

this is to raise that side of the car body toward which the bolster moves when striking a curve, and to give the effect of an additional elevation of the outside rail of a curve.

The 14B truck is designed with a short wheel base for railroads with curves of short radius. It is possible to make a wheel base in this design as low as 4 ft., but a shorter wheel base than 4 ft. 6 in. is not approved by the company when the truck is used on a 4 ft. 8½ in. gage. A wheel base not shorter than 4 ft. is recommended when the cars are run on a 3-ft. 6 in. gage. A close examination of the detail drawings of 14A and 14B trucks shows that the side frame and swinging bolster of these trucks are in every way the same, and the parts of the two are interchangeable. There is one marked difference, how-

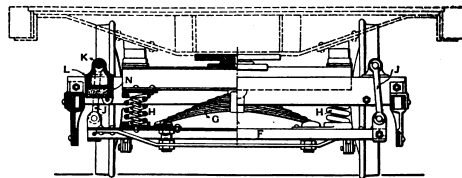


Fig. 4.—Half Cross-Section and Half End Elevation—14A Truck.

ever, in the construction of the two. There being a short distance between the axles in the 14B, it has been designed so that the motors are suspended between the outer crossbars of the truck and the axles. The practical result of this is to make the truck run very steadily, inasmuch as the motors being suspended at the extreme ends of the truck act as counterbalances.

#### Pneumatic Mail Tubes in New York.

On Monday, Oct. 11, the Postoffice Department of New York City began operating a system of pneumatic mail tubes between the General Postoffice and postal sub-station P, in the Produce Exchange Building. The plant has been put in by the Batcheller Pneumatic Tube Co., of Philadelphia, for the Tubular Dispatch Co., of New York.

Although the mail tubes are in operation in New York only over the route above mentioned, they are now being put in between the General Postoffice and sub-station H, in the Grand Central Palace, at Forty-fourth street, and it is expected that they will be in operation over this line before December 1. Tubes have also been laid from the General Postoffice to the end of the Brooklyn Bridge, with the intention of putting in a line over the bridge to the Brooklyn General Postoffice; but this work has been temporarily suspended. It is the intention, however, to connect all of the postal sub-stations in New York City with the General Postoffice, which with the line to Brooklyn will greatly increase the speed of transfer.

This system of pneumatic tubes is the invention of Mr. B. C. Batcheller, who is Chief Engineer of the Batcheller Pneumatic Tube Co., Mr. C. A. Budd being Resident Engineer of the company in New York. Tubes similar to those now in use in New York, but of smaller diameter (only 6 in.), have been in use for the past five years between the different postal stations of Philadelphia.

The tubes in New York consist of cast-iron pipes in 12-ft. lengths and 8½ in. internal diameter, being bored smooth and the joints being made with great care, to get exact alignment. They are laid side by side under the city streets, taking the most direct line that could be found between the different stations. After being bored out, these pipes are left ¼ in. thick. All bends are made by means of brass tubing of ¾ in. internal diameter, the greater size being to prevent jamming of the carriers. These brass tubes are bent to not less than 8 ft. radius. Short lengths of iron pipe with a conical bore are used at the joints with the brass tubes, to gradually increase and reduce the bore.

The carriers are cylindrical, being 2 ft. long and 7 in. internal diameter, and have a capacity for from 600 to 800 letters. They are made of sheet steel ½ in. thick, and open at one end, the cover for this opening being fitted with a device which locks it only when the carrier is in the tube. Each carrier is fitted with two bearing rings of a fibrous material, placed one near each end; these rings are the only parts of the carrier which touch the tubes, and thus reduce friction to a minimum. The rings last for about 1,000 miles of travel.

The carriers are propelled through the tubes by a continuous current of air, generated by a Rand duplex compressor, placed in the basement of the General Postoffice. This air current passes through one tube to the sub-station, and returns through the other tube to a tank in the engine room, from which tank, in turn, the air is again taken up by the compressor, thus forming a complete circuit. The compressor, whose cylinders are 2½ in. diam. × 20 in. stroke, were built by the Rand Drill Co., from specifications of the Batcheller Pneumatic Tube Co. They can deliver the air at 11 lbs. pressure, although 6 lbs. is all that is now being used. The speed of the air current, and consequently of the carriers, is about 3,000 ft. per minute.

The transmitting and receiving machinery in the General Postoffice is placed on the main floor of the building. At the end of the transmitting tube is a cradle, by means of which the carrier is thrown into posi-

tion. When no carrier is being sent the air current from the delivery pipe passes directly into the tube through one arm of the cradle. But when the cradle is in the act of being thrown, to place the carrier in position, the current is automatically switched off and goes through a by-pass, being returned against the rear end of the carrier as soon as it is in position, thus starting it on its journey through the tube. Immediately after the carrier has left the cradle the latter is automatically returned to its original position. This machine is regulated by a time lock, which allows a headway of not less than six seconds to each carrier.

At the end of the receiving tube is a gate, so arranged and regulated as to effectually close the end of the tube, only being opened by the impact of the carrier as it is shot against it. The air current passes off continually in a direction at right angles to the tube through a valve to a pipe which conducts it to the tank in the engine room. The gate closes automatically as soon as the carrier has passed through to the receiving table outside, the small quantity of air which passes out with it not being sufficient to hold the gate open.

The transmitting machinery at the sub-station is practically the same as that at the General Postoffice, but the receiver is somewhat different, being arranged for a continuous passage of air without loss from the receiving tube to the transmitter. This is effected by means of a sleeve placed on the end of the receiving tube, the air current passing from the tube through the sleeve to another tube and thence to the transmitter. The carrier, when it arrives, passes through a gate somewhat similar to that at the General Postoffice, into a short piece of tubing from which, after the gate has closed, to prevent loss of air, it is dropped on to the receiving table.

A plant which in its essential features is similar to that described is now being installed in Boston, and is expected to be ready for operation by Nov. 10.

#### Definitions of and Regulations for the Use of Interlocking Switches and Signals.

Adopted by the American Railway Association, Oct. 6, 1907.

##### INTERLOCKING.

##### DEFINITIONS.

**Interlocking.**—An arrangement of switch, lock and signal appliances so interconnected that their movements must succeed each other in a pre-determined order.

**Interlocking Plant.**—An assemblage of switch, lock and signal appliances, interconnected.

**Interlocking Cabin.**—A building from which an interlocking plant is operated.

**Interlocking Signals.**—The fixed signals of an interlocking plant.

**Home Signal.**—A fixed signal at the point at which trains are required to stop when the route is not clear.

**Distant Signal.**—A fixed signal of distinctive character used in connection with a home signal to regulate the approach thereto.

**Dwarf Signal.**—A low fixed signal.

##### REQUIREMENTS OF INSTALLATION.

1. The interlocking of signals with switches, locks, railroad crossings, or drawbridges, so that a clear signal cannot be given unless the route to be used is clear and stop signals displayed for all conflicting routes.

2. The interlocking of switches, locks, railroad crossings, drawbridges and signals through levers, or their equivalent.

3. Interlocked levers, or their equivalent, by which switches, locks and signals are operated.

4. Signals of prescribed form, the indications given by two positions, and in addition at night by lights of prescribed color.

5. The apparatus so constructed that the failure of any part directly controlling a signal will cause it to give the normal indication.

6. Signals, if practicable, either over, or upon the right of, and adjoining the track to which they refer.

7. Semaphore arms, that govern, displayed to the right of the signal mast as seen from an approaching train.

8. The normal indication of Home signals—Stop; of Distant signals—Caution.

9. The apparatus so constructed that the failure of any part directly controlling a switch or lock will prevent the display of the clear signal.

10. Facing-point locks, for all facing-point switches in main routes.

11. Detector bars, or their equivalent, for all facing-point switches in the main routes.

12. Pipe, or its equivalent, compensated for changes in temperature, for connecting levers, in mechanical interlocking, with switches and locks.

13. Latch locking, or its equivalent.

14. The established order of interlocking such that:

A clear home signal cannot be displayed until derails or diverging switches, if any, in conflicting routes are in their normal position, and the switches for the required route are set and locked.

The display of a clear home signal shall lock all switches and locks in the route as far as the point to which such signal gives permission to proceed, locking all opposing or conflicting signals and releasing the corresponding distant signal, where such signal is used.

Where distant signals are used the display of a clear distant signal shall lock the home signal in the clear position.

15. Interlocking and block signals, interconnected where both are operated from the same cabin.

##### APPENDICES.

The following may be used if desired: (A) Dwarf signals. (B) Distant signals. (C) Bolt locking of switches, or its equivalent, by signal connections. (D) Derails, or diverging switches, for railroad crossings, drawbridges, junctions, and in sidings connected with the running tracks: Normal position—Open. (E) Electric locking of derails, facing-point switches and

drawbridges so that they cannot be opened after a train has passed the clear distant signal until the train has passed over them. (F) Detector bars, or their equivalent, at railroad crossings and junctions. (G) Repeaters or audible signals to indicate the position of signals to signalmen operating them. (H) Annunciators indicating the approach of a train, or for other purposes. (J) Route indicators. (K) Torpedo placers.

##### RULES FOR INTERLOCKING.

801. Interlocking signals, unless otherwise provided, do not affect the rights of trains under the time table, or train rules; and do not dispense with the use or the observance of other signals whenever and wherever they may be required.

Signal.	Occasion for Use.	Indication.	Name.
Color.	The signal will be displayed when	For engineers and trainmen.	As used in rules.
(a) Red.	Route is not clear.	Stop.	Stop signal.
(b) —.	Route is clear.	Proceed.	Clear signal.

Where the semaphore is used, the governing arm is displayed to the right of the signal mast as seen from an approaching train, and the indications are given by positions:

Horizontal as the equivalent of (a).  
Vertical or diagonal — as the equivalent of (b).

Signal.	Occasion for use.	Indication.	Name.
(c) —.	Home signal at (a).	Proceed with caution to the home signal.	Caution signal.
(d) —.	Home signal at (b).	Proceed.	Clear signal.

Where the semaphore is used, the governing arm is displayed to the right of the signal mast as seen from an approaching train, and the indications are given by positions:

Horizontal as the equivalent of (c).  
Vertical or diagonal — as the equivalent of (d).

\* Angle above or below the horizontal.

##### SIGNALMEN.

803. The normal indication of Home Signals is (a), as above; of Distant signals (c), as above.

804. Levers, or other operating appliances, must be used only by those charged with the duty and as directed by the rules.

805. Signal levers shall be kept in the position giving the normal indication, except when signals are to be cleared for an immediate train or engine movement.

806. When the route is clear the home (and distant) signals shall be cleared sufficiently in advance of approaching trains to avoid delay.

807. Signals shall be restored to the normal indication as soon as the train or engine for which they were cleared has passed.

808. If necessary to change any route for which the signals have been cleared for an approaching train or engine, switches must not be changed or signals cleared for any conflicting route until the train or engine, for which the signals were first cleared, has stopped.

809. No attempt shall be made to move a switch or facing-point lock when any portion of a train or engine is standing on or closely approaching the switch or detector bar.

810. Levers must be operated carefully and with a uniform movement. If any irregularity, indicating disarranged connections, be detected in their working, the signals shall be restored to the normal indication and the connections examined.

811. Signalmen must observe, as far as practicable, whether the indication of the signals corresponds with the position of the levers.

812. If any signal fails to work properly its operation shall be discontinued and the signal secured so as to give the normal indication until repaired.

813. It is necessary to discontinue the use of any fixed signal, hand signals must be used and — notified.

814. If there is a derailment or if a switch is run through, or if any damage occur to the track or interlocking connections, the signals shall be restored to the normal indication, and no train or switching movement allowed until all parts of the interlocking plant and track liable to consequent injury have been examined and are known to be in a safe condition.

815. If necessary to disconnect the switch from the interlocking apparatus the switch must be securely fastened.

816. During storms or drifting snow special care must be taken in operating switches. If the force whose duty it is to keep the switches clear is not on hand promptly when required, the fact shall be reported to —.

817. During cold weather the levers must be moved as often as may be necessary to keep connections from freezing.

818. If any electrical or mechanical appliance fails to work properly — shall be notified and only duly authorized persons allowed to make repairs.

819. Signalmen will be held responsible for the care of the cabin, lamps and supplies; and of the interlocking plant, unless provided for otherwise.

820. Signalmen must not make or allow any unauthorized alterations or additions to the plant.

821. When switches or signals are undergoing repairs, signals must not be given for any movements which may be affected by such repairs, until it has been ascertained from the repairmen that the switches are properly set for such movements.

822. Lights in interlocking cabins shall be so placed that they cannot be seen from approaching trains.

823. Lights shall be used upon all fixed signals from one hour before sunset until one hour after sunrise, and whenever the signal indications cannot be clearly seen without them.

824. Signalmen must have the proper appliances for hand signaling ready for immediate use. These must be used when the proper indication cannot be given by a fixed signal.

825. Hand signals must not be used when the fixed signals are in proper working order. Where hand signals are authorized they must be given from such a point and in such a way that there can be no misunderstanding on the part of engineers or trainmen as to the signals displayed, or as to the train or engine for which they are given.

826. If any train or engine passes a stop signal the fact,

\* (Hand signaling includes the use of lamp, flag, torpedo and fusee signals.)

with the number of train or engine, shall be reported to the signalman.

827. If a signalman has information that an approaching train has parted, he must, if possible, stop trains or engines on conflicting routes, clear the route for the parted train, and give the "Train Parted" signal to the engine man.

828. Signalmen must observe all passing trains and note whether they are complete and in order and the markers properly displayed.

829. Only those whose duties require it shall be allowed in the cabin.

#### ENGINEMEN AND TRAINMEN.

830. Trains or engines shall be run to but not beyond a signal indicating stop.

831. If after accepting a clear signal it is changed to a stop signal before it is reached, the stop shall be made at once. Such occurrence shall be reported to the signalman.

832. Engine men and trainmen must not accept clear hand signals as against fixed signals until they are fully informed of the situation and know that they are protected. Where fixed signals are in operation clear hand signals must not be given or accepted against them.

833. The engine man of a train which has parted on approaching an interlocking cabin must sound the whistle signal for "Train Parted."

834. An engine man receiving a "Train Parted" signal from a signalman must answer by the whistle signal for "Train Parted." When the train has been recoupled the signalman shall be notified.

835. Sand must not be used over movable parts of an interlocking plant.

836. Engine men must report to — any unusual detention at interlocking plants.

837. Trains or engines stopped in making a movement through an interlocking plant must not move in either direction until they have received the proper signal from the signalman.

#### REPAIRMEN.

875. Repairmen are responsible for the inspection, adjustment and proper maintenance of all the interlocking plants assigned to their care.

876. Where the contacts of switches or track does not admit of the proper operation or maintenance of the interlocking plant, the fact shall be reported to —.

877. When any part of an interlocking plant is to be repaired, a thorough understanding must be had with the signalman, in order to secure the safe movement of trains and engines during repairs. The signalman must be notified when the repairs are completed.

878. If necessary to disconnect any switch it must be securely fastened before any train or engine is permitted to pass over it.

879. No alterations or additions to any interlocking plant shall be made unless authorized by —.

880. Repairmen when on duty, or subject to call, must keep — advised as to where they can be found, and respond promptly when called.

#### Rules for the Operation and Maintenance of Interlocking Plants.

(Recommended by the Railway Signalling Club.)

##### Operation.

1. All signal arms must be kept normally in the horizontal position, and must not be cleared for an approaching train until such train is within a mile of the tower. Each signal arm must be returned to the horizontal position as soon as the rear end of a train has passed it. When it is necessary for the lever man to be absent from the limits of the interlocking, signals must be left as directed by special order.

2. A signal must not be given until it is known that the route is clear.

3. Immediately after operating a signal lever the signalman must be observed to note whether the arm has assumed the proper position.

4. Passenger trains must be given precedence over freight trains, but after clearing the signals for an approaching train they must not be changed, except as per Rule 5, until after the train has passed beyond the stop signal limits of the interlocking, unless the train shall have come to a stop outside the stop signal.

5. Signals may be taken away from a train at any time, provided that anything is discovered which might endanger the safety of the train, and every effort must be made to avoid an accident.

6. When it is necessary to flag a train through the limits of an interlocking, the hand signal must be given from a point where there can be no misunderstanding as to which train is to be moved. The signals for this purpose to be given only by a green flag or light.

7. When a route is signalled in one direction only, and a movement is necessary in the opposite direction over that route, the signal lever governing the route must be unlatched to insure that the route is set. Said lever must then be put in the normal position and the train flagged through the limits of the interlocking.

8. When a switch or derail is out of order so that it cannot be operated and locked from the machine, the signal or signals that protect such defective part must be kept at danger. When a movement is to be made over the route or routes affected, the defective switch or derail must be spiked for the desired route, and the signal lever or levers governing the route must be unlatched to insure that the route is set. The train must then be flagged through the limits of the interlocking. In such a case trains that are to make movements over conflicting routes must be brought to a stop before the home signal is cleared for them.

9. If a signal arm fails to assume the horizontal position when the operating lever is put in the normal position, no switch or derail must be moved or conflicting signal cleared until the arm of the defective signal has been put in the horizontal position. Said defective signal must not be operated for a train until it is known to be in working order.

10. When a signal is out of order the arm must be kept in a horizontal position. Before flagging a train past such signal its lever must be unlatched to insure that the route is set.

11. When there is a defect in the machine or locking, making it possible to clear a signal with a switch, derail or lock in the wrong position, or a conflicting signal clear, the signal or signals affected must be kept in the horizontal position, and a train must not be flagged past such signal or signals until the lever man is sure that the route is set.

12. In case a signal light is extinguished said signal must be kept at danger, and a train that has been stopped from such a cause must be flagged through the limits of the interlocking. The lamp must be relighted at the first opportunity.

13. A switch, derail or detector bar must never be moved when a train covers it, and a switch or derail must never be moved when a train is closely approaching it, unless the moving of such a switch or derail will lessen the liability of damage to life and property.

14. Levers must be handled with a steady movement,

Lever men will be held responsible for any damage occasioned by rough handling. If a lever moves unusually hard, or with unusual noise, the cause must be at once investigated. An attempt to force a lever must never be made.

15. Signals must be observed frequently during the night to ascertain whether the lights are properly displayed.

16. During freezing weather the levers must be moved frequently to prevent the connections from freezing in.

17. Lights must be displayed from one hour before sunset to one hour after sunrise, and when from fog or other cause day signals cannot be seen clearly.

18. Lights must not be placed in the tower where they can be seen from an approaching train.

19. During the day if an arm is removed from a post the train that are affected by said signal must be stopped by a flagman, placed in advance of the signal affected, and must be flagged through the limits of the interlocking, in accordance with the instructions from the lever man.

20. At night if the red glass in a stop signal is broken, the signal arm must be kept in a horizontal position, and a red lantern must be substituted for the regular lamp. A train that has been stopped at such signal must be flagged through the limits of the interlocking.

21. At night if the green glass in a caution signal is broken, the signal must be kept in the cautionary position, and a green lantern must be substituted for the regular lamp.

22. In case of an accident or damage to any part of the apparatus, the proper officer must be notified immediately.

23. Engine men running their trains past a stop signal, or using sand or wasting water within the home signal limits of the interlocking, must be reported to the proper officer.

24. Lever men on duty must not leave the tower except in case of absolute necessity.

25. Unauthorized persons must not be permitted in the tower.

26. Whenever it is safe to do so, the switches must be operated upon the request of section men.

##### Maintenance.

27. The plant must be inspected daily.

28. All pins in crank stands, compensators, detector bars, and all bolts and nuts must be kept tight. Cotter pins must be kept in place and properly spread. Crank, compensator and other foundations must be kept rigid, and all boxing must be kept in repair.

29. All wire and pipe line connections must be kept in proper adjustment.

30. Glasses and lenses must be inspected daily. They must be kept in a clean condition. If any are cracked or broken, they must be replaced at once.

31. Switches must be inspected daily while in operation to see that the points fit up and are properly locked.

32. Home signal arms for the stop position, and caution signal arms for the caution position, must stand at right angles to the post, and each must stand at an angle of 30 degrees or less to the post when clear. The arms must be washed whenever the color of same becomes obscured by dirt, and painted when necessary.

33. Any part of the apparatus becoming so worn as to endanger the safe working of the plant must be renewed at once.

34. All moving parts of the plant must be kept oiled and greased. Care must be taken not to use too much oil, and all the old oil must be removed before reoiling.

35. The tower must be kept in a neat and orderly condition, and tools and hand signals must be ready for use.

36. Lamps must be cleaned and filled daily, and must be lighted at least ten minutes before being taken from the lamp-room, in order that the flame may be regulated.

37. Any damage to the plant must be immediately investigated, and the tracks and switches in a desired route must be put in a safe condition before allowing a train to pass.

38. In case of accident or derailment, the tower man or party in charge shall take precautions to prevent any unnecessary damage to the ground works or connections.

39. Tampering with the machine locking will not be allowed. Any defect in the locking must be reported to the proper officer immediately.

40. A report of the condition of the plant, including any trouble with the lamps, must be sent daily to the proper officer, or at the end of each week, as may be ordered by the proper officer. The report must be sent to the proper officer at the end of each month.

#### DEFINITIONS AND RULES GOVERNING THE OBSERVANCE OF SIGNALS AT INTERLOCKING CROSSINGS AND SWITCHES.

1. Interlocking signals are of the semaphore pattern, consisting of posts with movable arms. Train movements are governed by the position of the arms by day and by the color of the lights at night. The position of the arms, the color of the lights and the lights displayed indicates stop, caution, or clear.

2. Signals are located to the right of the normal direction of traffic, the arms being on single or bracket posts or on posts which are located on bridges over the tracks. When bracket posts are used, the posts carrying the arms stand in the same relative position as the tracks governed. (Note.—Any exception to this rule will be covered by special order.)

3. The front view of the signal, which is the only one giving indication to trainmen, is the one in which the arms are between the post and the observer. These arms extend from the post toward the right of such line of observation.

4. The stop signal placed at or near the danger point has one or more arms with straight ends. The front side of each arm is painted red with a white stripe.

5. High stop signals, except at junction points, may have two arms on the same post. The upper arm governs the movements of trains along the main or high speed route; the lower arm along the diverging route or routes.

6. At junction points three arms may be used. The upper arm governs the movements of trains along the main or high speed route; the middle arm the route of secondary importance, and the lower arm all other diverging routes.

7. The stop or dwarf stop signal has a signal arm on a post not over 5 ft. high, and governs movements of trains from side track to side track, side track to main track, and along the main track against the normal direction of traffic.

8. The caution signal, placed 130 ft. or more in advance of its home signal, has an arm with its forked end, the front side of which is painted green with a white stripe.

9. The back side of the signal arm is painted white with a black stripe.

10. When the arm on a single-arm stop signal is in a horizontal position, or a red light is displayed, or when all of the arms on a two or three-arm stop signal are in a horizontal position, or all red lights displayed, stop is

indicated, and the signal must not be passed when in this position, except as per Rule 15. When the arm on a single-arm stop signal, or one of the arms on a two or three-arm stop signal is inclined downward to an angle of 60 deg. or more, or a white light is displayed, clear is indicated, and the train which is governed by said home signal may proceed.

11. When the arm on a caution signal is in a horizontal position, or a green light is displayed, caution is indicated, and a train which is governed by said signal must be so controlled that it may be stopped before reaching the home signal. When the arm is inclined downward to an angle of 60 deg. or more, or a white light is displayed, clear is indicated, or that the home signal or signals for the high speed route are clear.

12. An indication is given for each movement to be made. A train having passed through the interlocking by permission of a clear signal, must not be moved in the opposite direction before receiving a clear signal for such a movement.

13. Movements to or from side tracks or along main tracks, against the normal direction of traffic, must be made at slow speed.

14. When a signal is not visible, or the arm is not inclined downward at an angle of at least 60 deg., or the light is not shown, or a white light is shown with a green or green light should be shown stop indicated. In such a case a train affected by said signal must not proceed until every precaution is taken to insure safety. The trouble must be promptly reported to the lever man, and to the superintendent or trainmaster by wireless.

15. If a signal is out of order, or if a movement is to be made that is not signaled, the train must be brought to a stop, and only proceed through the limits of the interlocking by taking every precaution in accordance with instructions from lever man.

16. Flying switches must not be made over interlocked switches.

17. The use of sand or wasting of water must be avoided within the stop signal limits of the interlocking.

18. No engine, train, or portion of trains, must be allowed to stand for any length of time within the stop signal limits of the interlocking.

19. When there is switching to be done at an interlocking, the train men must in no case cut their train before stopping, but must bring the train intact to a stop outside of the stop signal.

#### Exports of Electrical Machinery.

There has during the last two years been a marked increase in the exports of electrical supplies from this country. The increase has been particularly noticeable in the direction of the various apparatuses that go to make up an electric railroad equipment. It is, indeed, no exaggeration to say that the American manufacturer today stands unchallenged in the first place as far as railroad plants are concerned.

Thus far the electric railway exports have been largely to the United Kingdom and Continental Europe, Buenos Ayres being the only South American city in which an electric railway is in actual operation, though plants are proposed in Caracas, Lima and Valparaiso. The high cost of coal is one of the chief obstacles to the building of electric railways in South America, and to those countries the exports are at present largely appliances for transmission of power from the water courses. Custom House statistics fail to give any adequate idea of the value of the export trade, owing largely to defective returns. For the seven months ending with July the value of the exports reached a total of \$2,943,822, representing an increase of \$480,909 over the corresponding period of last year.

Among the American electrical manufacturing companies the most aggressive in the direction of bidding on foreign contracts seems to be the General Electric Company. This concern has agents in all the large European centers and employs an extensive system of travelers. Its European office is managed by the London branch house, which is officially known as the British Thompson-Houston Company. The President of the General Electric Company is now in London endeavoring to secure contracts. Among their recent large contracts the company has made are four, which involve a total amount of about \$750,000, although much higher figures of the amount have recently been published. These contracts include complete equipment for the Central London Underground Railway, the Dublin tramways, and the electrical equipment for the Barcelona and Madrid tramways.

In connection with the New Central Underground Railway is another contract awarded to the American company. The Sprague Electric Motor Company has secured the contract for putting in all the elevators (49 in number). The competition for this work was sharp, but it is stated that the railway people actually bid almost the same amount for the same work as those of foreign competitors because of superiority of workmanship.

Another large British contract to an American concern is that recently awarded to the European company of the Westinghouse Electric and Manufacturing Company by the Metropolitan Electrical Supply Company for a large electric lighting plant to be installed in London. The apparatus will be of the multiphase type, involving the use of the Tesla patents, which are owned in England by the Westinghouse Company. It is understood that the contract amounts to between \$350,000 and \$400,000.

The Walker Company has lately secured through its Paris representatives the contract for supplying the machinery and building street railways at Lignitz, Silesia and Fiume, Austria. At the local office of this company they say that the export field in the electrical line is encouraging, particularly with Europe and the continent.

Aside from the increased exports of electric supplies there has been a corresponding increase in the export demand for boilers and steam engines to operate them. The P. & A. L. L. Company, for instance, during the month of September closed contracts for foreign orders aggregating \$500,000, a very considerable part of which represented orders in connection with electrical machinery. It signifies of 1,500 H. P. each were ordered for the Central London Underground Railway. Six were ordered for the Dublin tramways to furnish 1,000 H. P. each to propel electric cars over the old tramways. Three engines of 1,000 H. P. were ordered by the Barcelona tramway to work electric cars on their tramways. Two duplicate engines will be sent to Madrid, Spain, for the tramways there. From Sydney, New South Wales, has come an order for four engines of 1,500 H. P. each for the Sydney tramways. The McIntosh & Seymour Electric Co., have booked orders for upward of \$100,000. These contracts, they say, are for engines for Japan, Australia, South Africa, the Argentine Republic and Mexico, all for use in connection with electrical machinery.—*Journal of Commerce*