

STONE'S ELECTRICAL INSTALLATIONS

ADOPTED
BY THE
RAILWAYS OF THE WHOLE WORLD.



STONE'S ELECTRICAL INSTALLATIONS

are equipped on upwards of **50,000** Coaches on more than **200** Railways all over the World.

The above is an illustration of a LONDON & NORTH WESTERN RAILWAY (England) Train so fitted.

STONE'S ELECTRICAL INSTALLATIONS

FOR

LIGHTING, the only system fulfilling all railway requirements,

COOLING, by cooled fresh air, freed from dust,

and **HEATING**, by warmed fresh air, freed from all impurities,

RAILWAY CARRIAGES.

ADOPTED BY RAILWAY COMPANIES ALL OVER THE WORLD.

UPWARDS OF 50,000 COACHES FITTED.

Protected by Patents throughout the world.

J. STONE & COMPANY, LIMITED,

Deptford, London, S.E.

Telegraphic Address: TOSTONES, LONDON.

STONE'S ELECTRIC LIGHT EQUIPMENTS FOR RAILWAY CARRIAGES.

THE ONLY PRACTICAL SYSTEM.

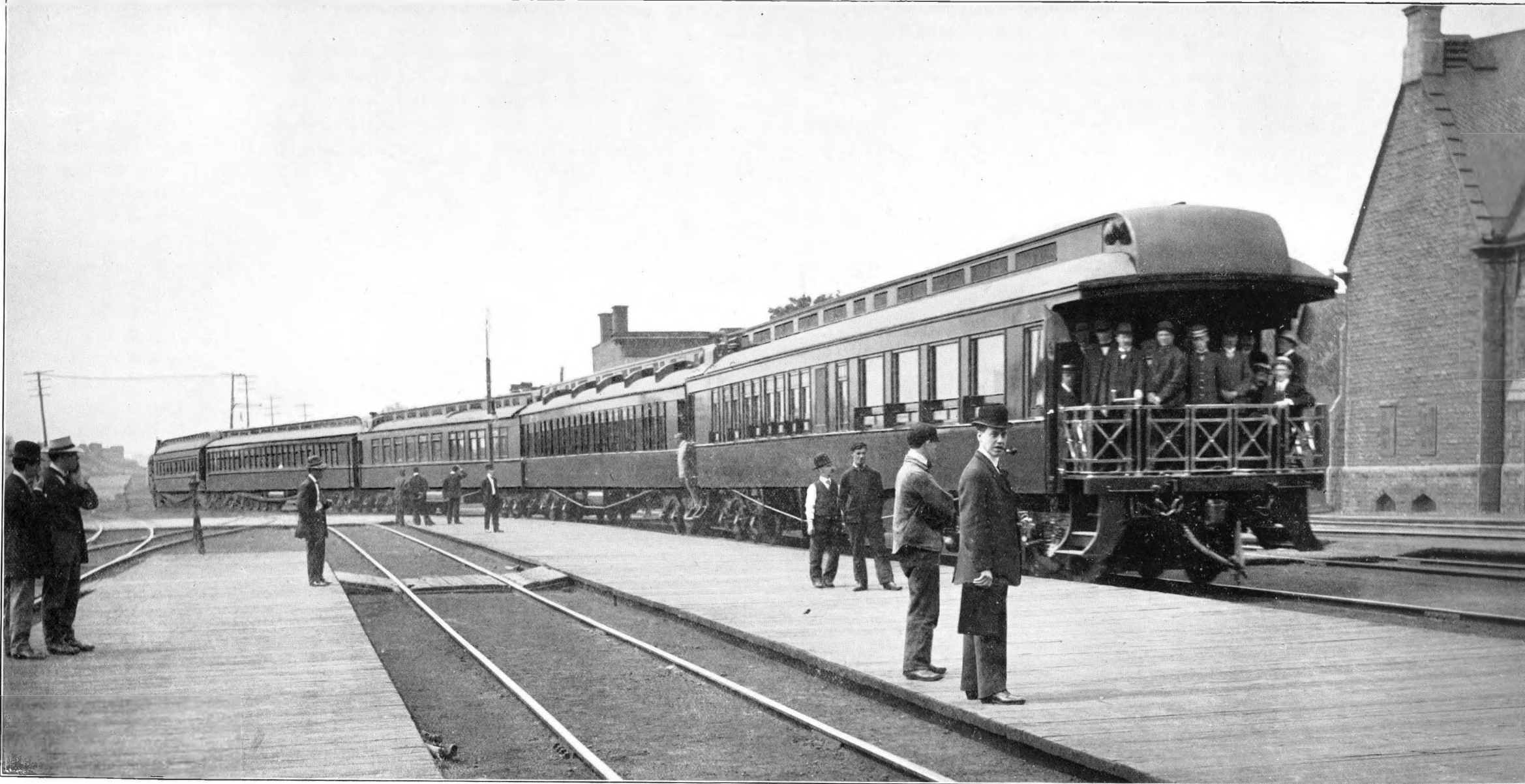
Cheaper than Gas and all other methods of Artificial Lighting.

CONVENIENT—SAFE—CERTAIN—UNIVERSALLY ADAPTABLE.

ELECTRIC LIGHTING—VENTILATING—HEATING.

Instructions for Use issued in most languages.

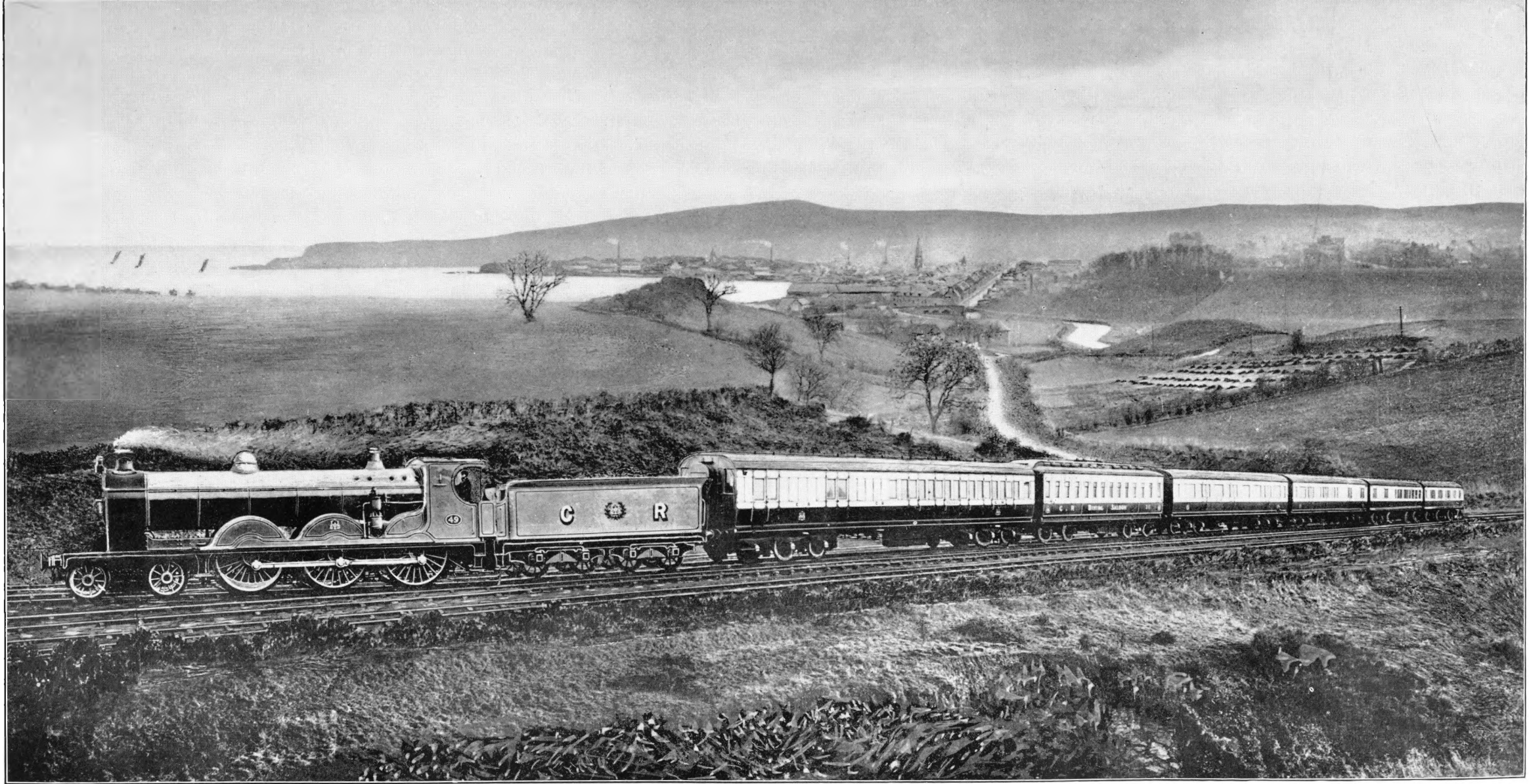
J. STONE & COMPANY, LIMITED, Deptford, London, S.E.



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The above is an illustration of a CANADIAN PACIFIC RAILWAY Observation Car so fitted.



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The above is an illustration of a CALEDONIAN RAILWAY (Scotland) Train so fitted.

Upwards of 50,000 coaches fitted with Stone's Electrical Installations in all parts of the world,

INCLUDING THE FOLLOWING COUNTRIES:—

GREAT BRITAIN	SWEDEN	CHINA	EGYPT	NEW SOUTH WALES
FRANCE	HOLLAND	JAPAN	UNITED STATES	WEST AUSTRALIA
GERMANY	GREECE	CAPE COLONY	CANADA	QUEENSLAND
AUSTRIA	SPAIN	NATAL	ARGENTINE	SOUTH AUSTRALIA
ITALY	RUSSIA	ORANGE RIVER	URUGUAY	VICTORIA
SWITZERLAND	TURKEY	COLONY	BRAZIL	NEW ZEALAND
BELGIUM	FINLAND	TRANSVAAL	CHILI	TASMANIA
NORWAY	INDIA	RHODESIA		

Stone's Installations are fitted to large numbers of cars running across the American Continent, over the Rocky Mountains from the Atlantic to the Pacific, in Arctic cold, 40° to 50° F. below zero; Cape to Cairo Railway, across South America (over the Andes), Australia, New Zealand, India, across Europe, Manchuria, China Japan, &c., &c., and it is possible

TO TRAVEL ROUND THE WORLD,
performing the overland journey entirely in trains fitted with
Stone's Lighting Installations.

Adopted in all the principal ROYAL TRAINS and PRESIDENTIAL CARS throughout the world.

New developments.

Generally.

Since Stone's Electrical Installation was first introduced it has from time to time been considerably improved in every one of its essential features, as experience in actual working has shewn to be necessary, so that its present efficiency and durability are greatly increased, while the cost of maintenance is considerably reduced; the installation as now supplied in its latest improved form is acknowledged to be the only one which gives entire satisfaction, not only to the travelling public, on account of the excellence of the light, but also to the Railway Companies for the reason that the cost of maintenance is considerably less than that of gas or of any other method of lighting. The reason Stone's electrical installations are cheaper to maintain than other electrical installations is that owing to the method of regulation being mechanical (see pp. 15 to 20) any ordinary railway fitter or mechanic can undertake its maintenance, and the attention of skilled electricians necessary with other installations, which are electrically regulated, is entirely dispensed with

The improvements are protected by Patents all over the World.

See separate pamphlet for full description.

Stone's
solid type
"Tonum"
accumulators.

The "Tonum" solid type train lighting accumulator is the outcome of many years' experience, and a most careful study of the many exacting requirements to be met; it possesses the following great advantages over **all** other types:—

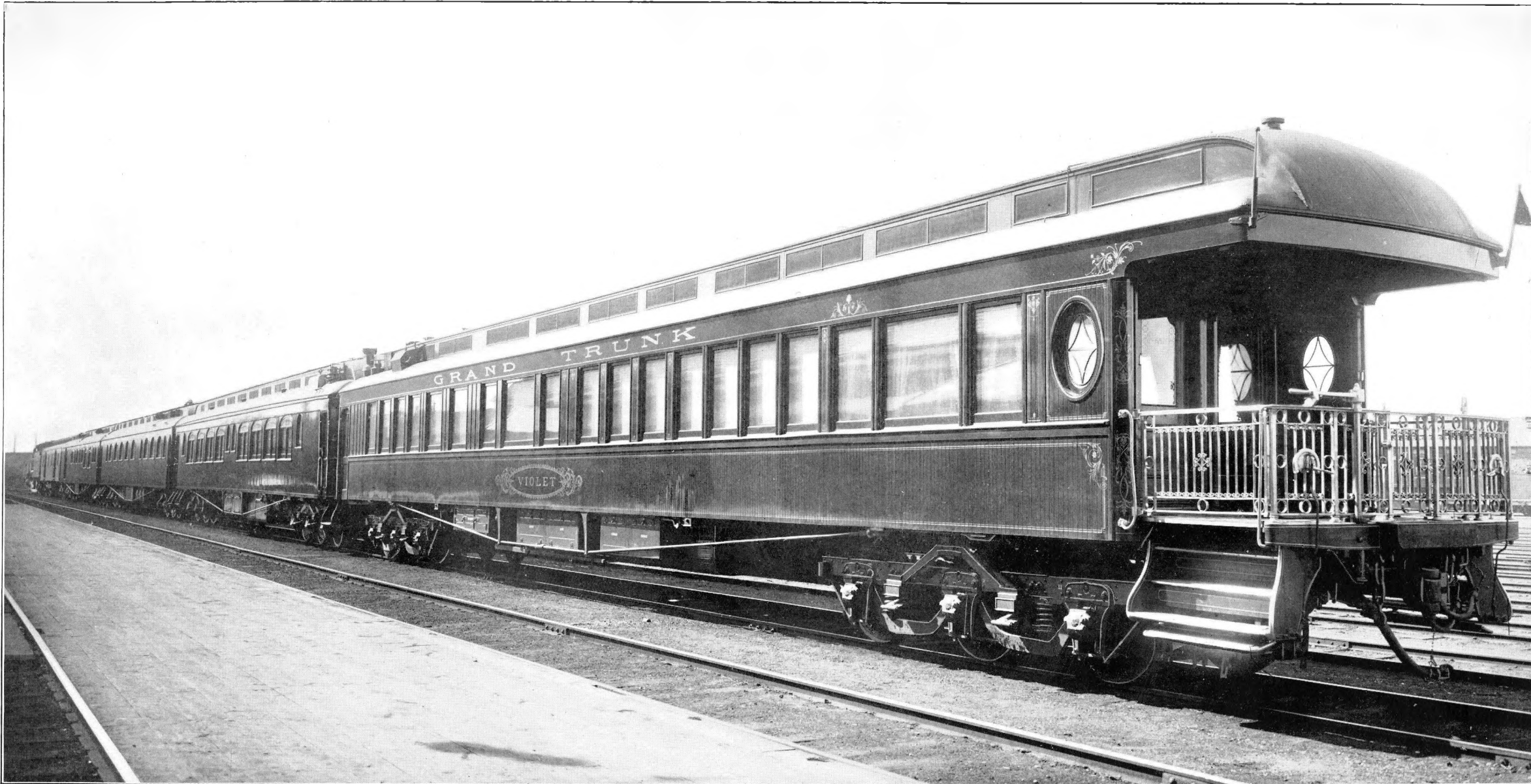
Higher initial voltage.

Greater capacity.

Longer life.

Interchangeability.

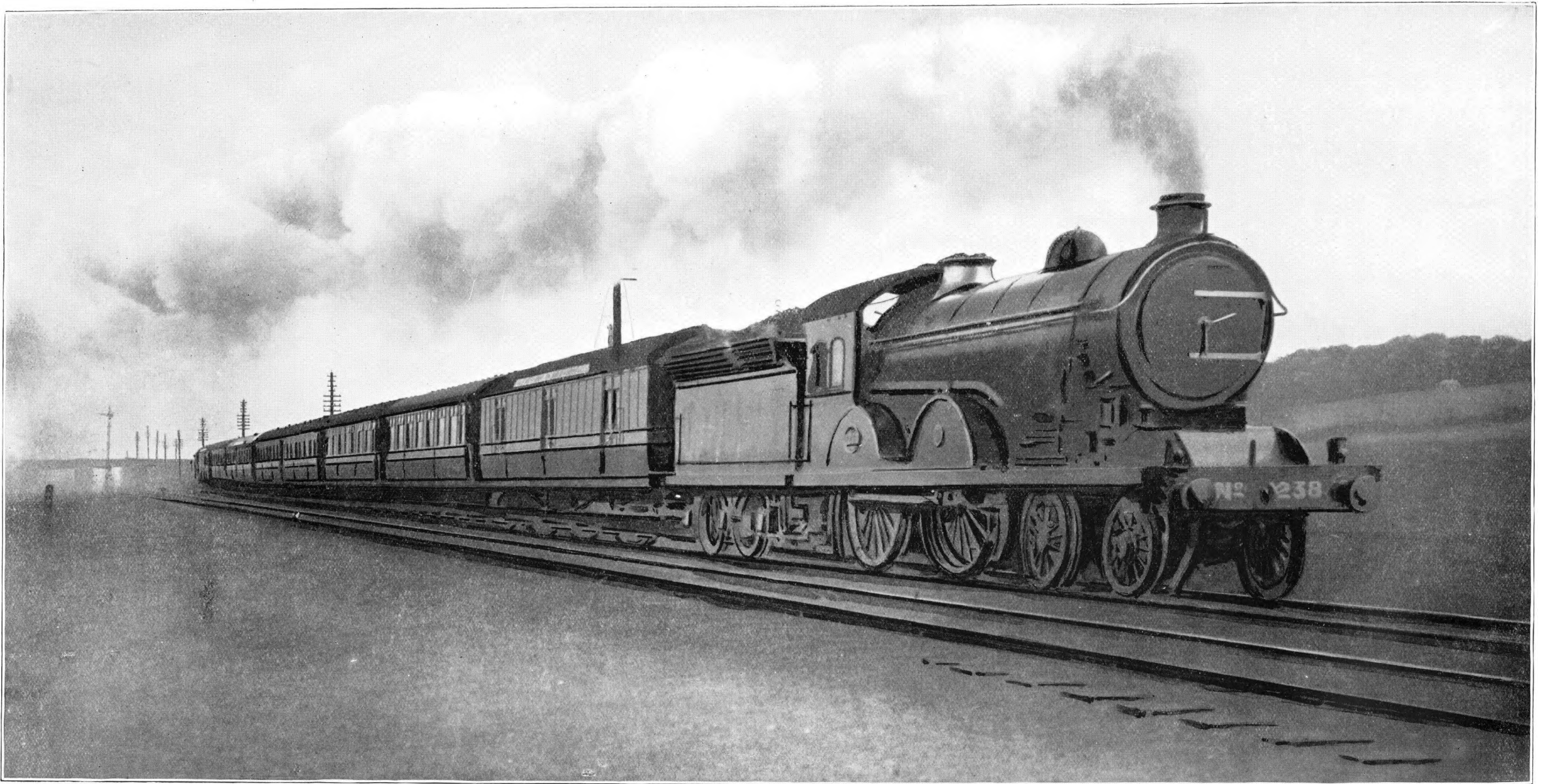
Greater mechanical strength.



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The above is an illustration of a GRAND TRUNK RAILWAY (Canada) Train so fitted.



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The above is an illustration of a NORTH EASTERN RAILWAY (England) Train so fitted.

**Combination
of Stone's New
"Tonum"
accumulator
with metallic
filament
lamps effects
great re-
duction in
Capital Ex-
penditure and
Annual Cost
Maintenance.**

The combination of Stone's "Tonum" Accumulator with the Metallic Filament Lamp (which consumes less than *one-half* of the electric current required by the carbon filament lamp previously in use) enables a large saving to be effected in the original capital outlay for equipping Railway Carriages, as smaller, lighter and cheaper installations can be fitted, while at the same time a much better light can be given in each compartment (72 c.p. or even more if required). A double advantage is thus conferred on Electric Lighting for Railway Carriages, as besides the considerable reduction in capital expenditure there is a corresponding reduction in annual cost of maintenance.

In Stone's new "Tonum" Accumulator the whole construction of the cell-plates, lugs and bridges, is most substantial, every essential part having been greatly strengthened, so that the breakage of a bridge or plate is practically an impossibility.

This Accumulator is of the type which J. Stone & Company, Limited, have proved by years of experience to be the best for Railway Work, and it besides embodies many important improvements which eliminate all the weak points which had been detected in the older type during many years of widely extended use.

The dynamo

Is of the most modern construction, and is fitted with ball bearings and a number of improvements in detail, all tending to simplicity and the more perfect adaptation of the machine to its particular work.

**Automatic
Battery
change-over
switch**

Can be fitted to equipments. Useful in cases of carriages running very long distances in one direction.

**Ventilation,
heating and
cooling.**

J. Stone & Company, Limited, have succeeded in perfecting an arrangement by which in summer cooled fresh air is introduced into the Railway Carriages, whilst excluding dust, and in winter warmed fresh air, freed from

**Ventilation,
heating and
cooling—
*continued.***

all impurities, is introduced. These further developments make a substantial contribution to the amenities of Railway travelling, tending to make lengthy Railway journeys, at all seasons of the year, both healthful and pleasurable, and should cause a corresponding increase in the number of passengers travelling long distances.

Apart from this complete system of ventilation, heating, and cooling, a special form of electrically-driven Exhaust Blower has been devised for Dining Cars and Restaurant Cars, by which all heated air and the fumes arising from cooking operations are exhausted from the kitchen compartment and delivered outside the cars.

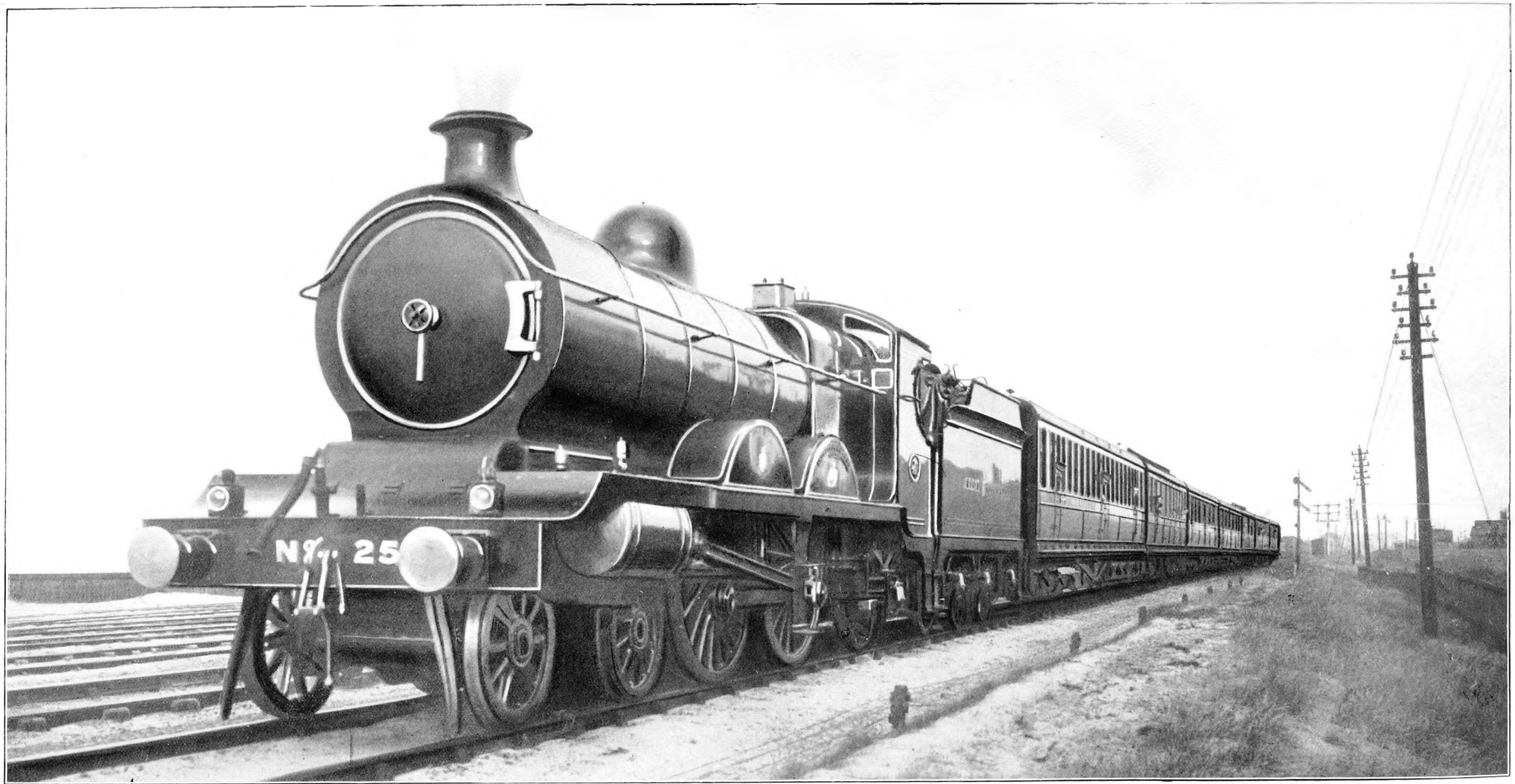
Circulating fans of the fixed, portable and universal type, Electric Hot Water Urns, Cooking Stoves, Foot Warmers, Radiators, Cigar Lighters, Table Lamps, Berth Lamps, Locomotive Head Lights, Tail Lamps, etc., are supplied of various new designs specially suitable for Railway requirements.



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The above is an illustration of a SHANGHAI NANKING RAILWAY (China) Train so fitted.



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The above is an illustration of a GREAT CENTRAL RAILWAY (England) Train so fitted.

DESCRIPTION.

Each installation complete and entirely automatic.

A complete installation for a coach consists of a *dynamo* and two batteries of *accumulators* attached to the under-frame of the coach, a *pulley* on one of the carriage axles, from which the dynamo is driven by a *belt*, the *lamps* and *lamp fittings*, main *switch* to turn the lamps on and off, and the necessary stranded copper wire or cable to make the electrical connections between the various parts of the installation.

While the train is at rest the accumulators supply current to keep the lamps burning; as the train gets up sufficient speed the dynamo is automatically connected to the lamps and accumulators, and takes up the work of supplying current to the lamps and in addition charges the accumulators; the dynamo supplies current of the proper polarity to charge the accumulators whichever way the train may be travelling, and continues to produce current until the train slows down again, when the automatic switch disconnects the dynamo from the accumulators and lamps; the accumulators then supply current to the lamps. The automatic switch of the dynamo is mechanically actuated by a powerful centrifugal governor, and is so perfect in action that not the slightest flicker of the lamps can be detected when the dynamo is connected or disconnected, the lamps giving a constant and perfectly steady light.

The accumulators, which are of the most modern type for the purpose, store sufficient electrical energy to meet all lighting requirements when the train is at rest.

The lamps are turned "on" (for either full or half light as required) or "off" by a switch that is fixed either inside or outside on the end of the coach; in the latter case the switch is operated by a sliding bar conveniently worked from either side of the coach; or tumbler switches or night light switches may be added to each lamp if required.

Each coach therefore carries a complete and self contained electric lighting installation which is absolutely automatic in action; the light is always available at a moment's notice, and the coach ready for any service whenever required.

In electrically-lighted trains, magnetically operated switches are fitted so that by a single controlling switch in the van the guard can turn "on" or "off" the whole of the lights throughout the train while the train is in motion, thus making provision for light while passing through tunnels during daylight running, an alternative to the old practice of half lights during the whole journey.

Simplicity of method of regulation.

The outstanding feature of the installation is the *absolute simplicity of regulation*, the speed of the dynamo being limited (by means of the particular way in which it is supported and driven) to just such a speed as is necessary to produce the output required. This is obtained by very simple mechanical means as follows:

Limitation of speed of dynamo, and consequent regulation of its output.

The dynamo is suspended from the underframe of the carriage so that its pulley is approximately at the same level as the pulley fixed on the axle of the coach, and from which it is driven direct by means of a belt. Consequently none of the vertical motion or vibration of the axle is transmitted to the dynamo.

However the speed of the train may vary, after a certain predetermined limit has been reached the dynamo always runs at an uniform speed, and consequently always produces the same amount of electricity.

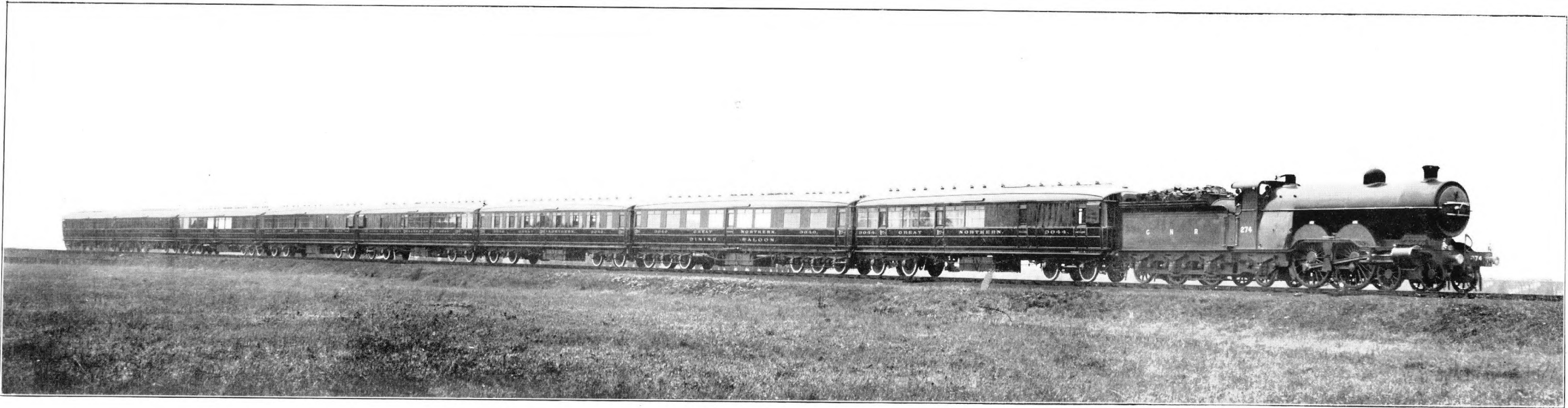
The suspension arrangement consists of an adjustable link by means of which the point of suspension of the dynamo is capable of a wide range of movement towards or away from the driving pulley on the axle. This suspension link is set in position by means of its adjusting screw, so that the driving belt draws the dynamo out of the diagonal position in which it would naturally hang, thus putting a definite tension on the belt just sufficient to transmit power equivalent to the



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The above is an illustration of a BUENOS AIRES GT. SOUTHERN RAILWAY (Argentine) Train so fitted.



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The above is an illustration of a GREAT NORTHERN RAILWAY (England) Train so fitted.

amount of electricity required. It will thus be evident that when the pull on the belt (owing to increase in speed of the train) exceeds the weight on the belt due to the one-sided suspension of the dynamo, the latter will automatically be drawn towards the driving pulley on the axle, thus allowing the belt to slip, whilst the armature will continue to revolve at its normal speed.

Minimum wear and tear owing to low speed of dynamo.

Mechanical regulation far better than complicated electrical.

Electrical regulation may work in laboratory, but absolutely unsuited for general railway work.

Besides being an exceptionally simple method of regulation there are other very great advantages in this manner of controlling the output. First of all there is a very great *saving in wear and tear* on the dynamo as compared with other systems, in all of which the dynamo follows the speed of the train; in the Stone installation there is no increase in dynamo speed after a certain predetermined limit, whereas in other installations on express trains the dynamo may be running four or five times as fast as is necessary to produce the current required. No electrical regulating mechanism is necessary, a mechanical governor of very strong and simple design automatically connects and disconnects the dynamo and accumulators, so that while the train is running the dynamo supplies the current required by the lamps and sends a small charge into the accumulators, and on slowing down the lamps are supplied from the accumulators only. The regulation by means of the use of solenoids, electromagnets, mercury contacts, and other complicated electrical devices on which other systems depend is thus entirely unnecessary. The whole of the working parts of the dynamo, with its mechanically operated automatic switch, are enclosed in a domed cover, quite dust-proof, which is readily removable to afford access to the bearings when required; there is thus *no separate regulating box* with complicated mechanism to attend to, a great *saving in time and trouble* when periodically inspecting the coach.

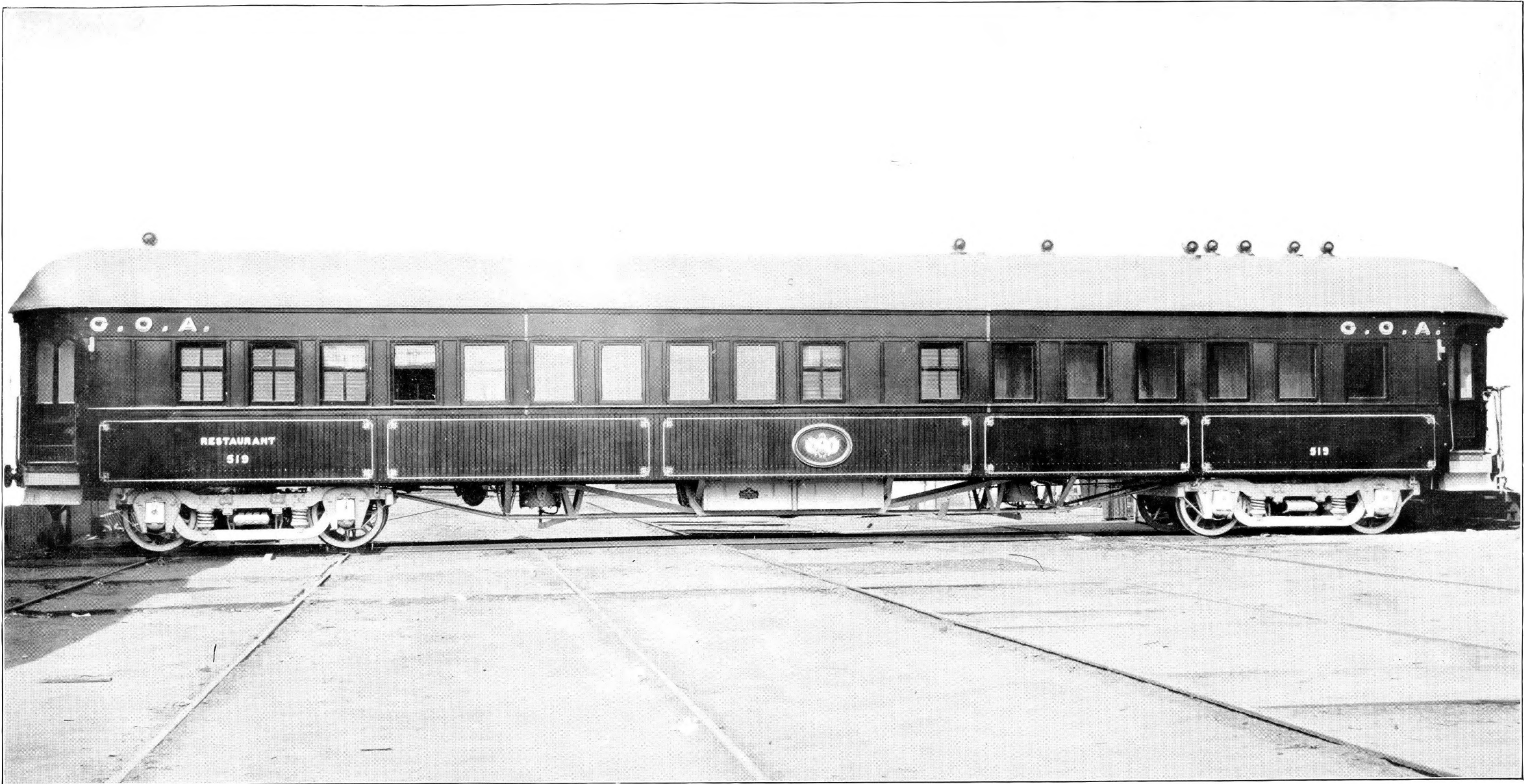
This is the only axle-driven installation in which the output is regulated mechanically and not electrically; any ordinary workman consequently can undertake whatever maintenance is required, instead of skilled electricians having to be in attendance, which is an absolute necessity with other systems.

Some eminent electricians *not thoroughly acquainted with the special requirements of railway traffic*, and judging from laboratory experiments only, have, in the first instance, expressed themselves in favour of electrical rather than mechanical regulation, but after they have investigated for themselves the peculiar difficulties of railway traffic, which can only be met in the former case (*electrical regulation*) by the constant attention of skilled electricians, which, of course, is practically an impossibility on most Railways, they have completely changed their opinion, and recognised *the great advantages of the mechanical regulation of Stone's Installations*.

Two, three, four, or more coaches may be supplied by a single installation if the traffic requirements permit of their being permanently coupled together.

Although the light is produced by the motion of the train operating a small dynamo, yet, however much the train speed may vary, the light is absolutely steady and without the slightest flicker, and in every way equal to the best electric system in buildings.

Notwithstanding the fact that the light is perfect the cost of producing it is almost nil; and the annual cost of maintenance is considerably less than that of Oil Gas, Oil, or any other form of lighting.



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The above is an illustration of a BUENOS AIRES PACIFIC RAILWAY (G.O.A. Section) (Argentine) Restaurant Car so fitted.



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*The above is an illustration of the Interior of a **CENTRAL ARGENTINE RAILWAY (Argentine) Dining Saloon** so fitted.*

STONE'S ELECTRICAL INSTALLATIONS

are equally adapted for :

ORDINARY FOUR AND SIX-WHEEL COACHES.

CORRIDOR TRAINS.

BOGIE COACHES.

TRAINS DE LUXE.

SLEEPING SALOONS.

MOTOR COACHES.

DINING CARS.

POSTAL VANS.

ROYAL SALOONS.

AMBULANCE CARS.

DRAWING-ROOM CARS.

MOUNTAIN RAILWAYS.

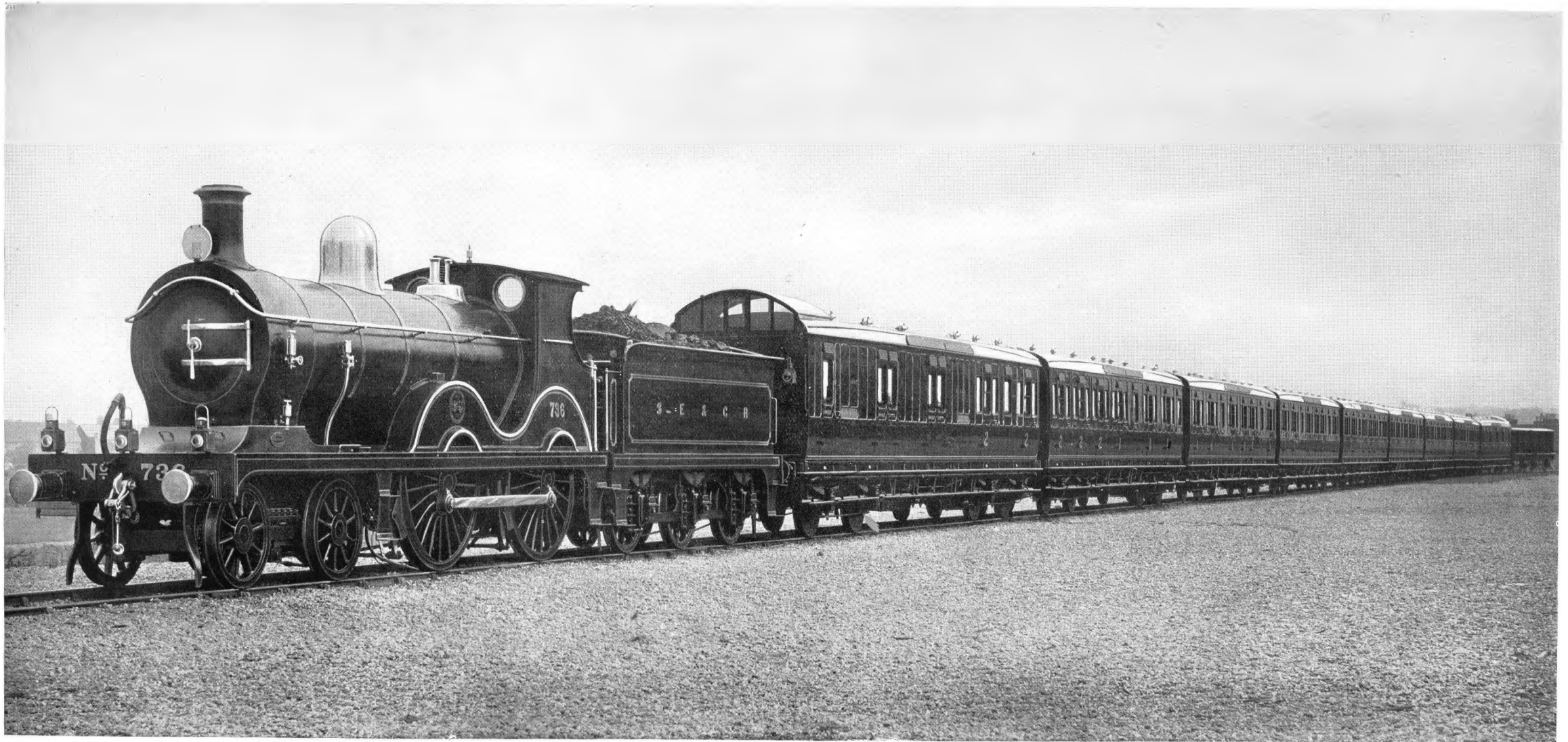
PRESIDENTIAL CARS.

UNDERGROUND RAILWAYS.

For slow trains stopping every few minutes or for the fastest express trains.

ADVANTAGES OVER GAS.

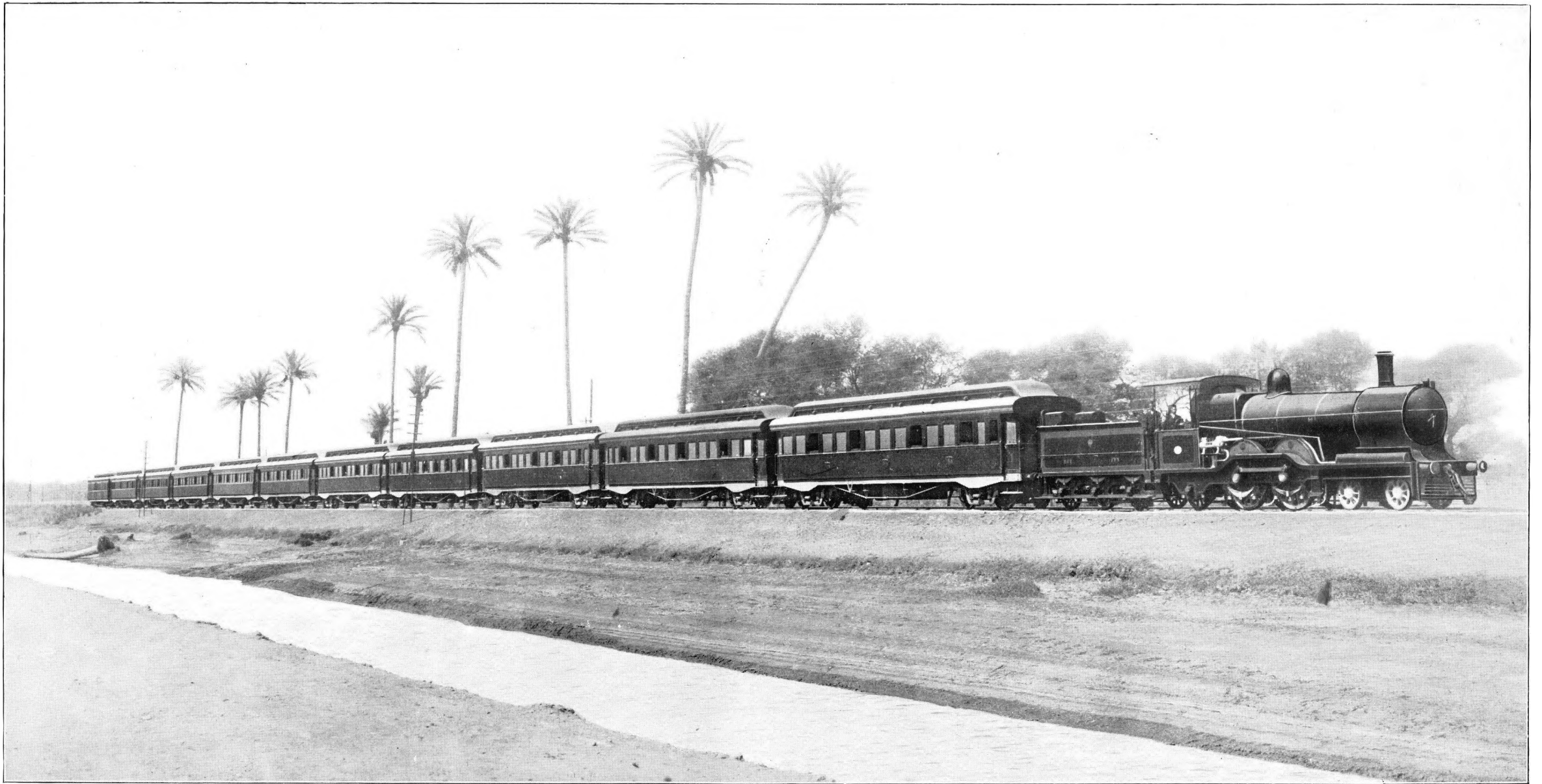
1. **Safety.**—The dangers arising from the inflammable nature of oil gas are entirely done away with. (See pp. 28 & 31.)
2. **Better light.**—Perfectly steady, and unaffected by the wind or by rush of air in tunnels.
3. **The expense and trouble of producing the gas, charging reservoirs in carriages, and removing carriages or portable gasholders to and from charging stations, changing mantles, cleaning lamps, etc., are entirely dispensed with.**
4. **Cheapness.**—The annual cost of Stone's Installations, including interest on capital outlay, and all charges for maintenance, is considerably less than that of oil gas.
5. **Superior efficiency of carriages.**—It has been found that 14 to 20 per cent. more work can be got out of carriages fitted with Stone's Installations than from those fitted with oil gas. This is due to the former producing their own light, whilst gas-lighted coaches require to have their gas cylinders periodically charged, and are necessarily tied to their charging depot, necessitating frequent delay and often considerable inconvenience and derangement of traffic.
6. **Consequent enormous saving to Railway Companies on unnecessary passenger coaches.**
J. STONE & COMPANY, LIMITED, have it on the highest authority that on Railways with large passenger traffic, owing to electrically-lighted coaches being more efficient than gas-lighted coaches (for reasons above stated), such Railways can be efficiently worked on a time table calculated on a superior efficiency to the extent above named if the rolling stock is electrically lighted—a matter of vast importance to Railway Companies, as it means a saving in capital outlay of between 14 to 20 per cent. on passenger stock, and besides this there is the annual saving of interest on this additional capital outlay, and over and above this the annual cost of maintenance of these additional unnecessary coaches.
7. **The ventilation and cooling of Railway Carriages by means of electric fans, etc., is impossible in the case of railway carriages lighted by oil gas.**



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The above is an illustration of a SOUTH EASTERN & CHATHAM RAILWAY (England) Train so fitted.



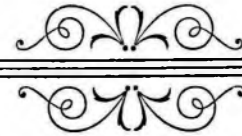
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The above is an illustration of an EGYPTIAN STATE RAILWAY Train so fitted.

Although the introduction of the incandescent mantle enables gas-lighted coaches to be provided with a better light than formerly the above disadvantages still remain, but the combination of Stone's "Tonum" accumulator and the Metallic Filament Lamps introduces into electric lighting of Railway Carriages in addition to the advantage of better light, the double advantage over oil gas of

Reduced capital outlay for the equipment of Railway Carriages, and
Reduced annual cost for upkeep of the Electric Lighting Installations.



Comparative statement of both the capital and the annual cost of lighting Railway Carriages by Electric Light with Metallic Filament Lamps and Oil Gas, with incandescent mantles and bye-passes, will be forwarded by J. STONE & COMPANY, LIMITED, to Railway Companies on application.

The facts and figures on which these comparative costs are based have been furnished to J. STONE & COMPANY, LIMITED, by some of the largest of the English Railway Companies.

DANGER OF GAS LIGHTING FOR TRAINS.

British Board of Trade Official Reports.

GAS UNSUITABLE FOR TRAIN LIGHTING.

Extract from Board of Trade Official Report, with reference to the accident at **Witham, Great Eastern Railway**, in which, it may be remembered, ten people were killed and about twenty injured :—

“ The third vehicle, a first class carriage, was also found derailed about 135 yards from the north end of the down platform, but its wheels appear to have taken the rails of the through connection on the down main line leading to the Maldon line, as it was alongside that connection that it was found standing; the gas in the cylinder underneath this carriage appears to have been ignited, and all the woodwork of the upper portion of the carriage was completely destroyed by fire. There was only one passenger in this vehicle, and he fortunately escaped.”

“ Attention should also be drawn to the fact that one of the carriages was destroyed by fire owing to the ignition of the gas in the cylinder underneath the framework. Fortunately, no lives were lost thereby on this occasion, but the occurrence points to the desirability of adopting some other source of illumination, probably electricity.”

GREAT CENTRAL RAILWAY.—Accident at Catesby Tunnel.

Extract from Board of Trade Official Report :—

“ One other point in connection with this accident calls for mention. Three of the vehicles on the train were lighted by gas; all the lights in these vehicles were at once extinguished by the derailment, and there was, in consequence, a great escape of gas. Fortunately, the officials of the Company who were travelling in the train, noticed the smell, and they at once took prompt measures to keep all naked lights away from these vehicles; danger was thereby averted, but it is terrible to contemplate what might have been the results of this accident if an explosion had occurred or a carriage had caught fire in the tunnel. The leading and rear vehicles of the train were both lighted by electricity; the lights in the latter were extinguished, but in the former vehicle they remained alight throughout, and were of the greatest assistance in rescuing and controlling the passengers. This accident furnishes, therefore, another instance showing the undesirability of the employment of gas as an illuminant for trains, and the superiority of electricity for that purpose.”



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The above is an illustration of a LONDON & SOUTH WESTERN RAILWAY (England) Train so fitted.



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The above is an illustration of a SOUDAN GOVERNMENT RAILWAY Train so fitted.

DANGER OF GAS LIGHTING FOR TRAINS—*continued.*

GREAT NORTHERN RAILWAY—Grantham Accident.

Extract from Board of Trade Official Report :—

“ From the suddenness with which the fire broke out, and from the fierceness with which it burnt, it is difficult to resist the conclusion that it was probably due to an escape of the gas with which these vehicles were lighted ; in any case it seems certain that its intensity was considerably increased from that cause, and I consider that this accident points, as previous accidents have already done, to the unsuitability of gas as an illuminant for railway vehicles.”

(Signed) P. G. VON DONOP,
Lt.-Col. R.E.

TERRIBLE RESULTS OF COLLISION OF GAS-LIGHTED TRAINS IN AMERICA.

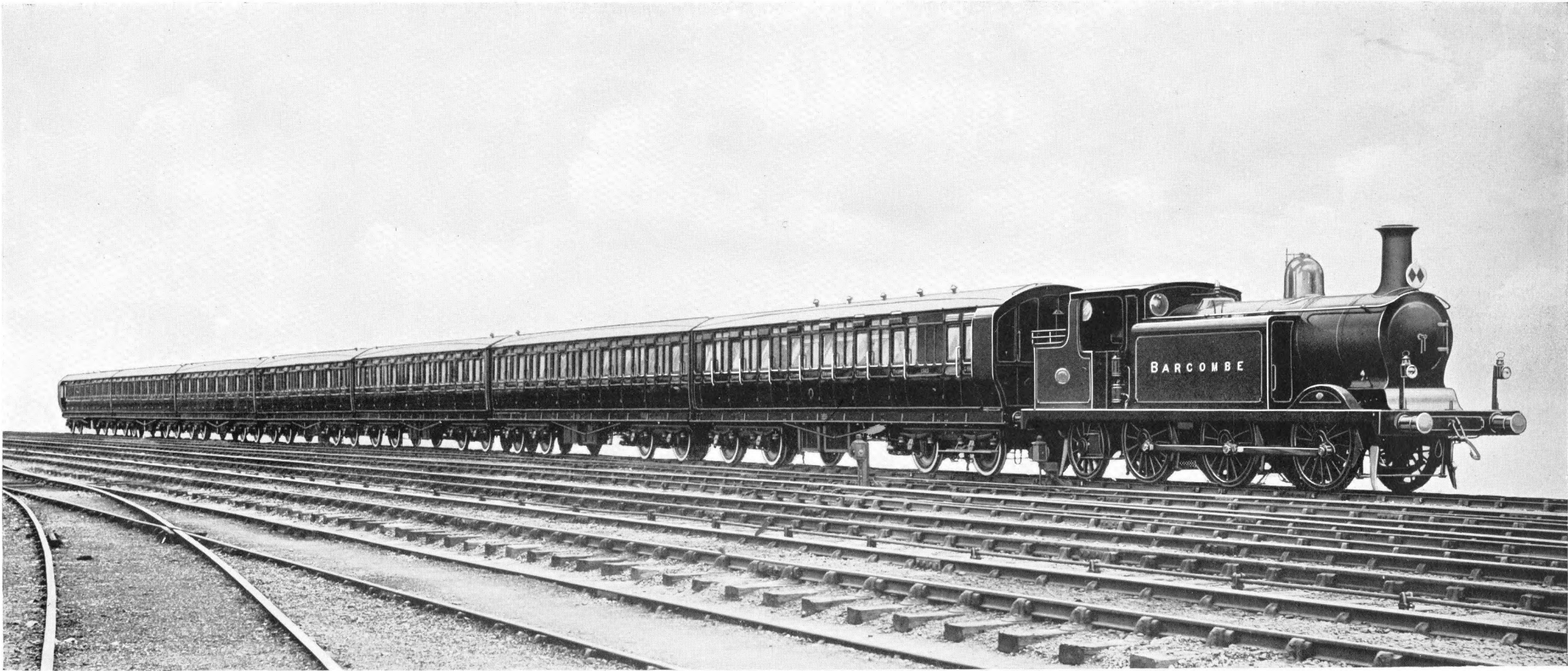
Extract from Lord Claud Hamilton's speech at Annual Shareholders' Meeting of Great Eastern Railway Company in January, 1907 :—

“ The Directors had been induced to substitute electric light for gas in their long distance trains, in view of the terrible results seen in America of the collision of trains lighted by gas.”

Advantages over other Axle-driven Electric Lighting Installations for Railway Carriages.

1. **Cost of Maintenance infinitely less.**—Owing to the output of Stone's Installations being regulated mechanically and not electrically, any ordinary workman can do whatever maintenance is required, instead of skilled electricians having to be in constant attendance, which is an absolute necessity with other Electric Lighting Installations.

2. **Wear and tear infinitely less.**—In all other axle-driven installations the speed of the dynamo varies according to the speed of the train; whereas in Stone's Installation, after a certain predetermined limit has been reached, the speed of the dynamo does not vary even if the train's speed exceeds 70 or 80 miles an hour, thus doing away with the enormous wear and tear necessarily inseparable from other installations, in all of which, as above stated, the speed of the dynamo follows the speed of the train. For instance, assuming the coach fitted with Electric Lighting is on a service which requires the full amount of current to be generated at a train speed of 12 miles an hour, as is frequently the case; then if this coach is put on an express service of say 72 miles an hour, the dynamo, in Stone's Installation, will still be running only at the same number of revolutions as at the train speed of 12 miles an hour, whereas in all other axle-driven installations the dynamo, following the speed of the train, would be making six times the number of revolutions sufficient to produce the full current, thus obviously causing an enormous increase in wear and tear, and consequent cost of maintenance, together with a corresponding reduction in the lifetime of the apparatus. Of course, the consequent wear and tear on these other axle-driven installations might be somewhat reduced by varying the size of the driving pulleys each time the running of the coach was altered from fast to slow or *vice versa*, but this would involve very serious inconvenience and delay to traffic, &c., and would be practically unworkable.



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The above is an illustration of a LONDON BRIGHTON & SOUTH COAST RAILWAY (England) Train so fitted.



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Advantages over other Axle-driven Electric Lighting Installations for Railway Carriages—*continued.*

3. **So simple that an ordinary workman can undertake the maintenance.**—By reason of the constant speed of the dynamo in Stone's Installations, the elaborate and complicated electrically regulated mechanism necessary to compensate for the varying speeds of the dynamo in other installations is entirely dispensed with, so that any workman of ordinary intelligence can give it all the attention that is necessary.

4. **Perfection of light.**—By means of Stone's Double Battery arrangement, in which each battery alternately acts as a regulator to the other, the light is always perfectly steady and without the slightest flicker, and is in every way equal to the best electric light system in buildings.

5. **Lamps last much longer.**—Owing to the absolute reliability of the regulation the electric pressure is constant; moreover, the lamps are of the very highest quality and specially designed to withstand the constant vibration to which they are necessarily subjected. For these reasons their life is far longer than in other installations.

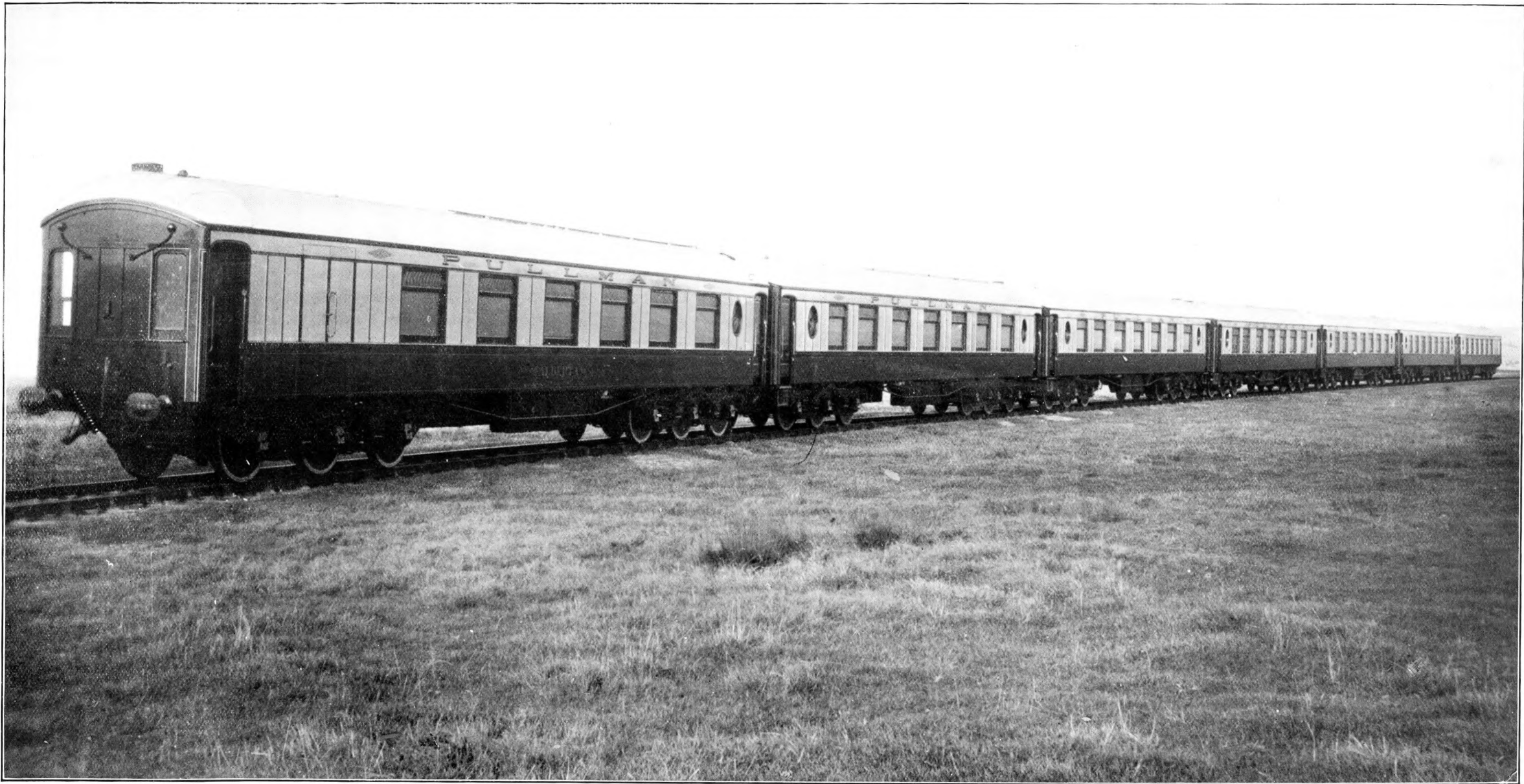
Advantages over Accumulator Systems of Electric Lighting for Railway Carriages.

1. **Always ready for use.**—Coaches fitted with Stone's Installations are ready at any time to run any distance, to any place, and over any line of Railway, being entirely independent of facilities for recharging, or of skilled attention.

2. **Great saving of trouble and expense.**—In Stone's Installations the movement of the carriage produces the electric current, practically without expense, and the accumulators, being always fully charged, do not require to be taken out and recharged from separate sources of power, as they would otherwise when exhausted, thus dispensing with all the trouble and expense connected therewith.

3. **Much longer life.**—Accumulators which have to be constantly handled and carried about to and from carriages and charging stations must necessarily be made exceedingly light, and therefore lack the mechanical strength and consequent long life, which are important features of Stone's Installations; and inasmuch as accumulators in Stone's Installations are always fully charged, they are not subject to the rapid deterioration which, as is well known, takes place in accumulators which, by the nature of their use, are constantly being more or less exhausted.

4. **Cooling and heating.**—It would be quite impossible to use Accumulator Systems for these purposes, as the accumulators would constantly require to be recharged.



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The above is an illustration of a Pullman Train running on the LONDON BRIGHTON & SOUTH COAST RAILWAY (England) so fitted.



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The above is an illustration of a Dining Saloon belonging to the INTERNATIONAL WAGON LITS COMPANY (Paris) so fitted.

Special Advantages of STONE'S ELECTRIC LIGHTING over Oil Gas Lighting.

(FROM A TRAFFIC POINT OF VIEW.)

In addition to the generally recognised advantages of Stone's Electric Lighting over Oil Gas from the railway passengers' point of view, such as *better light* and *absolute safety*, and the no less important advantage from the railway shareholders' point of view of *reduced annual cost of maintenance (including interest on capital outlay and all charges)* the following are some of the less known, though extremely important, advantages which specially affect the Traffic Department:—

1. **Saving in quantity of rolling stock required.**—Owing to electrically-lighted coaches producing their own light, they are always ready to run any distance and in any direction, whereas gas-lighted coaches have constantly to be withdrawn from traffic to have their gas cylinders recharged (this is accentuated during foggy weather) and consequently other coaches have to be provided to take their place. It has been found that this represents an economy in stock of from 14 per cent. to 20 per cent. in favour of electrically-lighted coaches, with the corresponding saving in sidings for berthing purposes, &c. Moreover it is found under actual traffic conditions on many railways that it is possible to get a far greater amount of work out of carriages electrically lighted than would be possible if they were lighted by Gas, owing to the fact that the latter are tied to their charging depot.

2. **Consequent enormous saving to Railway Companies on unnecessary passenger coaches.**
J. STONE & COMPANY, LIMITED, have it on the highest authority that on Railways with large passenger traffic, owing to electrically-lighted coaches being more efficient than gas-lighted coaches (for reasons above stated), such Railways

Special Advantages of STONE'S ELECTRIC LIGHTING over Oil Gas Lighting—*continued.*

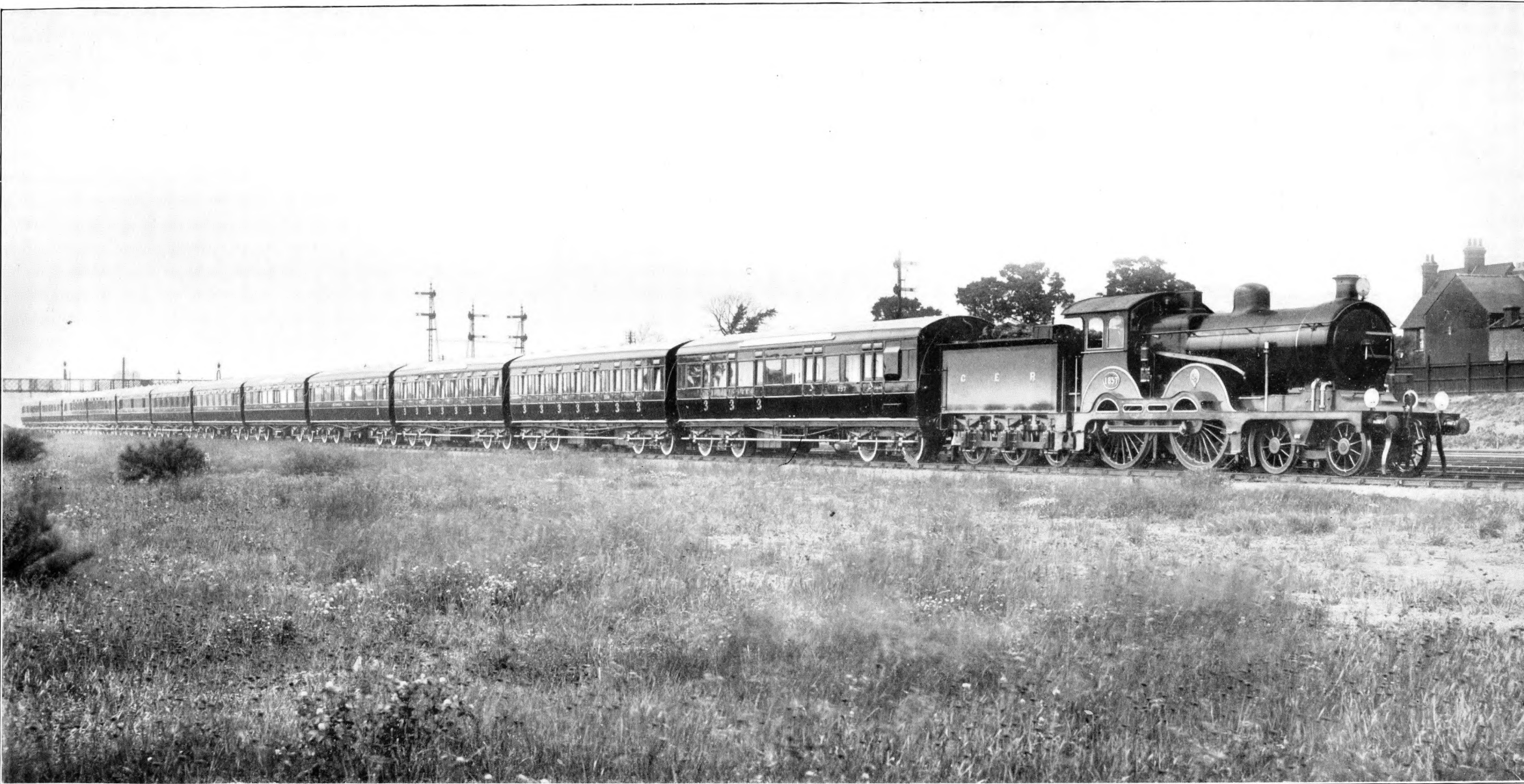
can be efficiently worked on a time table calculated on a superior efficiency to the extent above named if the rolling stock is electrically lighted—a matter of vast importance to Railway Companies, as it means a saving in capital outlay of between 14 to 20 per cent. on passenger stock, and besides this there is the annual saving of interest on this additional capital outlay, and over and above this the annual cost of maintenance of these additional unnecessary coaches.

3. **Saving of unremunerative mileage.**—The haulage of trains to and from Gas Depots for recharging, and also of portable gas holders, is entirely dispensed with. This not only prevents considerable confusion and interference with traffic, but also means a large saving in fuel, wear and tear, &c.

4. **Economy in staff.**—The whole of the staff engaged in lighting gas-lighted carriages, cleaning gas lamps, changing gas mantles, &c., can be dispensed with, as the electric light is switched on by Guards and others, without interfering with their ordinary duties.

5. **Punctuality of trains.**—The time occupied in charging up gas cylinders often interferes with punctuality of trains; in fact on Railways with large suburban traffic it is found that the existing time tables could not be adhered to if the trains were lighted by gas.

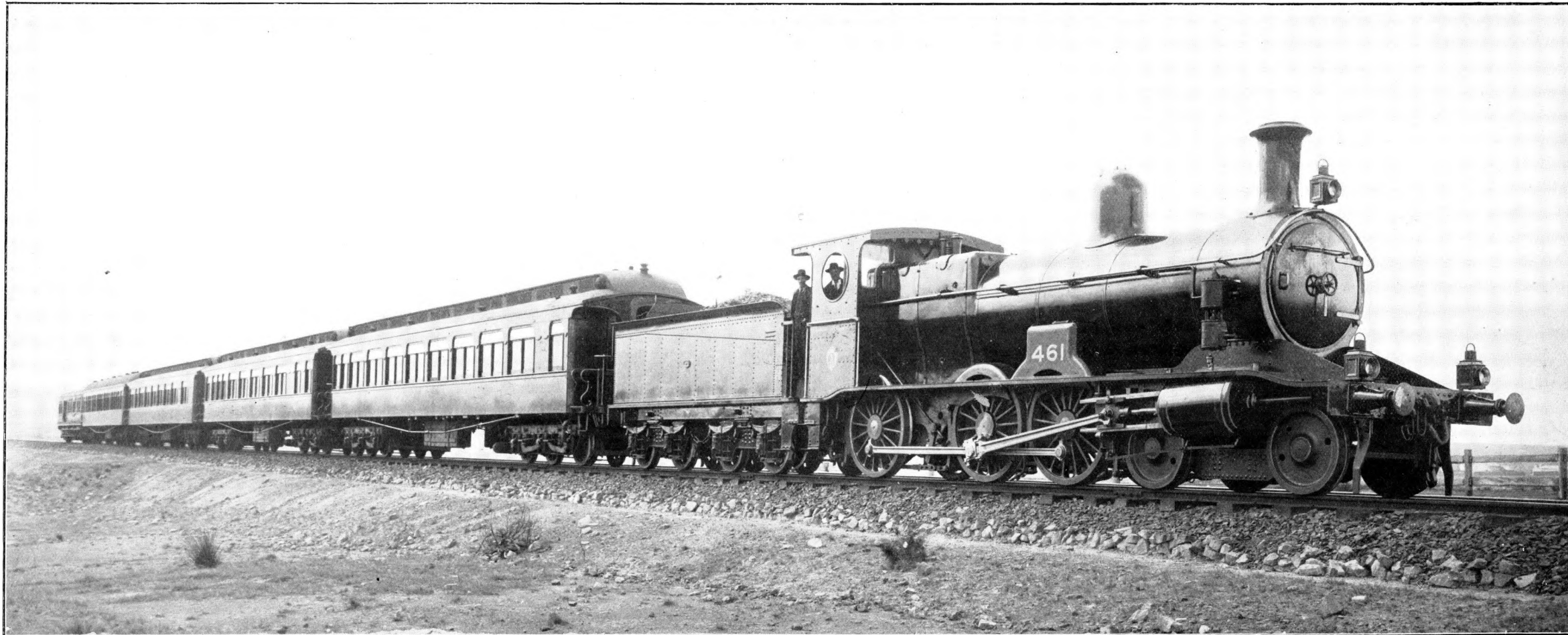
6. **No waste of light.**—Gas-lighted trains, running on lines where there are tunnels, are compelled to have the lights burning unnecessarily for hours, whereas Stone's Electric Light can, if required, be arranged so as to be switched "on" and "off" throughout the train by the Guard when entering or leaving tunnels.



STONE'S ELECTRICAL INSTALLATIONS

are equipped on upwards of **50,000** Coaches on more than **200** Railways all over the World.

The above is an illustration of a GREAT EASTERN RAILWAY (England) Train so fitted.



STONE'S ELECTRICAL INSTALLATIONS

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The above is an illustration of the SYDNEY-MELBOURNE EXPRESS (Australia) so fitted.

COAL CONSUMPTION.

In order to clear up the point raised by the opponents of electric lighting for Railway Carriages, J. STONE & COMPANY, LIMITED, addressed the following communication to the Railway Companies who were largely using their train lighting installations:—

“Will you be good enough to say if you find that our electric light system, as now fitted on your Railway, entails an appreciable extra consumption of fuel on the part of the locomotive either at high or low speeds.”

To this enquiry we received replies from:—

1. Caledonian Railway ;
2. South Eastern & Chatham Railway ;
3. Great Eastern Railway ;
4. Metropolitan Railway ;
5. North British Railway ;
6. London Tilbury & Southend Railway ;

which replies were, one and all, to the effect that it was impossible to trace any increase in consumption of coal on trains fitted with Stone's Train Lighting Installations.

Over and above this, one of the largest of the English Railways—the North Eastern Railway—set aside two trains to which were attached the Company's well appointed dynamometer car. These trains were run specially during a period of three months with the sole object of clearing up this question; in the result the experience gained by these exhaustive and extensive trials confirmed the opinion expressed by the Railway Companies above named. While of course power must be absorbed in driving the STONE or any other dynamo, and this power must mean some consumption of fuel, yet this, to quote the words of the Chief Mechanical Engineer of the North Eastern Railway, “is so slight as to be inappreciable.”

COOLING IN SUMMER.—HEATING IN WINTER.

See accompanying plan.

By means of STONE'S positive system of Ventilation, carriages are heated or cooled by the forced circulation of absolutely pure air, the dusty or impure air being taken in through a cowl on the roof of the railway carriage, and drawn by an electric blower first through a small water tank, and then through a cocoa-nut matting screening saturated with water whence it is delivered, fresh and free from dust, direct into the compartments, being conveyed there by means of an air-duct or ducts.

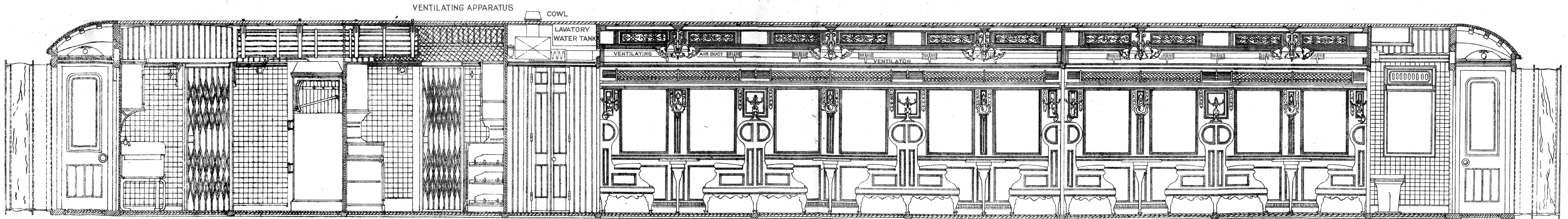
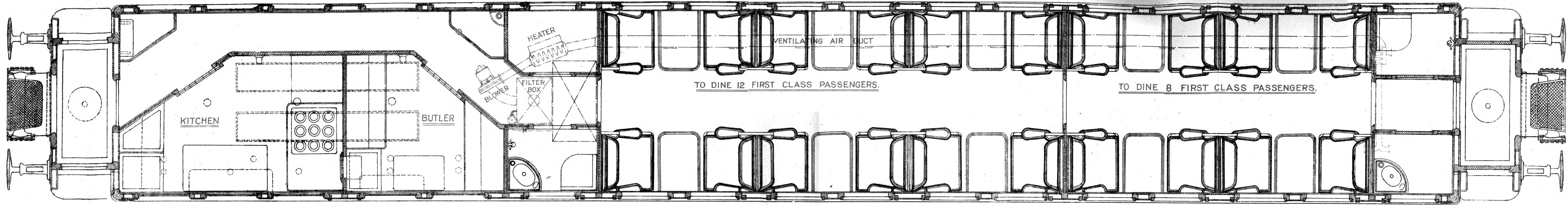
The superiority of this system of ventilating over the exhaust method will be manifest when it is considered that all spaces are filled with fresh air under a slight pressure, and the leakage is outwards, thus preventing the ingress of polluted air and dust into the compartments, whereas by the ordinary exhaust method, a partial vacuum is created, and impure air and dust leak inwards.

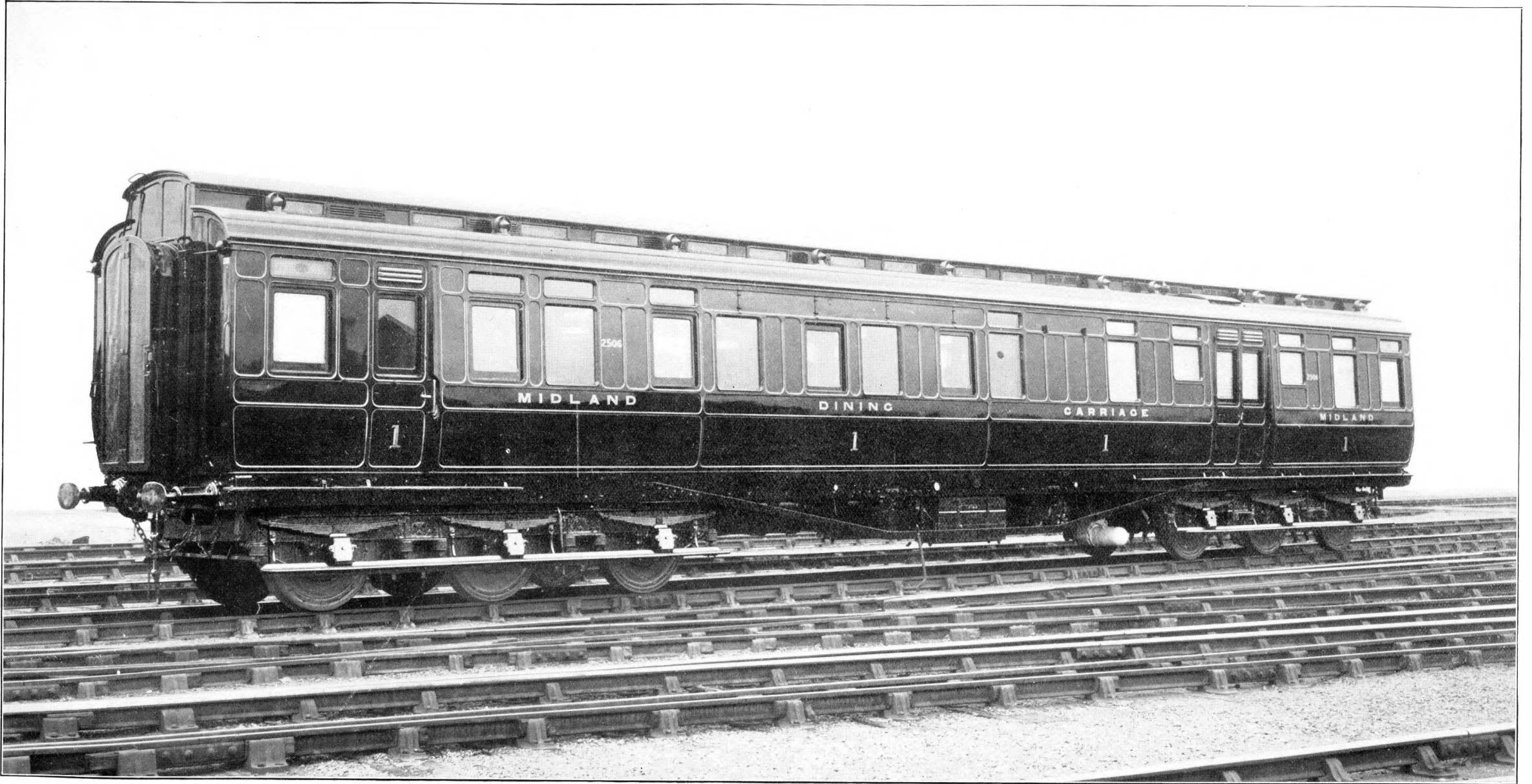
In hot weather, the effect of passing the air through the water is not only to render it absolutely fresh and pure, but also to very materially reduce its temperature, the degree of cooling being greatest when the temperature of the air is hottest.

In cold weather, the same apparatus, by the addition of a small steam coil, provides a supply of pure fresh air of any degree of warmth which may be required.

This system of heating is far preferable and far more healthy than the method of heating stagnant and impure air by steam.

On all coaches equipped with Stone's Electrical Installations this apparatus for cooling and heating can be readily added.





STONE'S ELECTRICAL INSTALLATIONS

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The above is an illustration of a MIDLAND RAILWAY (England) Dining Saloon so fitted.



STONE'S ELECTRICAL INSTALLATIONS

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The above is an illustration of a UNION OF SOUTH AFRICA RAILWAY Train so fitted.

STANDARD LIST.

Owing to the largely increased demand for Stone's Electric Light Installations all over the World, special machinery for the manufacture of the various standardised parts has been laid down, considerably reducing the cost of the complete equipments, as well as of replace and spare parts.

Moreover, the combination of Stone's Solid Type "Tonum" Accumulator and the Metallic Filament Lamp enables smaller and lighter equipments than formerly to be fitted to the coaches, thus reducing the initial cost of the apparatus, viz. :—

STONE'S Electric Light Installations for Railway Carriages, including Dynamo with Pulleys and Belting, Double Battery Arrangement, Regulating Switch, Lamp Fittings for Roof, Metallic Filament Lamps and Non-flammable Cable.

A R Type, for Coaches requiring a candle power up to 300 c.p.

C R Type, for Coaches requiring a candle power of from 300 to 600 c.p.

D Type, for extra large Coaches, including Dining and Drawing Room Cars, Sleeping Saloons, &c., requiring a light of from 600 c.p. and upwards.

STONE'S Patent Apparatus for Cooling and Heating.

All quotations are net, delivered at Railway Stations or Docks in London, and include all materials necessary for the complete equipment of coaches, except ironwork for suspending Dynamo and Accumulators; this is usually made on the spot to suit the special designs of under-frame, but, if desired, J. STONE & COMPANY, LIMITED, are prepared to supply same on receipt of detailed drawings of under-frame, and also to undertake the wiring and fitting complete to coaches, charging a slight extra for so doing.

PACKING FOR EXPORT EXTRA.

SPARE PARTS.

IMPORTANT NOTICE.

J. STONE & COMPANY, LIMITED, supply exact duplicates of all parts of the apparatus, which agree in every detail with the originals, so that any new part will take the place of an old part, without any alteration or fitting being required.

This is a matter of vital importance for the satisfactory working of the system, as otherwise the replacing of any damaged or worn out parts of the apparatus with others which are not identical with the originals, might be a cause of endless trouble and annoyance to the Railway Companies.

In some cases J. STONE & COMPANY, LIMITED, have found that, for the sake of supposed possible economy, some of their customers have purchased spare parts from other quarters, but although, to outward appearance, they may have been similar to STONE'S, yet really they were by no means identical, and the results have been, in many cases, failure.

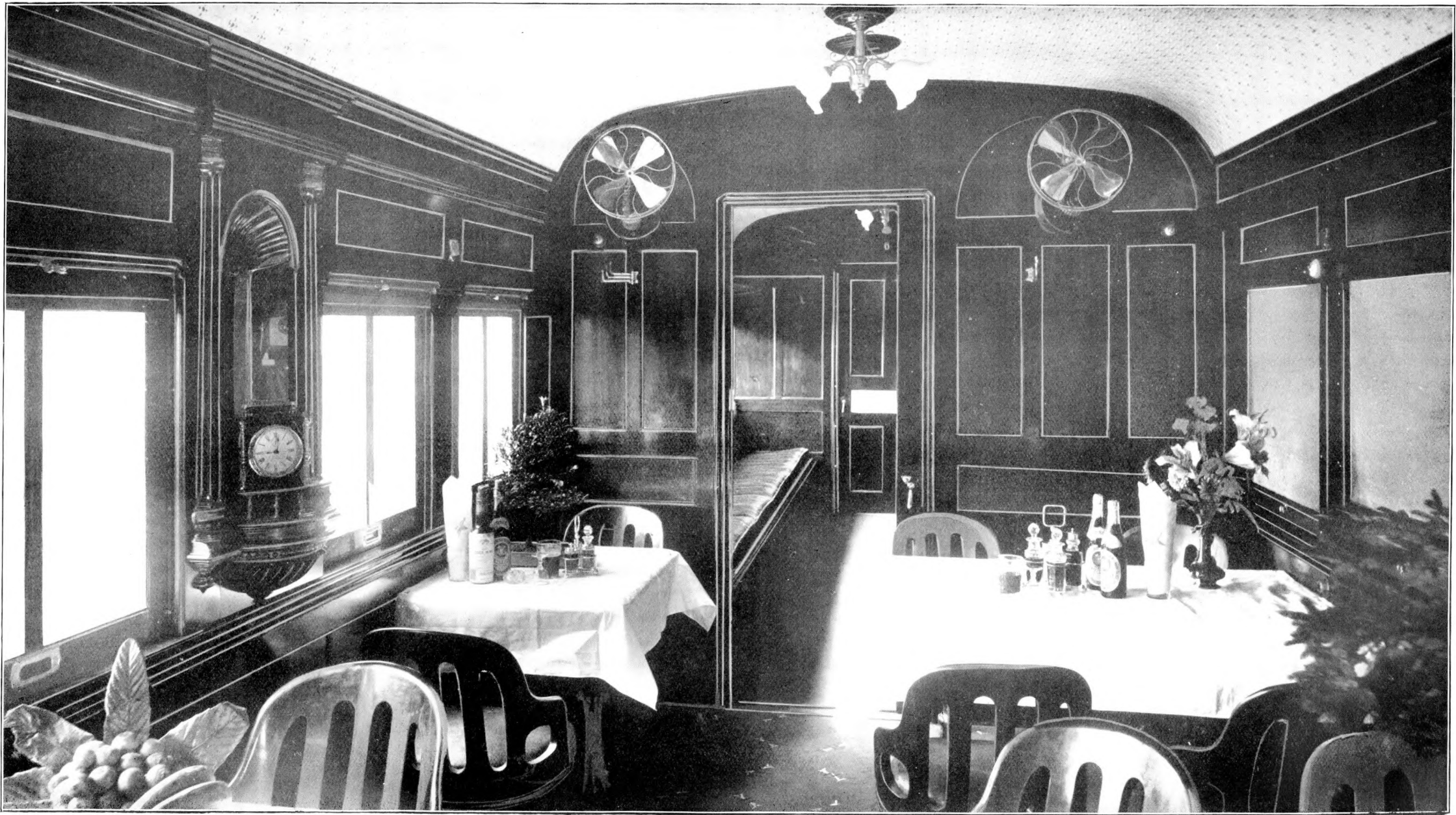
Every part of STONE'S apparatus is made by special machinery, to limit gauges, so as to give the best possible results, and is sold at the lowest possible cost.



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The above is an illustration of a LONDON TILBURY & SOUTHBEND RAILWAY (England) Train so fitted.



STONE'S ELECTRICAL INSTALLATIONS

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The above is an illustration of the Interior of an IMPERIAL JAPANESE RAILWAY Dining Saloon so fitted.

FITTINGS FOR STONE'S INSTALLATIONS.

All the fittings supplied by J. STONE & COMPANY, LIMITED, for use with their Electric Installations, have been specially designed by them to withstand the heavy and continuous vibration necessarily incidental to Railway traffic, and such designs are the outcome of their extensive experience all over the world.

Ordinary fittings, as supplied to buildings, are doubtless cheaper as regards first cost, but are altogether unsuitable for Railway requirements, and, when used, are a constant source of trouble and annoyance. In order, therefore, to reduce the annual cost of maintenance to a minimum, it is advisable that special fittings only should be used, and J. STONE & COMPANY, LIMITED, undertake to supply such as they have found, from many years' experience, will give complete satisfaction at the lowest possible rates.



*INSTRUCTIONS FOR MAINTENANCE OF STONE'S ELECTRICAL
INSTALLATIONS ARE PUBLISHED IN MOST LANGUAGES BY
J. STONE & COMPANY, LIMITED. IN A SEPARATE
PAMPHLET, AND WILL BE FORWARDED TO ANY RAILWAY
COMPANY ON APPLICATION.*





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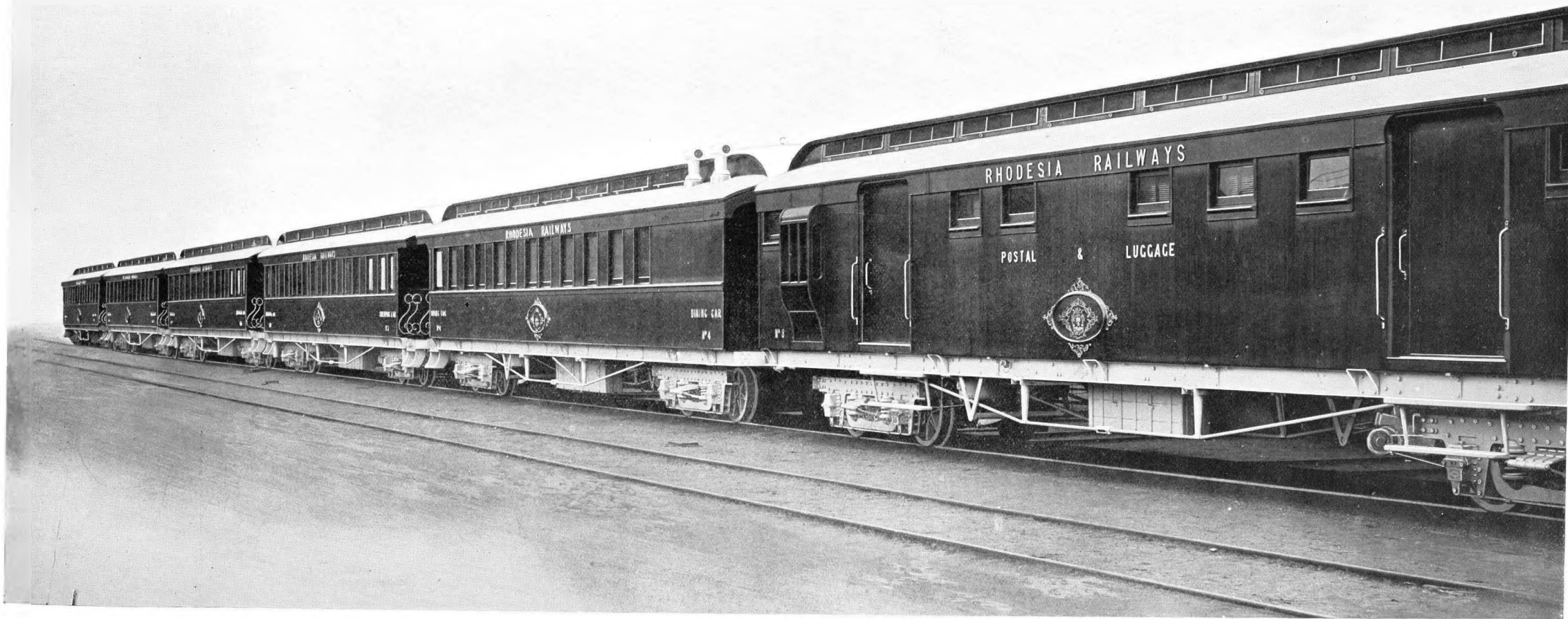
The above is an illustration of a NORTH BRITISH RAILWAY (Scotland) Train so fitted.



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The above is an illustration of a GREAT NORTH OF SCOTLAND RAILWAY Train so fitted.



STONE'S ELECTRICAL INSTALLATIONS

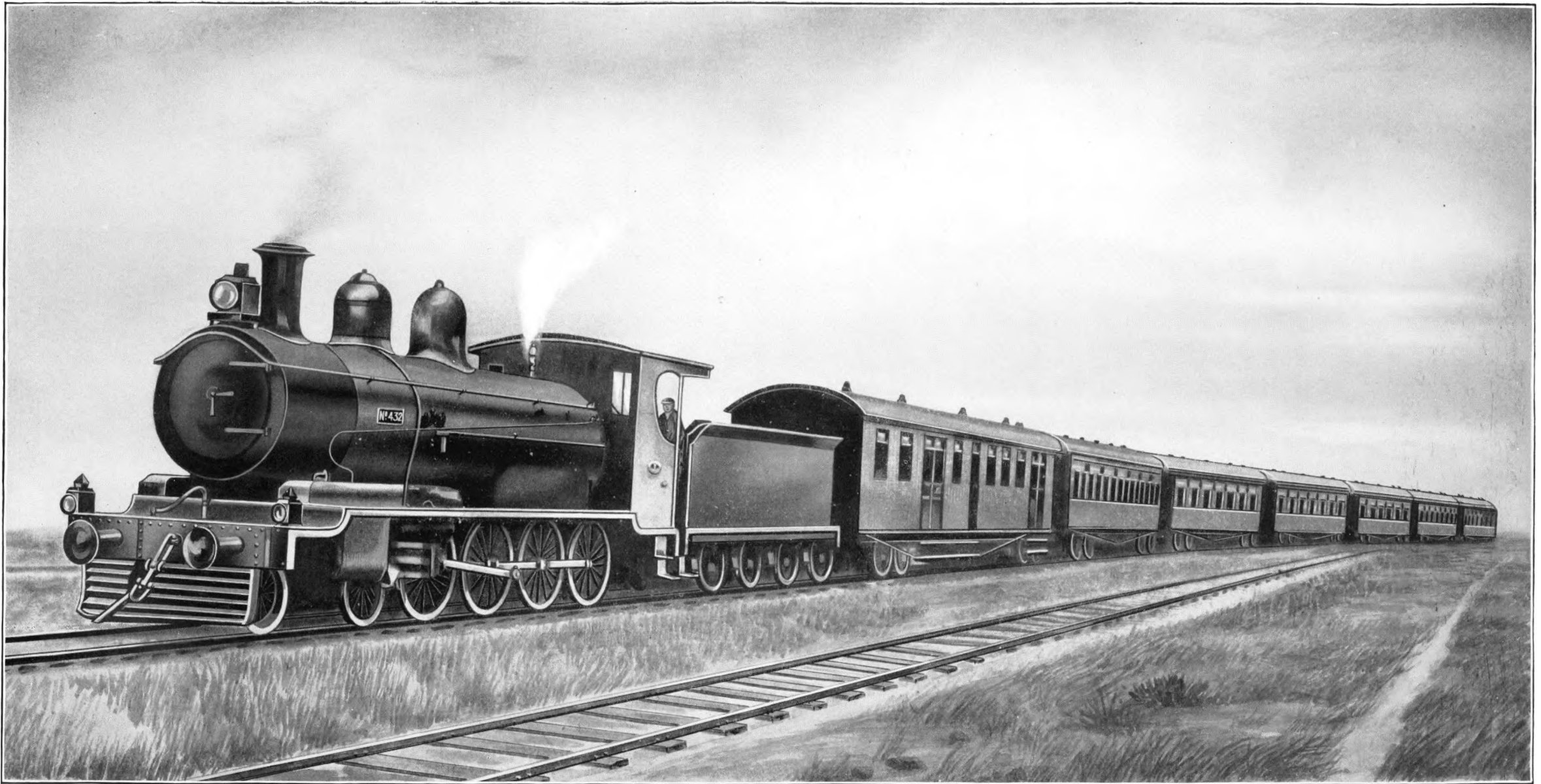
are equipped on upwards of **50,000** Coaches on more than **200** Railways all over the World.

The above is an illustration of a RHODESIAN RAILWAY Train so fitted.



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STONE'S ELECTRICAL INSTALLATIONS

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The above is an illustration of a QUEENSLAND GOVERNMENT RAILWAY Train so fitted.

One may now

TRAVEL ROUND THE WORLD

performing the overland journey entirely

IN RAILWAY CARRIAGES

FITTED WITH

STONE'S ELECTRICAL INSTALLATIONS

LIGHTING

FOR

COOLING &

HEATING

UPWARDS OF 50,000 COACHES FITTED.