# INTERCOLONIAL RAILWAY STEAM MOTOR CAR

## Steam Motor Cars for the I.C.R.

Three motor cars have been built for the Intercolonial Ry. The cars are very similar in design, at the passenger end, to the first-class day cars. At the motor end the roof is of wrought iron, and curved from plate to plate to which it is bolted, thus permitting it to be removed when it is desired to take out the boiler. As it is intended to run these cars in either direction, with or without a trailer as may be desired, they are equipped with a pilot, and M.C.B. coupler at both ends, also through piping and standard hose connections for steam heating and Westinghouse air brakes. The cars carry a standard I.C.R. locomotive bell on the roof at the motor end, and are equipped with a headlight which can be carried at either end. The cars are fitted with steel platforms at each end, built by the Standard Coupler Co., New York. The window sashes and fixtures are of metal. Water tanks having a total capacity of about 1,000 imperial gallons and the vapor and gas tanks, with the necessary pipes and fittings, are slung from the underframing with wrought iron straps. The cars are equipped with Westinghouse air brake apparatus of the latest and most approved design for cars of this class. This was specially designed for these cars by the Westinghouse Co. The passenger end of the car is carried on a standard four wheel passenger car truck.

The method of carrying the motor end of the car is unique, having been designed first for these cars. On account of the boiler passing through the center of the car it was not possible to put a center bearing immediately under the car sills and over the center of the engine truck. This had to be carried below the ash pan and was done in the following manner. A large cast steel body bolster weighing about 4,430 lbs. was made to fit the underframing of the car body, having an opening in the center through which the boiler passes. This casting is securely bolted to the sills of the car. Four heavy steel struts carry the weight of the car body to a cast steel bolster below boiler. Buffing springs are arranged in this casting to prevent any jarring when the car is in motion.

The locomotive has bar frames. The boiler is of vertical type and carries a pressure of 180 lbs. per sq. in. The locomotive has outside cylinders, with balanced slide valve operated by valve gear. The cylinders are 12 in. diameter by 16 in. stroke. The capacity of the engine is about 200 h.p. The journal bearings are 7 x 16 ins. long.

The interior arrangement and fittings are made up as follows, starting from the motor end of the car. The boiler room is 13½ ft. long inside. This section contains the boiler and boiler mountings, throttle lever, reversing shaft and gear, Westinghouse air brake pump, coal bunkers, etc. This section is fitted with sliding doors on each side, and an end door. Sliding doors leading to the baggage room are placed on each side of the partition. The baggage room is 8 ft. 4½ ins. long. In this section are placed the gauges in connection with the lighting system, also the battery for the electric bells and the tool case. It is fitted with a large sliding door on each side. The smoking compartment has seating capacity for 12 persons. The seats and other furnishings are similar to those in the passenger compartment. The passenger compartment is 30½ ft. long, and has seating capacity for 30 persons. The furnishings of this compartment are similar to those of a first-class day car. The woodwork is ash. The upper and lower ceilings are three-ply white wood painted olive green, striped in gold leaf ornamentation and varnished. The window curtains are the I.C.R. standard design. The material is pantasote. The seats are upholstered in rattan. The women's and men's lavatories are 3 ft. 11 in. long. They are each fitted with a closet and wash basin, the former being manufactured by Rhodes, Curry & Co., Amherst, N.S. A nickeline water cooler and tray is placed at this end of the car. The vestibule is 7 ft. longer than the standard, in order to give more room for the engineer's brake valve, throttle closing device, hand brake shaft, whistle and bell cords, all of which are arranged in this end, thus permitting the car to be operated from either end.

Car Heating and Lighting Co., New York. These are the first cars of this kind using the vapor system of lighting.

The entire motor car was designed in the I.C.R. mechanical drawing office at Moncton, under the supervision of G. R. Joughins, Superintendent of Motive Power. The locomotive was built in the I.C.R. shops, and the car body by Rhodes, Curry & Co., Amherst, N.S. The two parts were assembled and the trial tests made in the I.C.R. shops, Moncton. The first of the three cars built has gone into service—running between St. John and Hampton, N.B. Following are the principal items in the specifications:

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| Seating capacity | 52 persons |
| Gauge of track | 4 ft. 8½ ins. |
| Length over end sills | 66 ft. 0 ins. |
| Width over side sills | 9 ft. 10 ins. |
| Height, top of sills to under side of plate | 6 ft. 7½ ins. |
| Length, inside sheathing | 58 ft. 1½ ins. |
| Width inside sheathing | 8 ft. 11½ ins. |
| Width, between deck rails | 4 ft. 10 ins. |
| Height, inside, top of floor to under side of lower deck rail | 7 ft. 7 ins. |
| Outside of end sill to center of body bolster, at motor end | 10 ft. 0 ins. |
| Outside of end sill to center of body bolster, at passenger end | 7 ft. 0 ins. |
| Center to center of body bolsters | 49 ft. 0 ins. |
| Center to center of needle beams | 10 ft. 6 ins. |
| Center to center of transoms | 29 ft. 9 ins. |
| Height, top of rail to center of coupler | 2 ft. 10½ ins. |
| Wheel base of truck | 8 ft. 0 ins. |
| End door opening | 2 ft. 3 ins. |
| Width of end door | 2 ft. 4 ins. |
| Side-door openings in baggage compartment | 3 ft. 8 ins. |
| Side door openings in boiler room | 2 ft. 3 ins. |
| Width of side doors in baggage compartment | 4 ft. 0 ins. |
| Width of side doors in boiler room | 2 ft. 4 ins. |
| Total wheel base | 57 ft. 2 ins. |
| Body and underframe of car | Wood |
| Bolsters (at passenger end) | Wrought iron |
| Brake beams | Simplex |
| Brakes | Westinghouse |
| Couplers | M.C.B. automatic |
| Journal bearings | M.C.B. 4½ ins. x 8 ins. |
| Truck | I.C.R. standard 4-wheel passenger |
| Wheels | 36 x 6 W. I. disc Krupp steel tires |

Following are the specifications of the locomotive:

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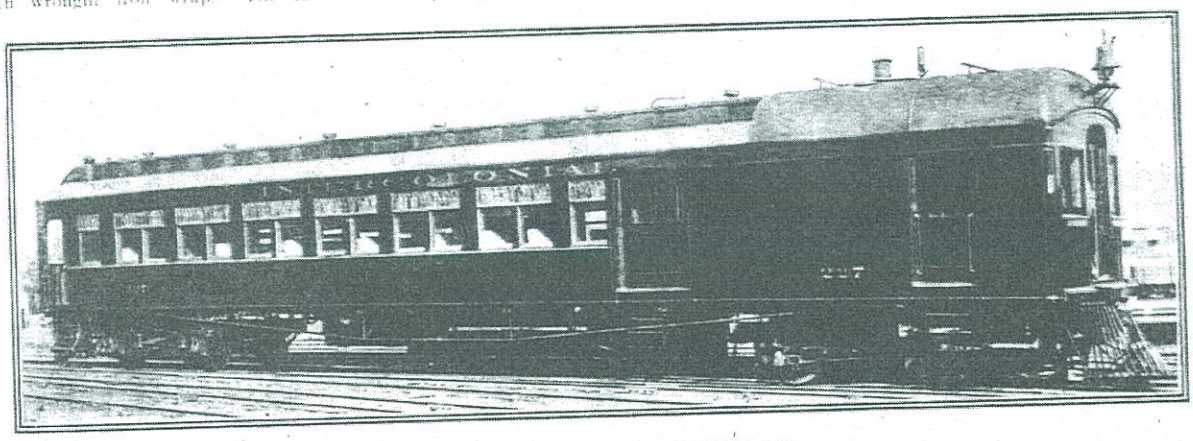
| Cylinders | 12 ins. x 16 ins. stroke. |
| Gauge | 4 ft. 8½ ins. |
| Driving wheels | 42 ins. dia. |
| Wheel base of engine | 8 ft. 0 ins. |
| Boiler type | Circular upright with steam drum. |
| Heating surface in tubes | 684.07 2 sq. ft. |
| Heating surface in firebox | 44.04 sq. ft. |
| Total | 728.712 sq. ft. |

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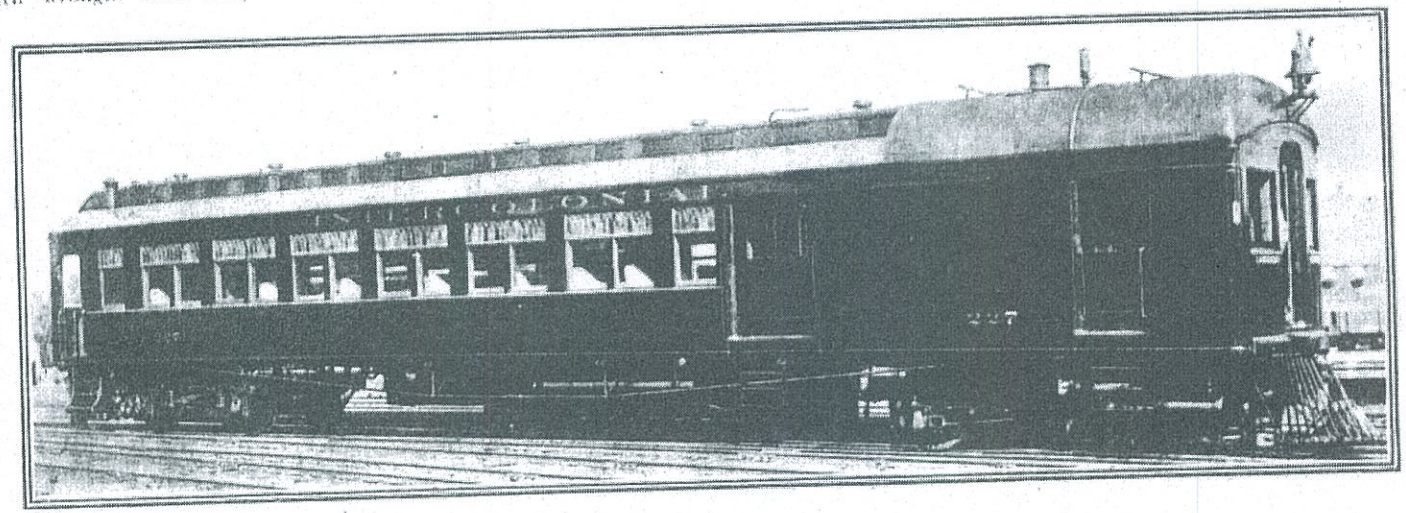


INTERCOLONIAL RAILWAY STEAM MOTOR CAR.

equipped with Westinghouse air brake apparatus of the latest and most approved design for cars of this class. This was specially designed for these cars by the Westinghouse Co. The passenger end of the car is carried on a standard four wheel passenger car truck.

The method of carrying the motor end of the car is unique, having been designed first for these cars. On account of the boiler passing through the center of the car it was not possible to put a center bearing immediately under the car sills and over the center of the engine truck. This had to be carried below the ash pan and was done in the following manner. A large cast steel body bolster weighing about 1,130 lbs. was made to fit the underframing of the car body, having an opening in the center through which the boiler passes. This casting is securely bolted to the sills of the car. Four heavy steel struts carry the weight of the car body to a cast steel bolster below the engine frame, having a male center bearing. This rests on a second casting, which is hung from the engine frame by means of four wrought iron hangers fitted with equalizing springs. The spring rests in cup shaped caps and seats, which allow the car body and engine to take the different positions necessary when rounding curves. The hole in the casting under the car body is made large enough to allow plenty of side and backward and forward motion of the

persons. The seats and other furnishings are similar to those in the passenger compartment. The passenger compartment is 30½ ft. long, and has seating capacity for 40 persons. The furnishings of this compartment are similar to those of a first-class day car. The woodwork is ash. The upper and lower ceilings are three-ply white wood painted olive green, striped in gold leaf ornamentation and varnished. The window curtains are the I.C.R. standard design. The material is pantasote. The seats are upholstered in rattan. The women's and men's lavatories are 3 ft. 11 in. long. They are each fitted with a closet and wash basin, the former being manufactured by Rhodes, Curry & Co., Amherst, N.S. A nickeline water cooler and tray is placed at this end of the car. The vestibule is 7 ft. longer than the standard, in order to give more room for the engineer's brake valve, throttle closing device, hand brake shaft, whistle and bell cords, all of which are arranged in this end, thus permitting the car to be operated at each end. This vestibule is equipped with hanged side doors, sliding end doors, and vestibule trap doors. Electric bells are placed in the vestibule and boiler room for communicating between these sections. The cars are heated throughout with the Safety Car Heating and Lighting Co.'s steam heat system. The lighting of these cars is a new feature, being the vapor system, in conjunction with the incandescent mantle lamps, and is made by the Safety

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| Center to center of needle beams | 10 ft. | 6 | ins. |
| Center to center of transoms | 29 ft. | 9 | ins. |
| Height, top of rail to center of coupler | 2 ft. | 10½ | ins. |
| Wheel base of truck | 8 ft. | 6 | ins. |
| End door opening | 2 ft. | 4 | ins. |
| Width of end door | 2 ft. | 4 | ins. |
| Side door openings in baggage compartment | 3 ft. | 8 | ins. |
| Side door openings in boiler room | 2 ft. | 3 | ins. |
| Width of side doors in baggage compartment | 4 ft. | 0 | ins. |
| Width of side doors in boiler room | 2 ft. | 4 | ins. |
| Total wheel base | 57 ft. | 2 | ins. |
| Body and underframe of car | | | Wood |
| Bolsters (at passenger end) | | | Wrought iron |
| Brake beams | | | Simplex |
| Brakes | | | Westinghouse |
| Couplers | | | M.C.B. automatic |
| Journal bearings | | | M.C.B. 4½ ins. x 8 ins. |
| Truck | | | I.C.R. standard 4 wheel passenger |
| Wheels | 36 ins. | | W. I. chse Krupp steel tires |

Following are the specifications of the locomotive:

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|---|---|
| Cylinders | 12 ins. x 16 ins. stroke. |
| Gauge | 4 ft. 8½ ins. |
| Driving wheels | 42 ins. dia. |
| Wheel base of engine | 8 ft. 0 ins. |
| Boiler type | Circular upright with steam drum |
| Heating surface in tubes | 684.672 sq. ft. |
| Heating surface in firebox | 44.04 sq. ft. |
| Total | 728.712 sq. ft. |
| Grate area | 11.54 sq. ft. |
| Working pressure | 180 lbs. per sq. in. |
| Test | 250 lbs. per sq. in. |
| Water tank capacity | about 1,000 gals. |
| Two coal bunkers (½ ton each) | 1 ton |
| Weight of motor (without car) | 51,000 lbs. |
| Weight of motor (with car) | 92,000 lbs. |
| Total weight of motor and car loaded about | 142,000 lbs. |
| Tractive power | 8,500 lbs. |
| Horse power of engine about | 200 |
| Speed on 1% grade | 25 miles |
| Drivers | Coupled |
| Motor to haul a trailer of | 40 tons |

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The engine truck is carried on four wheels coupled. Bar frame of mild steel. The boiler is carried on a cast steel saddle, and properly braced. The car body, supported on a cast steel body bolster, is attached to the equalizing spring gear of the locomotive with four steel struts; this is carried on the locomotive frame by means of cross bars and coil springs. Buffer gear and springs are arranged in the cast steel body bolster to take the forward and backward motion. Rubbing plates are secured on the sides of the boiler and to the car body bolster with ½ in. clearance on each side. Exhaust is carried on the stack. The boiler is attached to the saddle so that it can be easily taken out and replaced. The boiler is lagged with asbestos and covered with Russian iron. Steam and exhaust pipes are lagged with asbestos, and neatly bound with heavy duck. The locomotive can be easily detached from car body.

MATERIALS IN MOTOR.

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|---|---|
| Boiler and firebox shell | Sheet steel |
| Internal firebox | Firebox steel |
| Frames and stays | Mild steel |
| Cylinders | Hard close grained iron |
| Axles | Open hearth steel |
| Axle boxes | Cast steel |
| Shoes and wedges | Cast iron |
| Wheel centers | Cast steel |
| Wheel tires | Krupp |
| Piston rod and slide bars | Steel |
| Valve motion | Steel |
| Stay bolts | Double refined iron |
| Boiler tubes | Solid drawn copper |
| Springs | Crucible steel |
| Spring and brake gear | Best selected scrap |
| Boiler mountings | Brass |

The boiler shell is 9 ft. 9 ins. long over all. Barrel 4 ft. 8 in. o.d., outside plates ⅜ in. thick. Longitudinal seams butt jointed, plated on both sides with ½ in. butt strap plates and double riveted. Circumferential seams single riveted. Edges of all plates machined bevel. Firebox of best firebox steel ⅜ in. thick. Tube sheet best firebox steel ½ in. thick. Stay bolts 1 in. in diameter. Boiler smoke box tube sheet ½ in. thick. Longitudinal stays 14 in. number, 1¼ in. in diameter. 361 solid drawn copper tubes 1½ in. o.d. no. 12 w.g. thick. Manhole saddles fitted with patent manhead complete. Ash pan steel plates 3/16 in. thick, fitted with double doors front and back. Outside doors 3/16 in. plate. Inside doors wire netting on wrought iron frame, hinged separately and worked from cab. Grates and bearers, cast iron. Shaker and drop grates worked from cab. Boiler mountings I.C.R. standard as far as possible. Two locomotive pop safety valves muffled, size 2½ ins. Two inspirators. Steam pipe ¾ in. Suction pipe 1 in. delivery pipe, overflow 1 in., capacity 610 gals. per hour. Cylinders 12 ins. diameter by 16 in. stroke, of special tough, close grained, cold blast iron, properly machined and bolted to frame with turned bolts. Pistons of cast iron solid type with plain rings sprung on. Piston rods of toughened steel ground and keyed to crossheads. Valves, balanced slide. Bar frames of mild steel or wrought iron 4 in. x 3 in. section of top bar. Properly machined where necessary. Truck fitted with Westinghouse air brake. In addition to the air brake apparatus the locomotive is fitted with a hand brake. A 9½ in. air pump is attached to the boiler or in some suitable place in the cab. An engineer's brake valve is supplied for both ends of the car. The saddle is of cast steel turned to fit boiler foundation ring and machined to fit the frames. Horn blocks are forged on the truck frame. Axle boxes side rods of special mild steel. All made I section. Crank pins of toughened steel. Link motion arranged so as to give as nearly as possible equal cut offs in both gears. Reverse lever in the cab. Throttle lever placed in a convenient position in the cab, and so arranged that it can be operated from the cab or rear end of the car. Driving springs open hearth spring steel, 8 in number, placed two over each box on each side of the frame, of sufficient strength and flexibility to ensure easiness in running. The main water tank is of steel plate, 3/16 in., tank 19 ft. 2½ ins. long by 30 in. wide by 26 in. deep. Capacity about 600 imperial gallons. Two smaller circular tanks 24 in. in diameter by 9½ ft. long, each holding about 200 gals., making a total capacity of 1,000 imperial gals. Coal bunkers of steel plate, with capacity of about a ton. Two bunkers holding half a ton, each suitably arranged in the cab. Stack of sheet steel, straight type, fitted patent spark arrester.

## National Transcontinental Railway.

H. D. Lumsden, Chief Engineer, arrived in Winnipeg Aug. 13 from Ottawa, for the purpose of making an inspection of the construction operations eastward, carried on during the summer. It is reported that satisfactory progress has been made during the year with the grading and tracklaying on the portion under contract from Winnipeg, easterly to the junction with the Lake Superior branch from Fort William, which is being constructed by the G.T. Pacific Ry.

The Commissioners of the Transcontinental Ry. will receive tenders to Sept. 5, for the construction and erection of the steel superstructures and floor systems, with ties and guard rails complete required for bridges at the following points in District B, west of Quebec: Grand Bras d'Arme, mileage 38.9; Lachevrotiere River, mileage 39.93; Nigerette, mileage 86; Tawachiche River, mileage 83; Roberge Creek, mileage 85; River des Eaux Mortes, mileage 95; viaduct of River du Milieu, mileage 97; crossings of Brochet River at mileages 99, 101.5, 102, 108.5, and 109; Creek a Beance, mileage 115; overhead crossing, Quebec & Lake St. John Ry., mileage 118.25; Little Bostonnais, mileage 119.5; Big Bostonnais, mileage 124; Croche River, mileage 127; River au Lait, mileage 128.9; St. Maurice River, mileage 129.

GRAND TRUNK PACIFIC RY.

F. W. Morse, Vice-President and General Manager, returned to Montreal Aug. 8, after having been absent since July 4 inspecting the work in progress on the line. He said in an interview that the connection between Fort William and Winnipeg would not be made in time to carry the present season's crop. The company's branch from Fort William to Peninsula Lake, or Lake Superior Junction, would be completed, but the main line of the National Transcontinental Ry. into Winnipeg, which the Government is constructing, would not be completed. Satisfactory progress was being made on the line west of Winnipeg. A good deal of the grading and tracklaying between Winnipeg and Portage la Prairie had been completed, while about 60 miles of track had been laid and ballasted beyond Portage la Prairie. By the time the cold weather set in it was expected to have about 235 miles west of Portage la Prairie

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duck. The locomotive can be easily detached from car body.

MATERIALS IN MOTOR.

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|---|---|
| Boiler and firebox shell | Sheet steel |
| Internal firebox | Firebox steel |
| Frames and stays | Mild steel |
| Cylinders | Hard close grained iron |
| Axles | Open hearth steel |
| Axle boxes | Cast steel |
| Shoes and wedges | Cast iron |
| Wheel centers | Cast steel |
| Wheel tires | Krupp |
| Piston rod and slide bars | Steel |
| Valve motion | Steel |
| Stay bolts | Double refined iron |
| Boiler tubes | Solid drawn copper |
| Springs | Crucible steel |
| Spring and brake gear | Best selected scrap |
| Boiler mountings | Brass |

The boiler shell is 9 ft. 9 ins. long over all. Barrel 4 ft. 8 in. o.d., outside plates 7/8 in. thick. Longitudinal seams butt jointed, plated on both sides with 1/2 in. butt strap plates and double riveted. Circumferential seams single riveted. Edges of all plates machined bevel. Firebox of best firebox steel 3/8 in. thick. Tube sheet best firebox steel 1/2 in. thick. Stay bolts 1 in. in diameter. Boiler smoke box tube sheet 1/2 in. thick. Longitudinal stays 14 in number, 1 1/4 in. in diameter. 361 solid drawn copper tubes 1 1/2 in. o.d. no. 12 w.g. thick. Manhole saddles fitted with patent manhead complete. Ash pan steel plates 3-16 in. thick, fitted with double doors front and back. Outside doors 3-16 in. plate. Inside doors wire netting on wrought iron frame, hinged separately and worked from cab. Grates and bearers, cast iron. Shaker and drop grates worked from cab. Boiler mountings L.C.R. standard as far as possible. Two locomotive pop safety valves muffled, size 2 1/2 ins. Two inspirators. Steam pipe 3/4 in. Suction pipe 1 in. delivery pipe, overflow 1 in., capacity 600 gals. per hour. Cylinders 12 ins. diameter by 16 in. stroke, of special tough, close grained, cold blast iron, properly machined and bolted to frame with turned bolts. Pistons of cast iron solid type with plain rings sprung on. Piston rods of toughened steel ground and keyed to crossheads. Valves, balanced slide. Bar frames of mild steel or wrought iron 4 in. x 3 in. section of top bar. Properly machined where necessary. Truck fitted with Westinghouse air brake. In addition to the air brake apparatus the locomotive is fitted with a hand brake. A 9 1/2 in. air pump is attached to the boiler or in some suitable place in the cab. An engineer's brake valve is supplied for both ends of the car. The saddle is of cast steel turned to fit boiler foundation ring and machined to fit the frames. Horn blocks are forged on the truck frame. Axle boxes of cast steel. Axles are of best open hearth steel, 7 ins. in diameter, turned all over. Journals 7 in. x 16 in. long. Wheel centers are of cast steel, forced on to the axle with hydraulic pressure. Tires of Krupp crucible steel, 3 in. tires flanged 5 1/2 in. wide, secured by shrinkage and lip left off. Main and

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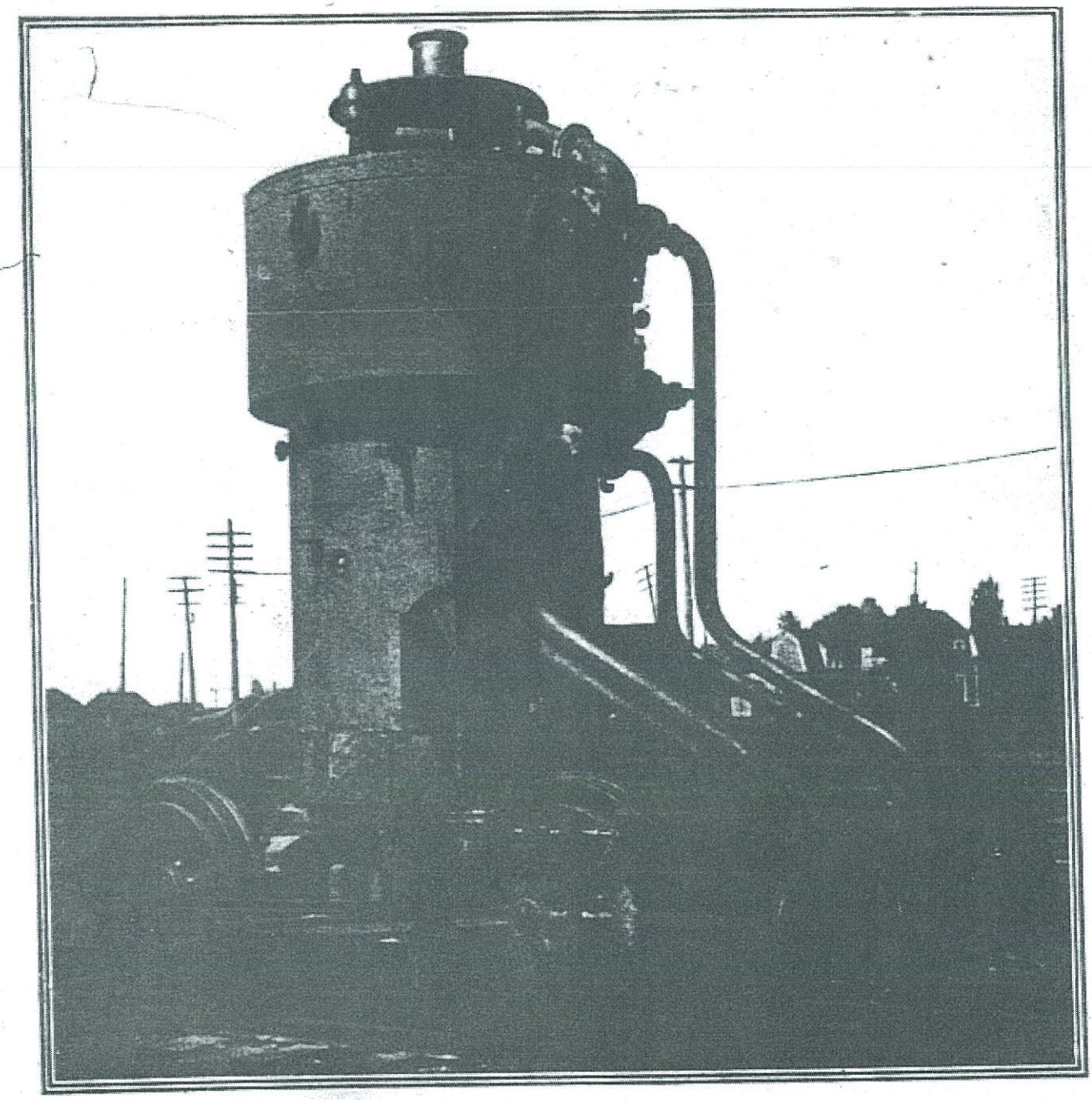

MOTOR TRUCK, INTERCOLONIAL RAILWAY MOTOR CAR.

This illustration shows the motor truck, boiler, engine etc., of one of the three steam motor cars which have been built for the I.C.R. and which were fully described and partly illustrated in our Sept. issue.

October 1907