric means operable from off the car for controlling the starting and stopping of said explosion motor, said means including a starting motor.

8. The combination of a track, a car for traveling thereon, an explosion motor for propelling said car, electric means for controlling the operation of said motor, an electric line extending parallel to said track, and a trolley for connecting said electric line with the electric controlling means on said car.

9. The combination of a track, a car for traveling thereon, an explosion motor for propelling said car, an electric igniter for said explosion motor, an electric line extending parallel to said track, and a trolley for connecting said line with said electric igniter.

10. The combination of a track, a car for traveling thereon, an explosion motor for propelling said car, an electric igniter for said explosion motor, starting mechanism for said motor, electric controlling means therefor, an electric line extending parallel to said track, and a trolley for connecting said line with said igniter and starter-controlling means.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR E. BROCK.

Witnesses:

NELLIE KINSELLA,

JAMES P. BARRY.