

No. 657,046.

Patented Aug. 28, 1900.

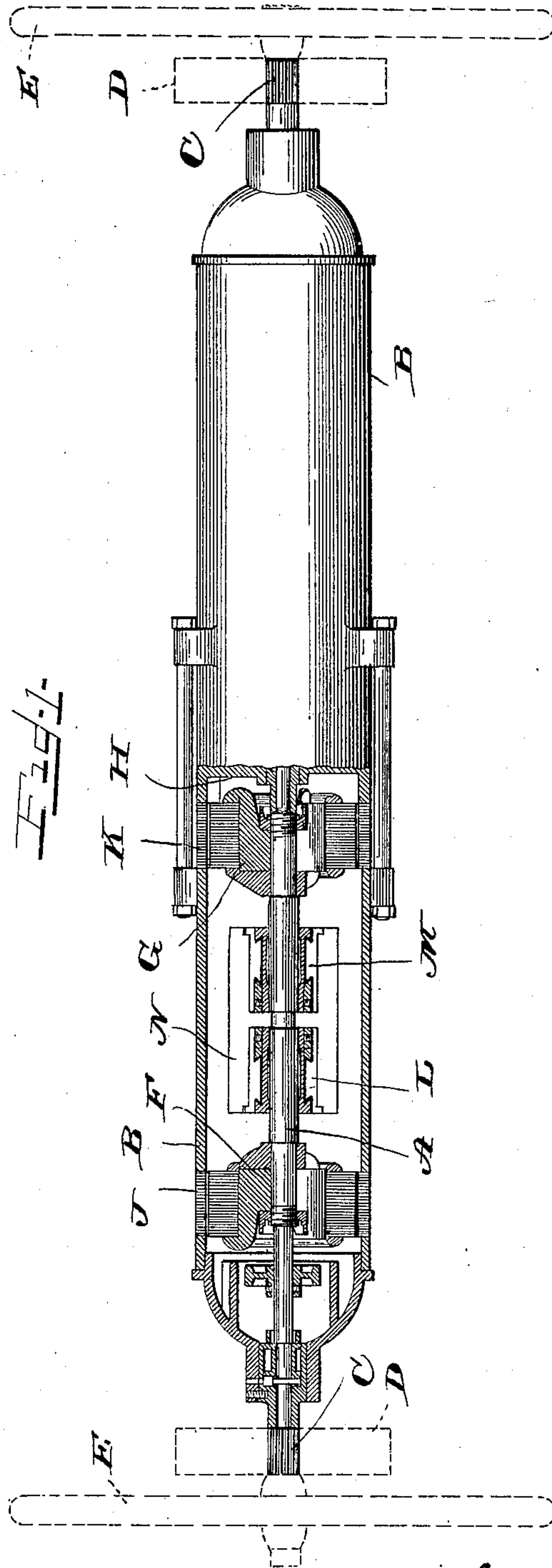
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MULTIPLE MOTOR SYSTEM FOR AUTOMOBILES.

(Application filed Apr. 26, 1900.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES

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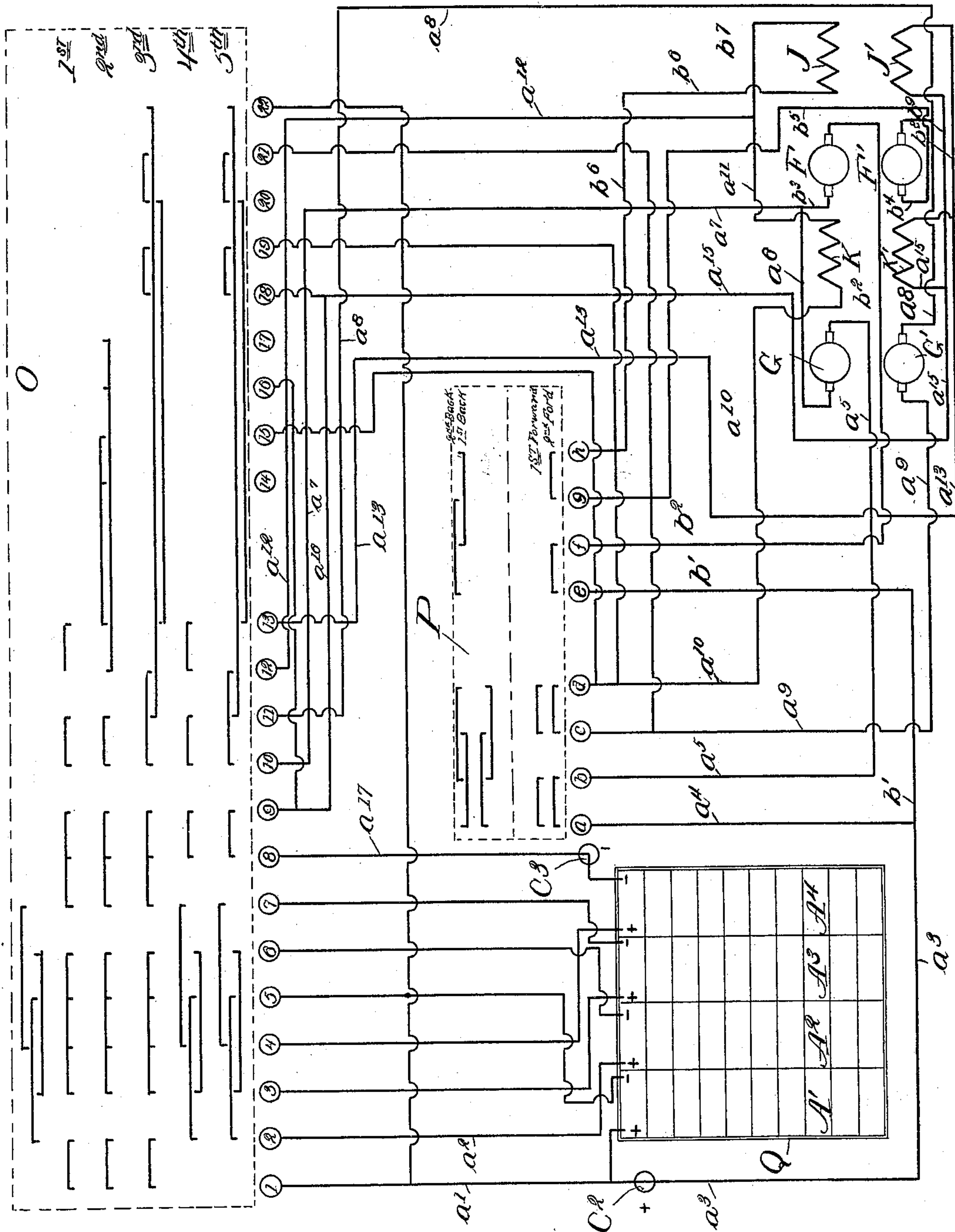
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# UNITED STATES PATENT OFFICE.

JOHN TRIER, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS,  
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## MULTIPLE-MOTOR SYSTEM FOR AUTOMOBILES.

SPECIFICATION forming part of Letters Patent No. 657,046, dated August 28, 1900.

Application filed April 26, 1900. Serial No. 14,395. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN TRIER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have  
5 invented a new and useful Multiple-Motor System for Automobiles and Similar Vehicles, of which the following is a specification.

This invention relates to multiple-motor systems for automobiles and similar vehicles.

10 One object of the invention is to provide a system of multiple motors and means for controlling the same which is simple and efficient.

15 A further object of the invention is to provide a plurality of motors for each shaft or for driving each wheel of the automobile, electric carriage, or similar vehicle.

Other objects of the invention will appear more fully hereinafter.

20 Referring to the accompanying drawings and to the various views and reference-signs appearing thereon, Figure 1 is a view, partly in elevation and partly in transverse vertical section, showing a construction of multiple-  
25 motor system adapted for use in automobiles or similar vehicles. Fig. 2 is a diagram illustrating the wiring connections, the controller-cylinder and the reversing-switch cylinder being shown developed.

30 In carrying out my invention I drive each wheel of a pair of wheels independently, and to this end I employ a motor-shaft A for each wheel. This shaft is suitably journaled in bearings formed in a casing B, which casing  
35 incloses the motors and is designed to be suitably supported upon the body of the carriage. Only one of these shafts is shown, the other shaft (as will be readily understood) being in alinement with shaft A, but shown  
40 as inclosed within casing B. Each shaft A carries at its outer end a pinion C, arranged to intermesh with a drive-gear D, the latter being arranged to drive the wheels indicated at E. Upon each shaft A is mounted two or  
45 more motors F G. A similar number of motors and similarly arranged is designed for use in driving the inclosed shaft A, which is not shown, the arrangement of the plurality of motors for each shaft being the same.

50 Only that set at the left hand of the casing is shown. All the motors F G are inclosed

within casing B. The inner end of shaft A is suitably journaled in a central casting H, the corresponding end of the shaft at the other end of casing B being similarly jour-  
55 naled on the opposite face of casting H. The motor G is mounted upon shaft A at the inner end thereof, and the motor F is mounted upon said shaft at the outer end thereof. The fields of said motors F G are designated,  
60 respectively, by reference-signs J K. The commutators of said motors F G are respectively designated by reference-signs L M, and the casing B is provided with an opening  
65 N, in which are received the brushes (not shown) which contact with said commutators.

By independently driving each shaft A, said shafts being respectively geared to the traction-wheels on opposite sides of the automobile or other similar carriage, I am enabled  
70 to maintain a more efficient and perfect control of the vehicle, and by employing a plurality of motors for each shaft A, I am enabled to regulate and control in a desirable manner the power required to drive the automobile.  
75 Thus on smooth roads only one motor will be required for driving each traction-wheel, but on rough roads or in ascending hills or the like the vehicle-driving power may be increased by bringing into action all the motors  
80 of each shaft. Thus I provide an arrangement whereby the current required is greatly economized. Moreover, by employing a plurality of driving-motors for each traction-wheel I am enabled to use small-sized motors,  
85 which may be readily inclosed within the casing and whereby the entire system of motors occupies small space, thereby avoiding clumsiness in appearance.

The system of wiring employed in connection with my multiple system of motors is illustrated, diagrammatically, in Fig. 2, wherein reference-sign O designates the surface of the controller, and P designates the surface of the reversing-switch, the surfaces of these  
90 cylinders being shown developed and carrying the contact plates or strips in the desired relation for effecting the desired circuit changes of the motors. I have designated as  
95 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, and 22 the stationary contacts with which the contact-strips on the  
100



controller-cylinder cooperate in effecting the desired circuit changes, and I have designated as *a, b, c, d, e, f, g, and h* the stationary contact-fingers which cooperate with the contact strips or plates upon the surface of the reversing-switch cylinder P, through which current is supplied to the motors in one direction or the other to cause the automobile to travel either forwardly or backwardly, as may be desired. Reference-sign Q designates a battery or other suitable source of current-supply. In practice I may employ any desired source of current; but a simple and efficient arrangement is shown wherein I employ batteries arranged in groups of cells. I have also designated as "first," "second," "third," "fourth," and "fifth" the various positions to which the controller-cylinder is moved in effecting the desired circuit changes, and I have designated as "first forward," "second forward," "first backward," and "second backward" the various positions to which the reversing-switch cylinder is moved in properly reversing the current through the motors. Suppose it is desired to start up the automobile. The reversing-switch cylinder P is moved to its first forward position. This movement of said reversing switch cylinder connects contacts *a* and *b* and also connects contacts *c* and *d*. The controller O is also moved to its first position, thereby connecting contacts 1 and 2 together, also connecting contacts 3, 4, 5, and 6 together, also connecting contacts 7, 8, and 9 together, also connecting contacts 10 and 11 together, and also connecting contacts 12 and 13 together. Thereupon the positive poles (marked *x x*) of the sets of batteries *A' A²* are coupled together through wires *a' a²* to connected contacts 1 and 2, and thence to wire *a³*, wire *a⁴*, contact *a*, contact *b*, wire *a⁵* to one of the motors—say, for instance, motor G—at the inner end of one of the independent shafts, thence through wire *a⁶ a⁷* to contact 10, thence to contact 11, wire *a⁸*, the corresponding motor on the other shaft and which I have marked G', thence through wire *a⁹*, contact *c*, contact *d*, wire *a¹⁰*, the field K of motor G, wire *a¹¹*, wire *a¹²*, contact 12, contact 13, wire *a¹³*, wire *a¹⁴*, the field K' of motor G', wire *a¹⁵*, wire *a¹⁶* to contact 9, to contact 8, wire *a¹⁷*, back to the negative pole of the set *A⁴* of batteries, the positive pole of set *A⁴* of battery-cells and the positive pole of set *A³* of cells being connected together and the negative pole of set *A¹* of cells and the negative pole of set *A²* of cells being similarly connected together through connected contacts 3, 4, 5, and 6, the negative pole of the set *A³* of cells being connected to the negative pole of set *A⁴* of cells through contacts 7 and 8. Thus in this position of the reversing-switch two of the motors—say, for instance, the two inner motors—are connected in series to cause the automobile to travel forwardly, and the first position of the controller couples the sets of battery-cells in parallel and connects the two armatures in series and the two fields in series. Under this

condition the automobile will move forwardly with one motor for each shaft in action, the armatures of said motors being in series and the fields of said motors being in series. The reversing-switch is now moved to its second forward position. This leaves the contacts *a b* and the contacts *c d* connected up, as before described; but it connects contacts *e* and *f* and also connects contacts *g* and *h*. Thereupon the circuit including wire *a³*, wire *a⁴*, contacts *a b*, wire *a⁵*, and on is identical with that above described. The current flowing through wire *a³*, however, is divided, part flowing through wire *b'* to contact *e*, contact *f*, wire *b²* to another motor—say, for instance, motor F—wire *b³* joining with wire *a⁷*, and on, as before described, through contacts 10 11, wire *a⁸*, where the current divides, part flowing on through motor G', wire *a⁹*, and on, as above described, the other part flowing through wire *b⁴*, motor F', (which corresponds to motor F,) wire *b⁵*, contact *g*, contact *h*, wire *b⁶*, field J of motor F, wire *b⁷*, thence joining with wire *a¹²*, and on, as above described, to wire *a¹³*, where it divides, part flowing through wire *a¹⁴*, field K' to wire *a¹⁵*, and the other part flowing through wire *b⁸*, the field J' of motor F', wire *b⁹* to wire *a¹⁵*, and thence on, as before described, to the negative pole of the battery. Thus the two inner motors G G' are arranged in series with each other and the two outer motors are arranged in series with each other and the two inner motors are arranged in parallel relation with the two outer motors.

In the second position of the controller the connections and circuits above described are the same, except that instead of coupling contacts 12 13 said contact 12 is coupled to contacts 16 and 17 and contact 13 is coupled to contacts 14 and 15. The result of this change in the position of the controller-cylinder is to leave the series of battery-cells in parallel with each other, to leave the armatures of the motors in series with each other as before, but to change the connections of the fields, so that the fields of the motors are in parallel with each other. Of course this change will be effected whether all the motors are in working circuit or only two of them. The third position of the controller leaves the connections of contact-points 1, 2, 3, 4, 5, 6, 7, 8, and 9 the same as before, but connects contacts 10 and 12 together, and also connects contacts 11 and 22 together, and also connects contacts 13 and 20 together, and contacts 18 and 19 together, and contacts 20 and 21 together. The result of this change is to leave the battery-cells in parallel and the motor-fields in parallel, as above explained, but to change the armatures from series to parallel relation. In the same manner it will be observed that the fourth position of the controller-cylinder changes the battery connections, so as to couple the sets of cells up in series, the armatures of the motors in series, and the fields of the motors in



series. The fifth position of the controller leaves the battery-cells in series and couples the armatures of the motors in parallel and the fields in parallel. These various circuit connections might be readily traced; but I deem it unnecessary to do so herein, as a sufficient description has been made, which when taken in connection with the accompanying drawings and diagrams will enable any person skilled in the art to readily trace the circuits of these various changes. It is obvious that any desired variation in the circuit connections may be made without departing from the spirit or scope of my invention.

Where storage batteries are employed as the motive power, said batteries may be charged, when desired, by suitably connecting the terminals of the charging source at the points marked C<sup>2</sup> C<sup>3</sup>, respectively, in a well-understood manner.

Having now set forth the object and nature of my invention and a construction and arrangement embodying the principles thereof, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent of the United States, is—

1. In a multiple-motor system for automobiles, an axle having a traction-wheel mounted thereon, a shaft, a plurality of motors carried by said shaft for rotating the same, and gearing connecting said shaft and axle, as and for the purpose set forth.

2. In a multiple-motor system for automo-

biles, an axle having a traction-wheel mounted thereon, a shaft having two or more motor-armatures thereon each adapted to rotate said shaft, a field for each motor-armature, and gearing connecting said shaft and axle, as and for the purpose set forth.

3. In a multiple-motor system for automobiles, a pair of traction-wheels, an axle for each wheel, a driving-shaft geared to each axle, and a plurality of motors for rotating each shaft, as and for the purpose set forth.

4. In a multiple-motor system for automobiles, a pair of traction-wheels, an independent axle for each wheel, an independent driving-shaft for each axle, a plurality of motors for driving each shaft, and an inclosing casing for said motors, as and for the purpose set forth.

5. In a multiple-motor system for automobiles, traction-wheels, an independent driving-shaft for each wheel, a plurality of motors for rotating each driving-shaft, and means for varying the circuit connections of said motors, whereby said motors may be connected up in suitable relation, as and for the purpose set forth.

In witness whereof I have hereunto set my hand this 10th day of March, 1900, in the presence of the subscribing witnesses.

JOHN TRIER.

Witnesses:

E. C. SEMPLE,  
S. E. DARBY.