C. H. TOMLINSON.

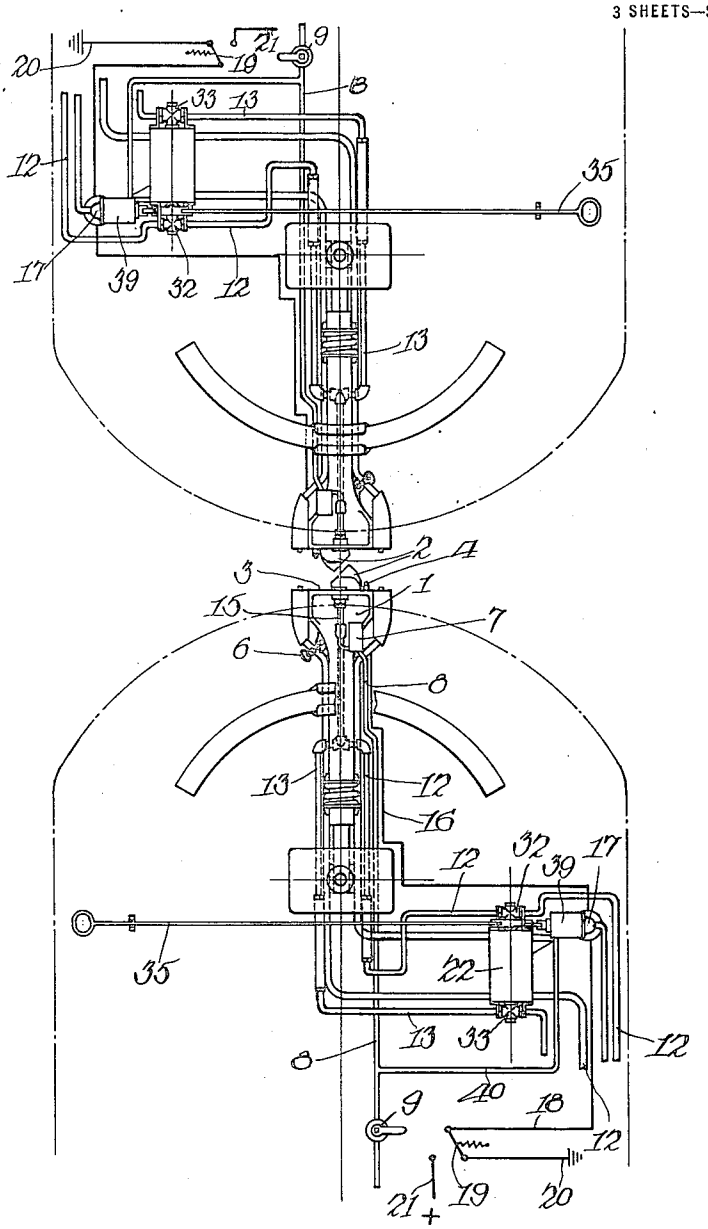
CAR, AIR, AND ELECTRIC COUPLING.

APPLICATION FILED JUNE 16, 1917.

1,402,120. Patented Jan. 3, 1922.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

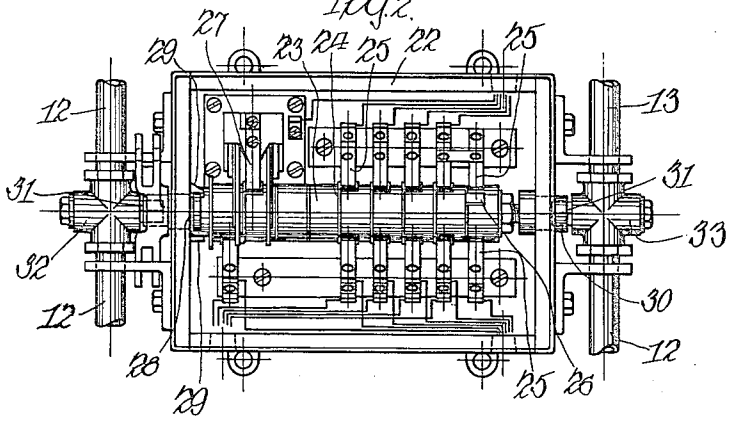


Fig. 3.

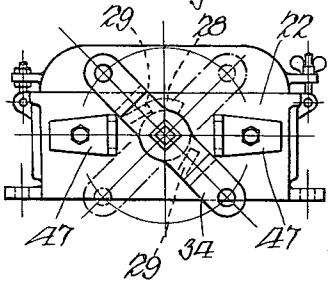


Fig. 4.

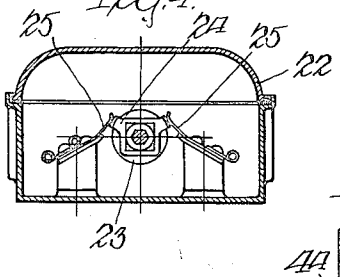
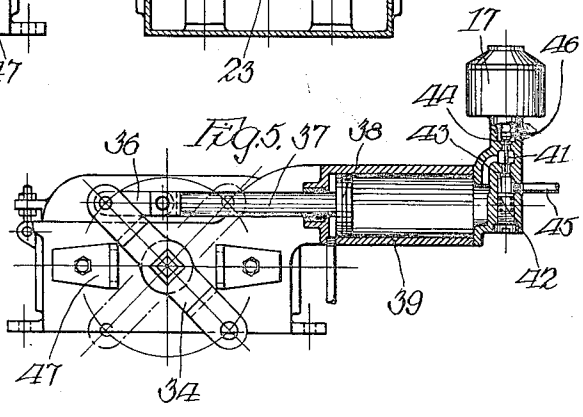


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 6.

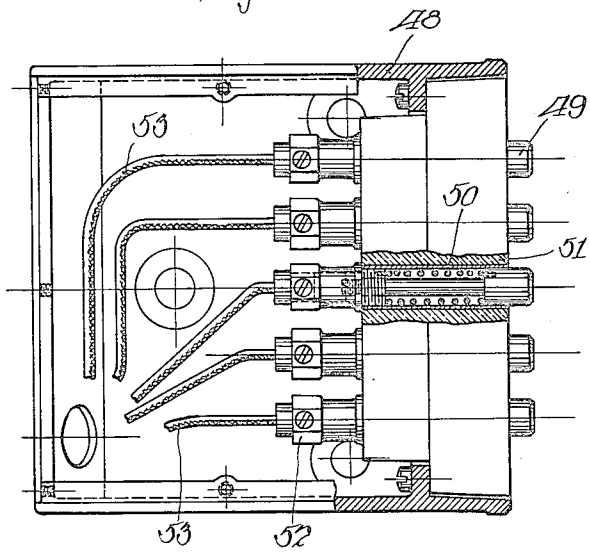


Fig. 7.

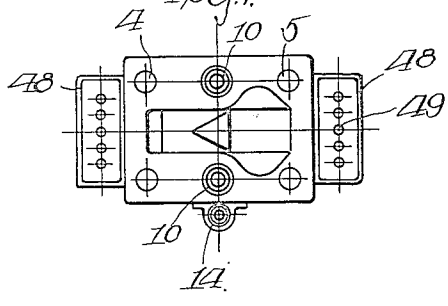
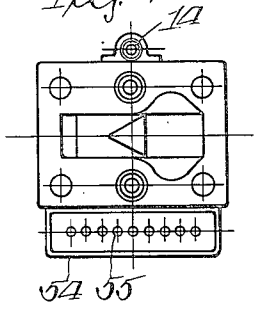


Fig. 8.



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CAR, AIR, AND ELECTRIC COUPLING.

1,402,120. Specification of Letters Patent. Patented Jan. 3, 1922.

Application filed June 16, 1917. Serial No. 175,087.

To all whom it may concern:

Be it known that I, CHARLES H. TOMLINSON, a citizen of the United States, residing at Mansfield, in the county of Richland and State of Ohio, have invented certain new and useful Improvements in a Car, Air, and Electric Coupling, of which the following is a specification.

This invention relates to a car, air and electric coupling system for use with electrically operated cars in train service requiring the establishment of certain electrical circuit connections, in addition to the pneumatic brake line connections for the proper operation and control of the coupled cars. The invention relates more particularly to the electrical coupling means and the provision of a necessary switching mechanism mechanically coupled to the air line cut-out cocks which will insure and enforce proper electrical circuit connection and disconnection. This arrangement provides protection for exposed electrical coupler contact points essential to the safe adoption of the electric coupler as shown in the drawings.

The invention consists in the novel construction, combination and arrangement of the several parts.

In the accompanying drawings—

Fig. 1 is a view of this invention as applied to the adjacent ends of two cars to be coupled.

Fig. 2 is a view of a combined air and electric switch.

Fig. 3 is an end view thereof.

Fig. 4 is a sectional view of the electric switch.

Fig. 5 is a view of the switch shown by Fig. 2 with an electrically controlled pneumatic device for operating it.

Fig. 6 is a view partly in section of one of the electrical contact boxes.

Fig. 7 is a face view of the end of the car coupler with the electric contact boxes at the side; and

Fig. 8 is a view similar to Fig. 7 with the electric contact boxes below the car coupler.

Practically all multiple unit control systems now used in this country require for their proper operation the connection from car to car of certain air pipe lines and certain electrical control circuits. These connections can be most conveniently made and maintained by means of special arrangements provided in the construction of the mechanical car couplers. Safety in operation demands that such cars be equipped with air brake systems of the automatic or semi-automatic type in which at least one of the air lines through the coupler is maintained under a sustained air pressure, and any considerable reduction of this pressure results in a prompt emergency application of the brake. When it is necessary to operate a car so equipped singly, this particular air line through the coupler must, therefore, be closed, and this is commonly accomplished by providing manually operable cut-out cocks conveniently located under the car platform. The present invention overcomes this difficulty by providing butt end contactors which extend beyond the face of the coupler and are normally dead, but are connected in circuit after the coupling operation is completed by the manual attention of an operator in either car, and at the same time the air lines are connected between the cars by the same operation. A switch controlling the electric coupler circuits is so interlocked with the air line valves that the exposed electrical contactors cannot be connected to supply circuits while the air valves are closed, nor can all the valves be opened without connecting each of the electric coupler contacts to its respective circuit. In other words, the air and electric coupling is effected when the cars are mechanically coupled, but neither the electric or air connections between the cars are made until the operator in either one of the cars gives manual attention thereto and then both connections are made simultaneously.

At each end of a car equipped in accordance with this invention is a pivoted drawbar 1 having a coupling hook 2 beveled at the front end and extending beyond the face of the coupler head 3. At one side of each coupler head are alining pins 4, and at the other side are corresponding alining recesses 5 which complete the alinement of the coupler heads brought into preliminary alinement by the coupling hooks 2. Each coupler is provided with a mechanical uncoupling device 6 which can be reached from between the cars, and with a pneumatic uncoupling device 7, with a pipe 8 leading therefrom, and controlled by a valve 9 which admits pressure to a cylinder from a reservoir (not shown) carried by each car.

In the face of each coupler head 3 are air

connections 10 comprising spring-pressed washers which project beyond the face of the coupler, so that when the coupler heads of adjacent cars are brought into engagement the washers will make a fluid-tight connection between the respective coupler heads for air pipes 12 and 13 connected thereto.

A combined air and electric connecting device 14 is also carried by each coupler either at the bottom, as shown in Fig. 7, or at the top thereof, as shown by Fig. 8, and this device also projects beyond the face of each coupler head, so that when the car couplers are connected an air hose and electric connection will be made between them by the said devices 14. Extending from each of the devices 14 is a pipe 15 connected to one end of the pneumatic uncoupling device 7 and an electric conductor 16 which is connected to an electro-responsive device 17 and thence by means of a conductor 18 and a switch 19 either to a ground 20, or to a positive source of current supply 21 within the car.

In a receptacle 22 is a rotatable drum 23 carrying a number of engaging contacts 24 which electrically connect fixed contact fingers 25 when the drum is in one position, and open the circuit between them when the drum is in another position. One or more of the contact fingers 25 may be for engaging corresponding contacts 26 on the drum when the other contacts are open-circuited for the purpose of closing the door or signal light circuit of the car to which the switch is attached when the corresponding end of the car is not coupled to another car. At one end of the drum is a magnetic blow-out 27 for preventing excessive sparking at the switch contacts when the connections thereof are broken, as for example, when a motor car is uncoupled from a trailer that has lighting and heating circuits connected through the motor car. At one end within the receptacle 22 the drum carries a projection 28, and projecting from the casing are stops 29 to limit the rotation of the drum in either direction.

The drum 23 is mounted upon a shaft with recessed portions 30 at each end thereof into which a squared stem 31 of angle cocks 32 and 33 extend. These angle cocks 32 and 33 are connected respectively in the air line connections 12 and 13 and then are connected to the respective brake and reservoir devices (not shown) carried by each car.

For operating the switch a lever 34 is connected to the shaft of the drum 23 at one end thereof, and attached to one end of the lever is a handle 35 which terminates adjacent the side of the car for operation thereof, and attached to the other end of the lever by means of a link 36 is a rod 37 of a piston 38 which is movable in a cylinder 39. One end of this cylinder is connected by means of a pipe to the pipe 8 which is controlled by the valve 9, and at the other end of the cylinder is an air connection controlled by a double valve 41 which is operated by the electro-pneumatic device 17. This double valve has a spring 42 for holding one of the valves normally on a seat 43 and when actuated by the electro-responsive device 17, the double valve is lowered from the seat 43 and closed on a seat 44. Connected to the end of the cylinder 39 around valve seat 43 is an air pipe 45 which leads from a suitable source of fluid-pressure supply carried by the car, and a bleed hole 46 is provided for permitting discharge of air from the cylinder 39 around valve seat 44 when the double valve is held on the seat 43 by the spring 42. This permits the piston 38 to be held at either end of the cylinder 39 without maintaining pressure thereon so that it is not necessary to keep the switch controlled thereby closed under fluid pressure against the tension of a retracting spring.

At the ends of the receptacle 22 are brackets 47 which limit the movement of the lever 34 and also act as supports for the pipes 12 and their angle cocks, as clearly shown in Fig. 2.

At the sides of each coupler head, as shown in Fig. 7, are boxes 48 for containing a plurality of electric contactors 49 each of which is pressed forwardly beyond the face of the coupler head by means of a spring 50 and is suitably held and insulated from the others in the box by insulating material 51. At the inner end of each contact member is a terminal 52 to which a conductor 53 is attached, and these conductors are preferably connected and parallel with the corresponding conductors of the other box 48 and are then connected to the switch contacts 25 of the reversing switch.

Instead of disposing the contact boxes at the sides of the coupler a single contact box 54 may be supported below the coupler with a number of contacts 55 corresponding to and connected the same as the contacts 49 of the boxes 48.

In operation the abutment of the coupler faces engages the coupler hooks 2 of adjacent couplers making a mechanical connection between the cars. The projecting extremities of the hooks cause a preliminary alinement of the couplers which is completed by the engagement of the alining pins 4 with the holes 5, and these alining pins are greater in length than the projections of the electric contacts and hose connections from the face of the coupler, so that when the coupler faces are moved in direct abutment there is no lateral or wiping movement imparted either to the contacts or the hose connections, but instead there is a direct impact which is opposed by the springs

so that the contact and hose connections are held firmly together. In this position there is no electrical or air hose connection between the main air lines 12 and 13, but there is an air and electric connection through the devices 14 of adjacent couplers. To complete the electric and main line hose connections between the cars both of the handles 35 must be operated from the sides of the cars, or the switch 19 may be closed in either car which will complete a circuit from the source of current supply in the car through the electro-responsive device 17 of the car in which the switch 19 is located and through the combined air and electric devices of the couplers to and through the electro-responsive device 17 in the opposite car to ground 20. This will operate the drum type switches in both cars simultaneously and will also open the main air line cocks 32 and 33 in both of the cars at the same time. As soon as the switch 19 is opened the electro-responsive devices 17 do not receive current, and the double valves 41 are, therefore, closed by springs 42 allowing the cylinders 39 to discharge to atmosphere through the bleed holes 46.

When it is desired to uncouple, either of the handles 35 may be operated from without the car which will break the circuit and air connections through the couplers and the mechanical uncoupler 6 may be operated from the end of the car, but if it is desired to uncouple from within either car the valve 9 is opened which admits fluid under pressure through the pipe 40 to the cylinder 39 for operating the switch to which it is connected and it also admits under pressure through the pipe 8 to the uncoupling cylinder 7 and from the uncoupling cylinder through the devices 14 in the coupler heads to the uncoupling cylinder 7 of the adjacent car and from there to the cylinder 39 of the adjacent car. By this operation the switch and main air line connections are operated in both cars and the mechanical coupling between the cars is released so that the cars can be separated. Upon their separation there is no danger of setting the brakes in either car by the air leakage at the coupler heads, nor is there any tendency for the electric connections at the coupler heads to spark when the cars are separated. The mechanical uncoupling cannot take place until sufficient pressure is built up in each car to operate the pistons 38 in both cars which insures that the electric circuits will be opened by the reversing switch in each car, and the air cocks for controlling the main air lines 12 and 13 will be closed thereby in each car.

With this construction the mechanical separation of cars previously coupled electrically, pneumatically and mechanically would open the air lines, which would immediately set the brakes and thereby notify the operator of his failure to first uncouple the air and electrical connections. It is impossible, therefore, to operate the cars thus equipped without having the switch at each end of the car in such position that the protruding contacts at the coupler head are dead and the air lines are closed for the interlocked connection of the air line cocks, and the electric drum switch insures their simultaneous operation when the drum is rotated either by pneumatic or mechanical means.

I claim:—

1. The combination, with a mechanical car coupler, of electrical connecting means comprising a plurality of circuits carried through the car, a rotatable switch for simultaneously closing some of said circuits when in one position, and means in connection with the switch for closing other of said circuits when the switch opens the first-named circuits.

2. In a car, air and electric coupler, the combination with air connecting means, of electric connecting means, and means for simultaneously operating said air and electric connecting means, said operating means comprising a lever and pneumatic device connected to one end of the lever and a handle connected to the other end of the lever for independent manual operation.

3. In a car, air and electric coupler, the combination with air connecting means comprising valves at a distance from and supported independently of the coupler, of electric connecting means comprising a switch also at a distance from and supported independently of the coupler, means connecting the valves and the switch for simultaneous operation, and means to limit the movement of the switch in both directions.

4. The combination with a mechanical coupler, of air and electric connecting means projecting from the face of the mechanical coupler and extending inwardly therefrom, a rotatable switch for the electric connecting means, and valves for the air connections one at each end of the switch and directly connected therewith for simultaneous operation.

5. In a car coupler system, the combination with electric circuits carried through the car and having exposed electrodes at the ends thereof, of an air brake system carried by the car having a valve at each end of the car, an electric switch directly connected to the air valve at each end of the car and having means for opening some of the electric circuits, and means for simultaneously closing other of said circuits as the switch is operated.

6. In a car coupling system, the combination with electric circuits connected through the car and having exposed electrodes at

the ends, of an air brake system carried by the car having valves at each end thereof, a switch at each end of the car operated by fluid pressure for opening and closing the electric circuits, and means at each end of the switch for directly engaging one of the valves of the air system to insure that the valves will be closed when the circuits through the switch are open.

7. In car, air and electric couplers, the combination with electric circuits carried through each car and exposed terminals at the coupler face, of an air brake system including protruding air connections, a combined air and electric connection also protruding from the face of each coupler, a switch for opening and closing the electrical circuits, valves interlocked with the switch for controlling the air brake system between cars, a fluid pressure device for operating the switch at the end of each car, an electro-responsive valve, mechanism for admitting fluid under pressure to the said device for moving the switch in one direction, and manually operable means for admitting fluid under pressure from one car through the combined air and electric connections of both cars to operating the switches of two adjacent cars in the same direction, and manually operable circuit closing means for energizing the electro-responsive valves in both cars to operate the switches in the opposite direction from one of the cars.

8. In combination with a mechanical coupler having a pneumatic uncoupling device, of a combined air and electric connector protruding from the face of each coupler and having connection with the said uncoupling device, separate air and electric connecting means protruding from the face of each coupler and extending rearwardly therefrom, pneumatic means for operating the said air and electric connecting means simultaneously, an electro-responsive device for admitting fluid under pressure to operate the said pneumatic means in one direction, an electric connection closed through the said combined air and electric connector in the face of the coupler to operate the electro-responsive devices in adjacent couplers simultaneously, and pneumatic controlling devices comprising a valve and connections to the said uncoupling device and the other pneumatic device of each coupler so that the uncoupling means of two adjacent couplers and the said air and electric connecting means will be operated simultaneously through the combined air and electric connection.

9. In counterpart car and electric couplers, the combination with electric circuits carried through each car, of a rotatable switch for opening and closing the circuits at the end of each car, means for opening and closing each switch, and controlling means in each car for rotating the switches in both cars simultaneously in the same direction.

10. The combination with a plurality of electric train line circuits, of a switch for simultaneously opening some and closing others of said circuits, a fluid pressure train pipe, a valve device operated by fluid pressure for controlling communication through the train pipe, fluid pressure control means for operating the switch, and a manually operated valve for controlling the fluid pressure for actuating said valve device and switch.

11. The combination with a plurality of electric train line circuits, of a switch having two opposite positions for connecting said train line circuits, means tending to maintain the switch in said neutral position, and fluid pressure mechanism for throwing the switch to either one or the other of its opposite positions, and an intermediate neutral position in which the circuits are open.

12. In a car, air and electric coupler, the combination with air connecting means comprising valves at a distance from the coupler, of electric connecting means comprising a switch also at a distance from the coupler, and means connecting the valve and the switch for simultaneous operation.

13. In a car coupling system, the combination with electric circuits connected through the car and having exposed electrodes at the ends, of an air brake system carried by the car having valves at each end thereof, a switch at each end of the car operated by fluid pressure for opening and closing the electric circuit, and means on the switch for directly engaging the valves of the air system to insure that the valves will be closed when the circuits through the switch are opened.

14. The combination with a mechanical coupler, of air and electric connecting means projecting from the face of the mechanical coupler and extending inwardly therefrom, a rotatable switch for the electric connecting means, and valves for the air connections directly connected with said switch for simultaneous operation therewith.

15. In a car, air and electric coupler, the combination with the air connecting means comprising a valve at a distance from the coupler, of electric connecting and disconnecting means comprising a switch also at a distance from the coupler, means for connecting the valve and switch for simultaneous operation, and means to open the valve when the switch is closed.

16. In a car, air and electric coupler, the combination with the air connecting means comprising a valve at a distance from the coupler, of electric connecting and disconnecting means comprising a switch also at a distance from the coupler, means connecting

the valve and switch for simultaneous operation, and means to close the valve when the switch is open.

17. In a car, air and electric coupler, the combination with air connecting means comprising a valve at a distance from the coupler, of electric connecting and disconnecting means comprising a switch, and means connecting the switch and valve for simultaneous operation.

18. In a car, air and electric coupler, the combination with air connecting means comprising a valve, of electric connecting and disconnecting means comprising a switch at a distance from the coupler, and means connecting the valve and switch for simultaneous operation.

19. In a car, air and electric coupler, the combination with air connecting means comprising a valve at a distance from the coupler, of electric connecting means comprising a switch also at a distance from the coupler, means connecting the valve and the switch for simultaneous operation, and means for manually actuating said valve and switch.

20. In a car, air and electric coupler, the combination with air connecting means comprising a valve at a distance from the coupler, of electric connecting means comprising a switch also at a distance from the coupler, means connecting the valve and switch for simultaneous operation, and train line circuits connected with said switch and having contacting members on said coupler, said switch being operable to two positions in one of which said circuits are connected with said contacting means on said coupler and in the other of which said circuits are disconnected from the contacting means on said coupler and said switch makes a different electrical connection.

21. In a car, air and electric coupler, the combination with air connecting means comprising a valve at a distance from the coupler, of electric connecting means comprising a switch also at a distance from the coupler, means connecting the valve and switch for simultaneous operation, and train line circuits connected with said switch and having contacting members on said coupler, said switch being operable to two positions, in one of which said circuits are connected with said contacting means on said coupler and in the other of which said switch makes a different electrical connection.

22. The combination with a mechanical car coupler, of an electrical coupler comprising a plurality of contacts, a plurality of circuits carried through the car, and a switch operable to two positions and arranged to close and connect said circuits to said contacts when in one of said positions and to close some of said circuits when in the other of said positions.

In testimony whereof I have signed my name to this specification, on this 12th day of June, A. D. 1917.

CHARLES H. TOMLINSON.