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PRIMAL ELECTRIC TRANSIT IN SAN DIEGO

by Richard V. Dodge



Perhaps it's Sunday morning on Fourth Street. Passengers on this Electric Rapid Transit Street Railroad Company car may be churchgoers from the First Methodist Church (marked by the steeple) two blocks south at Fourth and D (Broadway) Streets. Note the man with the broom and the second car waiting on a siding. First cross street is B St. (Fred Reif picture)

The brilliant sparks are terrifying!

Your watches will be ruined!

It's not safe! Them lightnin' manufacturing machines may be the death of you!

Despite these and other ominous warnings, it was proudly announced that "perfection" had been attained in electric traction right here in San Diego, California, by 1889.

"The Electric Rapid Transit Street Railroad Company had been organized, starting in 1886, and was incor-

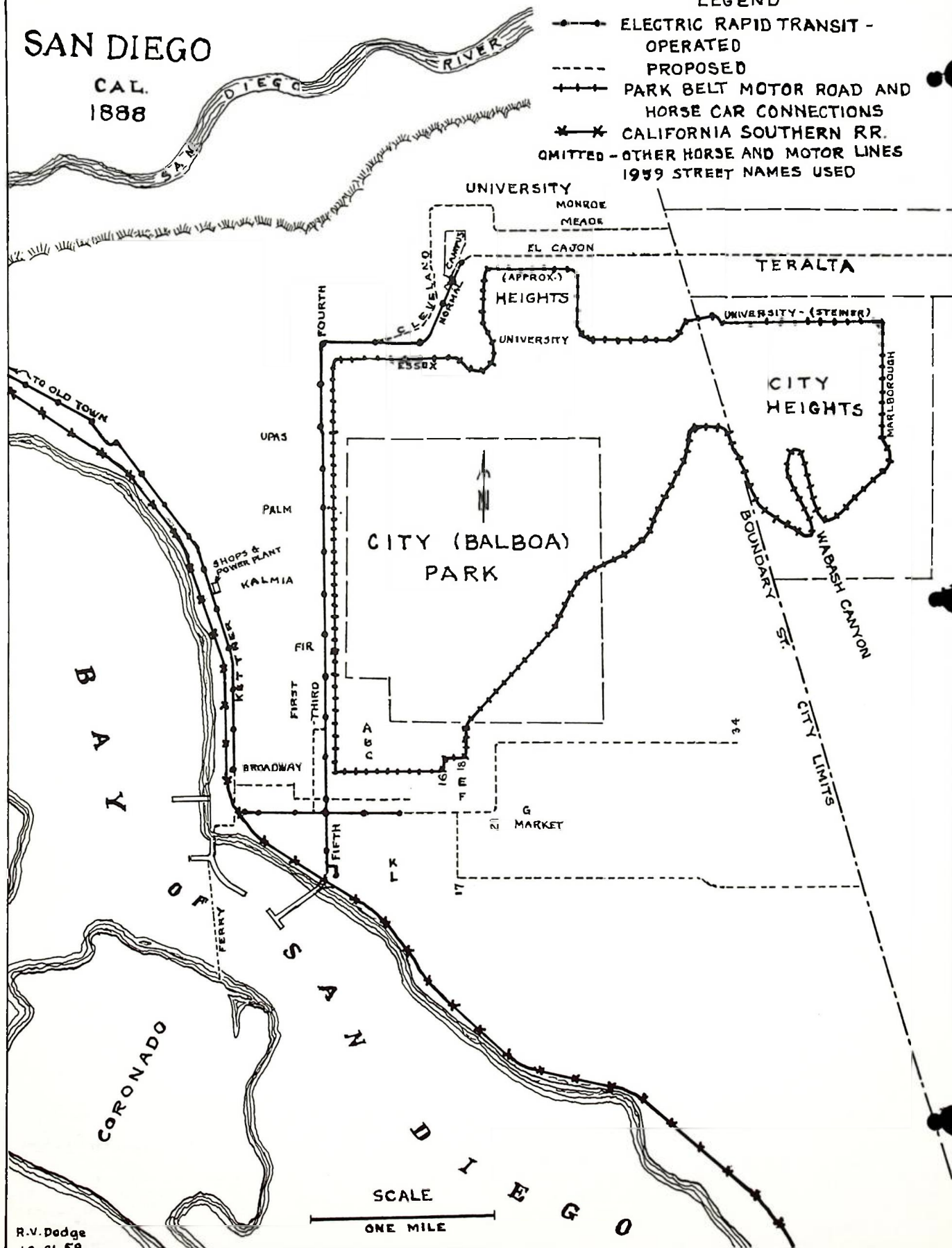
porated in February 1887 to build and operate the largest electric street railway in the country under the "Henry" patented system. The chief promoters were: George D. Copeland, who served as San Diego Postmaster in 1881, president; Doctor David Gochenauer, M.D., vice president and general manager; his partner, C. F. Francisco; and George B. Hensley, an energetic business man who had become interested in the Stonewall gold mine at Cuyamaca Lake in 1870. The company had a capitalization of \$200,000.

SAN DIEGO

CAL.
1888

LEGEND

- ELECTRIC RAPID TRANSIT - OPERATED
- - - PROPOSED
- + + + PARK BELT MOTOR ROAD AND HORSE CAR CONNECTIONS
- * * * CALIFORNIA SOUTHERN RR.
- OMITTED - OTHER HORSE AND MOTOR LINES
- 1959 STREET NAMES USED

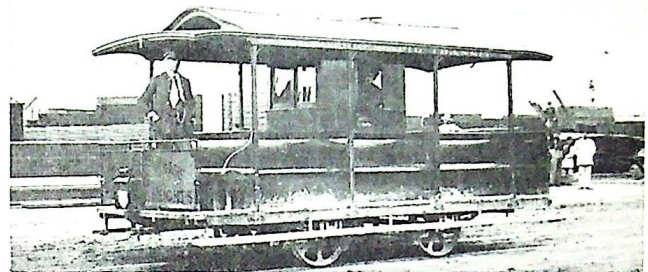
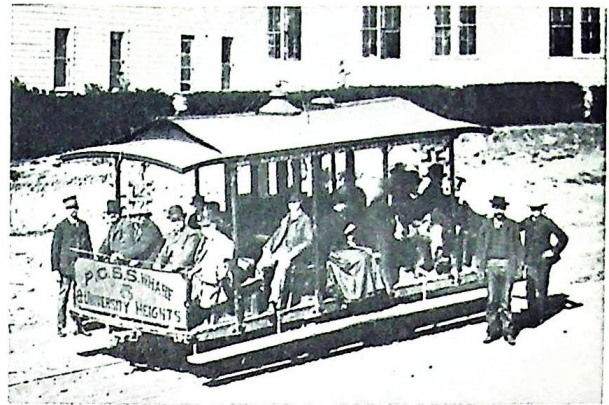


Top This car (No.5?) is on Fourth, near Fir, alongside the Florence Hotel. (Fred Reif picture)

Next Foot of Fifth Street. (Herbert R. Fitch picture)

Next Possibly at Campus and Normal. No.5 (?). Historical Collection, Union Title Insurance Co.

Bottom Two open trailers carry ERT initials on ends and PCSSCo. initials on sides. Location not known. (Fitch picture)

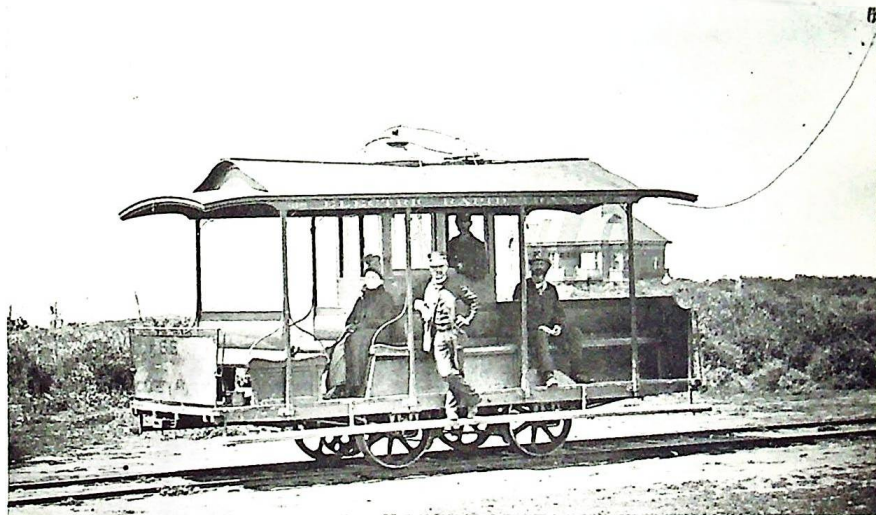


Professor John C. Henry, Francisco called him "the electrician", had invented a means of vehicular propulsion using the "mysterious power" through an overhead wire. His method for the San Diego installation utilized the running rails for the negative return of the direct electric current. He had formed the Henry Electric Railway Company and had built experimental set-ups in the suburbs of Kansas City, Missouri, in 1884 and 1885. There details of construction were worked out and tested. His first commercial electric street car line was established on East Fifth Street in Kansas City with a length of about one mile. Two cars were operated. According to an article in the Street Railway Journal, double trolley wires were used, one for the positive and the other for the negative current. If this be correct it differed from the local practice. Henry achieved success in the operation of this car line and "Kansas City has the only electric railroad in the world which is operated on a street of general traffic." It proved "that the public will accept the mode of transportation for the cars were crowded on every trip and many were standing in the rain waiting for an opportunity to ride." The company intended "at once to complete the contract of the road over the route held by the old Fifth Street Railway, which extends from Fifth Street and Grand Avenue; east to Lydia Avenue; and thence north to East Bottoms; thence east to the distillery". (Quotations are from The San Diego Union of June 17, 1887.)

San Diego offered favorable conditions. Contracts had been signed with the Henry Electric Railway Company in April 1887 to build several railroads, the principal one to be in San Diego.

A BRIEF CHRONOLOGY OF ELECTRIC TRACTION

The first known application of an electric motor to drive a car in



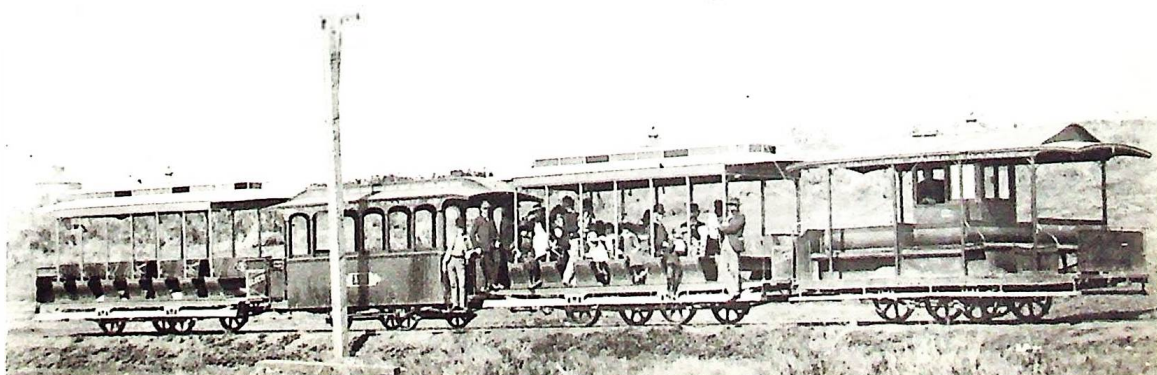
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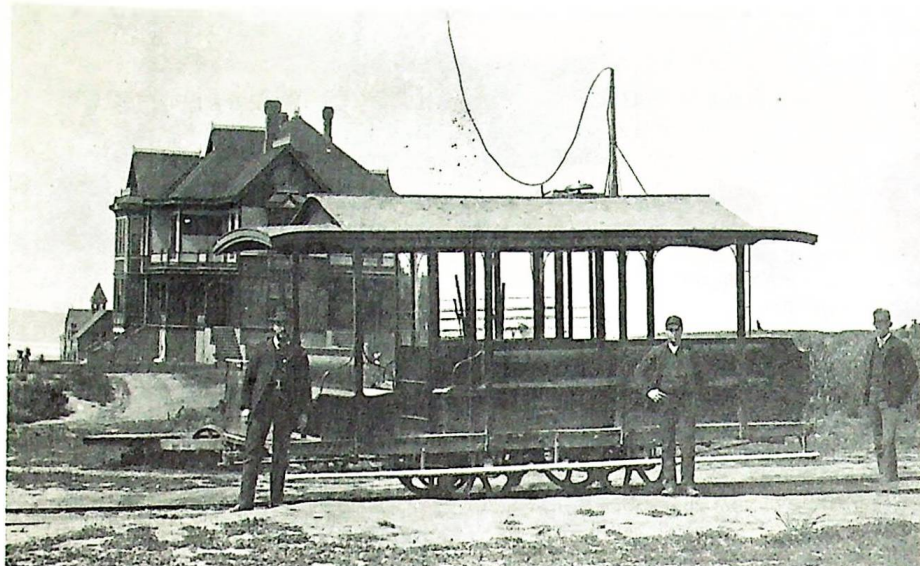
HORSE TAILS
AND BOB-TAILS
OF SAN DIEGO
COUNTY

Horse car
issue

25¢

7861 Normal
La Mesa, Cal.





On these pages are shown four types of cars. Note that the construction of the cars shown in the cover picture is considerably different from the other three types. Picture this page is from the Historical Collection of the Union Title Insurance Company.

circuit is again opened and no current can be felt except close to the car. The most serious objection to the use of this system is that the current used is necessarily one of high volt pressure and therefore dangerous to man and beast. No animal can tread on the iron plates forming the slot without being killed instantly. I learned that several valuable horses have been killed this way in Denver."

How street cars could be operated in electrical series could not be determined from Dr. Gochenauer's account.

The question was intriguing and additional research in the Denver Public Library and the Colorado State Museum's Library in Denver furnished the answers. The ingenious designs should be of sufficient general interest to warrant the inclusion of descriptions.

Professor Sydney H. Short, then Professor of Physics in the University of Denver, had contrived an electric car to operate on a circular track using conductors placed underground in 1885.

The newly-formed Denver Electric & Cable Company investigated Short's layout and adopted a modified version of it. Short called in Mr. John W. Nesmith, head of the Colorado Iron Works, to perfect the "mechanical appliances". One-half mile of track was laid on Fifteenth Street from the Court House to Larimer Street. Two cars were ordered and were run. Thus Denver claims the honor of having the second commercial electric street car line, Kansas City being the first. Difficulties were encountered in the winter of 1885-6.

In 1886 a reorganization resulted in the name Denver Tramway Company and a total of three and one-half miles of track, part double, from east of Grant Avenue on Capitol Hill, on Colfax Avenue; to 15th Street; to Central Street in North Denver, was constructed and equipped.

The power house was built at 15th and Tremont Streets. One 20 "horse power" dynamo, driven by a 25 horse power steam engine, furnished the theoretically constant direct current.

Seven bob-tailed (horse car type having closed bodies with four windows per side and open platforms) cars were operated more or less irregularly for about one year, then the \$200,000 system was abandoned.

A newspaper clipping explained the "improved" (over Dr. Gochenauer's version) type of construction. An underground conduit was made between the rails, two iron plates forming a slot one and one-half inches wide.

A series of contactors, called "circuit breakers", was installed in the conduit, spaced every 17 feet. The feeder wire from the generator was connected to one wing or blade of the first contactor, say the left side. A wire connected the right wing to the left wing of the next contactor, and so on, snake-like, to the end of the line. From there an overhead wire returned the current to the generator. The wings were curved to the shape of a segment of a circle, convex to convex. When the two wings of each breaker were in contact, the electrical circuit was complete.

The motor of each car was mounted between the axles of the single truck and was double-reduction gear-connected to drive one axle. Controls were run to the front platform. A plow extended from the truck frame out several feet ahead of the dash and its two shoes slid along the slot rails. A vertical plow was attached at the rear end. Hangers from

the United States dates back to 1835 when Thomas Davenport, of Brandon, Vermont, built a circular track with a primary battery in the center of the circle. Power was drawn through flexible wires to energize a crude motor on a home-made car. Gradual improvements followed, using batteries, until 1861 when Pacinotti, in Italy, invented a reversible, continuous-current dynamo.

Subsequently demonstrations of experimental electric-powered cars and locomotives were conducted, mostly at expositions. American originators and developers included, among others: Professor Moses Farmer in 1867; George F. Green in 1875; Stephen D. Field and Thomas A. Edison in 1880; Charles J. Van Depoele and Leo Daft in 1883. At the Railroad Exposition in Chicago in June 1883, the possibilities of electric street railroads as business enterprises were demonstrated by Edison and Field. Professor Henry's installations featured 1884.

In 1885, Leo Daft built and demonstrated a 4-wheeled locomotive on the Ninth Avenue Elevated Railroad in New York City and, also, hauled a horse car with a small locomotive using a center third-rail in Baltimore, Maryland.

The next year saw Frank J. Sprague, rightly recognized as "The Father of Electric Traction", enter the field with a center third-rail demonstration in New York City with the world's first "nose-suspended" motors mounted in the truck and regenerative braking.

Later in 1886, Van Depoele built an electric street railway system in Montgomery, Alabama, with the motor set up on the front platform of a horse car, connected to one axle. He introduced the first overhead wire with an under-running trolley, pressed up against the wire by springs and used the running rails for the return.

(Note: Most of the historical data given above were adapted from "Ride Down Memory Lane", The Story of the Branford Trolley Museum in Connecticut.)

DENVER'S SERIES SYSTEM

Denver, Colorado, had a conduit line called the "Series System", using variable high voltage. Dr. Gochenauer inspected the layout and, according to an interview published in The San Diego Union of June 17, 1887, "The system operates successfully." He described the construction in which the underground conductors are "broken" into a series of short segments. "..... the motor upon the car is thrown into the circuit by two arms, one reaching forward from beneath the car a distance of seven or eight feet and the other from the rear. On the ends of these arms are shoes that slide along the iron plates that form a slot between the tracks and from these shoes extending down to the copper conductors a projection of metal which closes the electric circuit. As the car moves onward the

the plows supported the ends of a "brush", which was an eighteen-foot long hickory slat, 7/8ths of an inch thick. On each side of the slat was a piece of rubber cloth insulation and a continuous brass strip. The brass strip on one side was connected to one motor terminal. The other terminal was wired to the brass strip on the opposite side.

Thus, as the car advanced, the brush spread the wings of a contactor apart and the brass strip, in contact with the wing, picked up the current, passed it through the motor and it was returned through the other strip to the opposite wing of the contactor, restoring the closed circuit. "At one end of the motor is a switching coil box for increasing or decreasing the speed by levers connecting with the platform under control of the driver." This must have provided a by-pass when the car was stopped, otherwise all other cars would be halted.

Consider the difficulties in trying to maintain 310 circuit breakers per mile, underground, with teams driving over the wide slot, causing dirt, stones and trash to fall into the conduit. And when it rained, everything was "hot".

FIRSTS IN THE WEST

Thus it is evident that electric traction was still in its infancy when the Electric Rapid Transit Company was proposed. San Diego's electric street railway was the second one on the Pacific Coast. The Pico Boulevard-Maple Street line in Los Angeles, using the Daft System, ante-dated the Electric Rapid Transit by only ten months.

H. L. Story, of the Coronado Beach Company, who had proposed to construct an electric railway from San Diego to National City, made an inspection of the Los Angeles Electric Railroad. According to his report, it was about five miles long. His impressions were that it appeared to work well but had no steep grades and there was only one car. (Story, with Elisha S. Babcock, Jr. and others, had formed the Coronado Beach Company. That organization had acquired the North and South Islands, named the latter "Coronado", established the San Diego & Coronado Ferry Company, had built the Coronado Beach Railroad from the ferry landing to the ocean front, started construction of Hotel del Coronado and was extending the railroad to belt the bay to San Diego.)

THE HENRY SYSTEM

Henry had invented a unique method of conducting direct electric current from an overhead wire to a street car. It consisted of a metal frame carrying four - 3 inch diameter, horizontally placed, grooved brass wheels, two on each side. These were "clamped" to the sides of the hard copper trolley wire by means of steel springs. This rig was given the name "troller". Once placed on the wire, it was towed along by a flexible conductor attached to the roof of the car. The trolley wire could be as much as 15 feet off the center of the track. Two wires were required - one for the troller of the outbound car, the other for the inbound. Professor Henry emphatically stated that the Daft System, with positive and negative trolley wires, as originally used on the line in Los Angeles, was an infringement of his patents.

He had also developed a line of dynamos (electric generators). Street Railway Journal reported that they were compound wound but a local newspaper listed them as shunt wound. The dynamos were connected in series to produce a line potential of 250 volts. There was much superstition prevalent in those days in connection with the dangers of electricity. 1,000 volts was considered to be fatal but 500 might kill an invalid. The potential adopted would never exceed 350 volts, considered to be safe.

Henry discovered that the car motors could be reversed by a simple pole-changing switch instead of the prevalent practice of shifting the brushes. The brush holder could then be set in a fixed position.

The motors were mounted on the car and ran continuously until stopped and reversed. The speed was controlled by a rheostat operated by a small lever. The

reversing of the motor was used as a brake. Cars could be stopped in ten feet from full speed. The armatures are of the Pacinotti-Gramme type. "The commutators contain grooves into which fit round copper wires." The brushes were probably of brass, requiring frequent renewals.

It was specified that the motors should be of 40 horse power rating but the newspaper continued: "although each will develop 25 horse power". This would indicate that there were two motors per car.

The mechanical power from the motors was transmitted to the axles by means of an "excellent" friction clutch and differential gears running in oil. Armature speeds of 1,500 revolutions per minute are "toned down" to a car speed of eight miles per hour. Francisco claimed a top speed of 20 miles per hour.

The need for feeder circuits had been recognized. On the Kansas City line, $1\frac{1}{2}$ inch cast iron bars, coated with asphaltum and wrapped in burlap, were buried at the foot of the line poles. They were tapped at every pole with a riser to the trolley wires. Such construction was specified for the first line in San Diego. Soon it was discovered that a cable in a conduit could do just as well, then an overhead parallel wire was tried and found to serve satisfactorily.

The Henry Electric Railway Company had contracted to furnish all the electrical equipment and running gear needed. The Professor came out to San Diego to supervise the installations.

THE FIRST FRANCHISES

At the time applications were made for city franchises, the great Land Boom of the 1880's in Southern California was in full swing. Real estate sub-divisions were springing up all over. Steam motor railways were being built, business blocks and dwellings were being constructed in great numbers and freight shipments were blockaded for weeks on the railroads. The latter were ordering engines by the hundreds to cope with the situation. Speculative ventures spread rifely. The most appropriate expression applying to the frenetic times is that the people were just running "hog wild".

Permits for new rail projects were passed out freely for the asking. Naturally confusion resulted. The Electric Rapid Transit reflected the stress and strains of the times in the planning and the wild grabbing.

Francisco outlined, in April 1887, that the system will be divided, basically, into three proposed routes:-

1. The Old Town Line, using a steam motor road's track.
2. The Fourth Street, now Avenue, Line up Third Avenue to A Street; to Fourth Avenue; to Upas Street; to City, now Balboa Park.
3. The "G" Street Line, from the waterfront to Derby Heights, via G Street to 21st Street; to B Street; and spanning ravines to 34th Street.

The elastic franchise allowed for a total of some 14 miles. Ramifications multiplied rapidly. A permit had already been granted to the National City & Otay steam motor road for a track on Fourth Avenue. The Electric Rapid Transit was accused of having swapped franchises with the N. C. & O. but the E. R. T. produced a document authorizing a line on that street.

SHOP FACILITIES

A site for the shops and the power plant had been acquired at India and "Ivy" Streets, near Rankin's Brick Yard. A contemporary photograph shows that India Street had been graded, ending abruptly at the top of the south bank of a gully which is now Kalmia Street. Ivy was the last cross-roadway visible. The location was in the present block bounded by India Street, Kalmia Street, Arctic Street, now Kettner Boulevard, and Laurel Street. Some shop buildings had been erected by April 1887.

MOTIVE POWER AND ROLLING STOCK

Francisco had decided that he would build cars better and cheaper locally.

Five cars were soon under construction and, by August 30, these were completed. The intentions were to build 20 cars, "some open, others closed, seats crosswise and lengthwise to please everybody." "As soon as the machinery arrives you will see the carriages in motion."

The electric motors and drives were mounted on cars bearing a close resemblance to the then familiar dummy of the cable roads. They were single truck, open type, with an enclosure in the center to accommodate the engineer, motomeer or motioneer, as the operator was variously called, and the controls. The motor cars pulled trains of from one to four trailers.

The San Diego Sun on September 19 announced that six motors had arrived from Kansas City and the "experts are setting them up out on the San Diego & Old Town Railroad Line."

By July 5, 1887 a brick building was nearing completion "to accommodate the machinery". It was 28 feet by 42 feet with an "L" 28 feet by 40 feet.

On that date, a reciprocating steam engine arrived on the steamer "Queen" from the Pacific Iron Works in San Francisco, later identified as a Buckeye of 125 horse power, with a Hazelton 100 horse power boiler. The apparatus was being placed on the tenth.

Delays were experienced in the delivery of the Henry dynamos. Four generators arrived on September 19. A later newspaper article mentioned that they were connected in series to deliver 100 amperes at 250 volts. It was explained that the same machinery will furnish power for the Old Town Line, the Fourth Avenue Line and other extensions.

Five more dynamos were received on January 4, 1888, making a total of nine.

The transmission line from the power plant to Fourth Avenue consisted of four overhead wires - number one Brown and Sharpe gauge.

THE OLD TOWN LINE

A franchise had been granted to George Neal, James McCoy, R. A. Thomas, George B. Hensley and others to build and operate a standard gauge steam dummy line from San Diego to Old Town. The San Diego & Old Town Street Railway Company was incorporated about August 1886, with a capital of \$50,000. A meeting of the stockholders was held in mid-October and preliminary surveys were ordered. The route selected started at "D" Street, now Broadway, and ran out Kettner Blvd., through Middletown, to Chalmers Street; to California Street; to Moore Street; to San Diego Avenue; to the Plaza in Old Town, the original San Diego de Alcalá.

At the end of the same month, another meeting was called to discuss the feasibility of the construction of an electric railway to Old Town.

A sort of agreement was then drawn up between the San Diego & Old Town Street Railway and the Electric Rapid Transit Company whereby the latter would erect overhead and operate its motors on the former's tracks as soon as they were completed, more or less on an experimental basis.

The San Diego & Old Town Railway had already ordered a steam dummy similar to those being operated by the Pacific Coast Steamship Company on its wharf railway at the foot of Fifth Street but claimed that it would be three times as powerful. (?)

In the spring of 1887, grading and track laying were progressing and a small depot was being built on Kettner Blvd. near Broadway.

Already Francisco had concocted more elaborate ideas and was examining the practicability of extending the electric line from Old Town to the Mussel Beds (Ocean Beach). On July 28, it had been decided that the Old Town electric motors should not terminate at Broadway but would continue up-town via Kettner Blvd. to E Street; to First Avenue; to F Street; to Sixth or Seventh Avenue. Soon they wanted a franchise on Kettner Blvd. to H, now Market, Street; to Atlantic Street, now Pacific Highway; and out the Santa Fe Wharf to the Coronado Ferry Landing, a route already being operated by the San Diego Street Car Company's horse cars.

By mid-August, the track laying had advanced to the point that they felt that an operating test was desirable. Arrangements were made with the Pacific Coast Steamship Company to furnish a steam dummy and it hauled one open car "with a swarm of boys thereon" up Fifth Avenue, down Broadway and out Kettner Blvd. to the rail front. All was pronounced O. K. The track was completed to the Plaza in Old Town on September 4, 1887.

Wire and other materials had arrived. Erection of the overhead was underway in September. The greater part of the line in open country used single poles with side-arms to carry the two trolley wires and stiffened with angle braces. The "town" section consisted of two poles set opposite each other and the trolley wires were suspended from copper span wires. The feeder was an underground cable in an insulating tube with taps and risers at intervals until an overhead wire was tried out.

At this time came the surprising announcement that the San Diego & Old Town Railway will extend its tracks to Pacific Beach, $4\frac{1}{2}$ miles, and that a deal had been made with Messrs. Gochenauer and Francisco to equip and operate electric cars over it.

The coal-burning steam dummy, an 0-4-0, for the Old Town Line was delivered on October 10. It was fired up and tested immediately. It was then decided to begin service at once, using the cars built by the Electric Rapid Transit for a few weeks "until the electric apparatus is working." Regular trips started the next day.

On August 31, it had been sanguinely predicted that the electric cars will be running by November 1, ten miles, to Pacific Beach and in six months to Ocean Beach,

ELECTRIC OPERATION STARTS

At last, the overhead was completed and the boiler, steam engine and the dynamos were all set, ready for the generating of the electric current. On November 9, electric motor number 1, named J. R. Thomas, made a trial trip with only Dr. Gochenauer, the engineer and the conductor aboard. According to the news reporter, on leaving Broadway, the motor glided over the rails and, had the track been in good condition, it would have been smoothly. This run was made to test the electrical contact with the rails.

The inauguration of electric street car service in San Diego, through to historic Old Town, about four miles, took place on November 19, 1887. This was something new and radically different. The public viewed the electrical innovation with wonder mixed with fear and trembling. The San Diego Union of the 20th commented: "Yesterday morning the electric motor commenced running through to Old Town and the residents along the line are no longer bothered with coal smoke and shrill tooting of the steam dummy. A second motor is to be added to-day." And two days later: "The San Diego Electric Rapid Transit Railway is a success. The rapidity of motion is entirely under control. It surmounts almost incredible grades. It starts, stops and moves promptly and smoothly. The passenger as he marvels at the mysterious power that propels him, marvels at its transmission in such strength through the medium of an overhead wire, marvels as he beholds the brilliant sparks that occasionally flash from the revolving wheels, sensible manifestations in another form of subtle force the inventive genius of man is subjugating to his service."

But it was soon announced that the electric motor and the steam engine will make the half-hourly trips.

THE BUSINESS MEN'S SPECIAL

Local business and professional men were invited to make an inspection trip on the 22nd. The consist was "the car containing the locomotive apparatus and two other large ones, well filled."

"The only noticeable noise was that caused by the electricity as it passed around the wheels. This resembles the intensified rumbling of the electricity as it passes over telegraph wires." Comment was made that "the noise is not as great

as that made by a steam motor, it emits no smoke or disagreeable odor and it is not loud enough to interrupt conversation in ordinary terms in adjacent cars."

Professor Henry, who accompanied the group, had given assurance that the buzzing of the motors can be overcome but he liked the noise as a notice to the people.

A stop was made at the "electric power works" to look over the boiler and the machinery installations. H. L. Story got all the information he could from Prof. Henry and Dr. Gochenauer.

A. E. (Father) Horton told the crowd how he bought most of the land including the downtown section of San Diego in 1867 at 26 cents an acre.

There was one quite heavy grade which was successfully surmounted. The train was carried around 20 degree curves and up four per cent grades with ease. The whole set-up was voted a big success and was acclaimed as a great improvement over Los Angeles' outfit. "San Diego is to have the finest electric street railway in the country" and the cost is only 25 per cent of that of cable roads.

BREAK DOWNS

The vicissitudes of the primitive electric railway were legion.

On the second day of operation the first mishap occurred. An axle on a motor broke near the engine house. On the 27th another one failed. The axles were too light for the loads and track conditions. "It is becoming evident that the present cars in use are not suitable."

Imagine what might develop if the trolley, nicknamed roller skate, were dislodged from the trolley wire, as it befell frequently.

A severe storm on November 23, flooded the track in many places but the water did not interrupt the electrical circuit, proving that the ground return through the rails was entirely practicable.

THE FIRST FATALITY

The first fatal accident happened on the 21st. The victim was a spaniel belonging to the conductor. The dog was riding on the motor, spied a bird, sprang from the car in a cut, rolled down the embankment and under the wheels.

THOSE FINE WATCHES!

An article appeared in the San Diego Sun of December 1, 1887 on "the baleful effect of the current on watches by the dynamos. The finer classes of watches are injured. A watch that has fallen under the electric influence may not show the effects right away but it is liable to stop at any time and prove unreliable. A respected citizen says the company should never be permitted to run the electric motors without a car attached. It would be well for persons having fine watches to keep off the motors when riding over the electric road."

Enterprising persons quickly started businesses of demagnetizing the time pieces. To counteract this adverse publicity, the San Diego Sun of December 27 proclaimed: "Dr. Gochenauer has perfected a new motor properly enclosed in glass. The attraction will not injure watches."

THE UNTIMELY END

It developed that there was no definite agreement between the San Diego & Old Town Railway and the Electric Rapid Transit Company. "The former alleges that the poles are not properly set and the cars are not suitable". The railway company will order its own equipment. An illustration of the Street Railway Journal shows an electric motor car coupled to a double truck combination open and closed coach of the San Diego & Old Town, bearing the name "J. C. Henry", indicating that one passenger car had been constructed.

That fine electric car service to Old Town was short lived. On December 1, 1887, it was announced that "The Old Town line will withdraw the electric motors and

cars to use them on the Fourth Street line to the campus site of the San Diego College of Arts and Letters.

Then, in an advertisement for the University Heights real estate promotion, it was indicated that the College planned to erect the buildings and had contracted with the Electric Rapid Transit Company to complete the line to the campus (on Normal St. to Campus Avenue) by January 1, 1888. On December 2 the San Diego Sun published that work will start removing the "experimental" overhead wires to Old Town as soon as the weather settles. The dismantling began on the 13th. Dropping the Old Town line will make Fourth Street operation more satisfactory, so it was said. This ended the proposed extensions to Pacific Beach, Ocean Beach, on Kettner Blvd., etc.

THE FOURTH STREET LINE

The company had been going ahead with the building of the other two routes, while devoting its main energies to the completion of the Old Town project.

Rails were ordered and grading was started on Fourth Avenue from G Street to C Street in July 1887. In that month it was decided to change the course to begin at the foot of G Street, thence to Fourth Avenue; to Palm Street; to Fifth Avenue. Rails were laid from G Street to Broadway. The route as shown on the "Official" (real estate promotion) map was out Fifth Avenue to University Avenue; to Cleveland Street, to Monroe Avenue; to Florida Street; to Meade Avenue to Boundary Street. However the proposed Teralta motor line with which it was to connect is drawn on El Cajon Avenue. (Teralta was located east of Boundary Street on lands formerly the property of Mission San Diego de Alcalá. The strip was about four blocks wide, between Polk and Monroe Avenues.)

For the suspension of the trolley wires, it had been agreed to use nicely painted poles of uniform height in pairs, opposite each other, on each side of the street at a distance from the center as the City Engineer specifies, not less than 150 feet apart nor 20 feet high. (Posts on the Old Town line had been 180 feet apart.) This will be very different from Los Angeles' ungainly layout with poles only 50 feet apart with heavy cross arms. They will not interfere with vehicular traffic. The City Engineer ruled that the poles be set near the curb stones.

Underground feeders will not be used as parallel overhead wires served the purpose on the Old Town Line. The first shipment of heavy feeder wire was received in August.

The crossing with the track of the San Diego Street Car Company at Fourth Ave. and Broadway was put in in that month and the track was completed to Ivy Street. A second crossing was required at Fir Street.

Then the contractor laying the pipe for the City's new Waring Sewerage System came along in mid-September and tore up the track. It was relaid two weeks later.

An application was made in that month for a franchise for the Fifth Avenue route north of Palm Street, which was to be double track. But the San Diego Street Car Company already had a permit on Fifth.

In October 1887 an advertisement for the Teralta Sub-division read that work has been resumed on the electric motor road and it will be completed to Teralta.

Following the Business Men's Special on the Old Town Line, bigger and grander plans were released. It was declared that the "franchise now covers 21 miles of track and will extend ultimately to El Cajon Valley. Another set of electric works will be operated by water power of the Flume Company in the vicinity of La Mesa, ten miles from San Diego." (An aqueduct was being constructed by the San Diego Flume Company, of which George D. Copeland was the organizer and President. Crossings of the valleys were accomplished by constructing elevated wooden flumes. It was planned to tap the flume at a high point to make a waterfall which would turn wheels to drive the generators.) "It will be the cheapest power known."

By November 20, the overhead wires had been erected to the Florence Hotel at Fir Street. On December 15, the length of the line was set at four miles. Two days

before, the grand opening of the University Heights tract had taken place and \$100,000 in sales of lots were reported by noon. From Normal Street and El Cajon Avenue graders were working on the extension to Teralta. It was boasted that the ties and steel had been ordered for the additional track through the College Hill Tract and University Heights. Through Teralta the motor road would be a separate corporation and would extend for five or six miles east from Boundary Street.

A few days later the routing was revised. The Fourth Street track was extended from G Street down to the Pacific Coast Steamship Company's depot and changes were made beyond Florence Heights. The plans to run on Palm Street and Fifth Avenue were abandoned and track and overhead were installed out Fourth to University Avenue; to Normal Street; to a terminus near Campus Avenue.

Rails had been "strung" as far as the College Tract (Normal Street) and, according to a December 15 dispatch, "...it is actually constructed to the college campus."

An unexpected break in the wires at Fourth and Broadway delayed the trial runs. Then there was too much dirt on the track on unpaved Fourth Street due to teams driving over the rails.

OPERATION - FOURTH STREET

The first motor car arrived downtown, as far as Broadway, on the afternoon of December 27, 1887. The clanging bell attracted much attention. Dr. Gochenauer was the only passenger. "Circuit difficulties were encountered, dirt was cleaned off the track and a number of gentlemen made the return trip."

The first official runs were made on the 31st and regular service began on New Years Day, 1888. The opinion was that "the Fourth Street Line is a success despite the croakers." This was a historic event. The Electric Rapid Transit has accomplished results never before achieved. The San Diego Union of January 4 described the feats: "With their electric motor, they pull a heavily loaded train, consisting of a motor car and a passenger coach, up a hill having an $8\frac{1}{2}$ per cent grade. In some places the grade is nearly 9% yet it averages $8\frac{1}{2}$ %. As stated no ordinary traction engine of any device ever overcame a grade as great. In going uphill the speed does not diminish appreciably and the motor is capable of starting a train when it is on the heaviest grade. The cause of the superior efficiency of electricity to steam on heavy grades is not evident to those unfamiliar with electrical science." "It is a singular electrical phenomena that when a current passes from the wheels to the rail or in any similar contrivance the tractive power of the wheels is increased probably more than 50%. For this reason, the driving wheels of the electric motors using rails for the return currents seldom, if ever, slip, although the weight of the motor is not one-fifth that of a steam dummy of the same capacity." Others voiced the opinion that it was the phenomenon of a closed magnetic circuit.

As of December 23, 1887, the rolling stock on hand consisted of 3 motor cars, one of which lacked parts, 6 coaches (trailers) and 2 flat cars. 3 new motor cars and 6 coaches were received then from Kansas City and a motor car of new design had been ordered from Hall Brothers of Stockton, California. According to the newspaper account: "The cars are painted a dark olive color and present a handsome appearance."

Trains were run to Florence Heights every five minutes, so it was printed, competing with the San Diego Street Car Company's horse cars on Fifth Street. The running time to Upas Street was recorded as seven minutes. Three trains ran "clear through" to the college campus. Evidently many troubles were encountered and a January 4, 1888 paper dispersed the information that trains will run to Florence Heights in ten days.

Timetable Number 2 was issued January 19 listing four trains a day.

"No electric cars tomorrow", warned the San Diego Sun on January 23, reason: making repairs to the engine. A cement foundation was needed under the dynamos. Operation was resumed on the 28th. Dr. Gochenauer gave assurances that the road will be running smoothly in ninety days. He resigned as President to devote his time to managing the operations.

The Doctor indicated that two new and larger motors had been ordered. These were to be double truck, double deckers with locomotive type wheels with side rods. The bodies were to be 30 feet long, half open and half closed, similar to cable cars. They will be finished in hard wood. The closed portion will be upholstered in plush. The windows will be heavy French plate. Power will be increased 50%. They will be finished in April and will run from the steamship wharf to El Cajon. As the route on the mesa was sparsely settled, a speed of 20 miles per hour was expected. (No record has so far been found confirming the receipt of such contraptions.)

"THE SUBTLE FLUID"

"C. A. Wetmore was driving along Fourth Street. When opposite the Sun office (south side of the Plaza), his horse stopped and dropped to the earth as though he had been shot. It was soon discovered that he had sustained an electric shock.

A telephone wire had been stretched from the Faivre Building to the west side of Fourth Street and rested on top of the large wire that carries the current for propelling the Rapid Transit cars. As the horse passed along his head came in contact with the small wire. As an employee of the Telephone Company was pulling the wire across the street, the end touched the rail of the electric road, causing sparks to scintillate in all directions and burning the wire up as if it had been paper.

The horse got up, appeared greatly exhausted but was apparently uninjured. (From the San Diego Sun, January 7, 1888)

LA MESA & EL CAJON RAILWAY

On January 24, plans for expansion were outlined. Since the operation from Fourth and K Streets to University Heights "has proved entirely satisfactory", "it has been definitely decided to push the track" to Teralta and Cajon. The distance from the College Campus to Teralta at Boundary Street was given as 3 miles (it could not have been more than $1\frac{1}{2}$ miles) and Electric Rapid Transit will build the track.

A new organization, La Mesa & El Cajon Railway Company, will continue from Teralta through La Mesa and on to El Cajon Valley, terminating on the Hawley Tract.

Construction will be pushed as soon as the University Heights company shall have designated the route.

(By this time interest in real estate had begun to wane. According to figures from Los Angeles the peak of the great land boom had been passed in August 1887. By then the professional boomers had taken over, tracts of land were subdivided and the proposed townsites were given attractive names. Auction sales were staged with brass bands and free lunches to draw the crowds. Grandiose plans were advertised, always including the building of a \$100,000 hotel, to be followed by other improvements such as cement sidewalks, street railways, water and sewerage systems. Residents were urged to buy all the lots they possibly could and to hold them to sell to the land-hungry easterners who would rush to Southern California during the winter but didn't.)

OTHER 1888 HAPS

By February 9, 2 trains were running from the foot of Fourth Street to Florence Heights, (evidently meaning per hour).

The new motor, which had been built in Stockton, arrived on the 15th

An announcement was made on March 9 that new and larger motors will be assigned to the Fourth Street runs, then two old motors will be taken off for cleaning. When returned they will operate five minute service to Florence Heights and one train an hour to University Heights.

In the latter part of the month Dr. Gochenauer resigned, to introduce the Henry System in other cities on account of the perfection reached on the Fourth St. Line.

April brought a trolley wire failure on the third at Fourth and Ash Streets.

Notice was given that a coach will be added to each motor to do away with the idea that watches are ruined. The E. R. T. was blamed for the damages when a telegraph wire shorted the trolley wire at Fourth and B Streets and burned out the telegraph instruments. This occurred on June 2. Another notice was served on June 4 that the road will shut down for repairs and additions. There was no service for two weeks.

PARK BELT LINE COMPETES

Messrs. Babcock and Story, of the Coronado Beach Company, had obtained a franchise for a steam motor road from 18th and A Streets, through Balboa Park, crossing Wabash Canyon and out to what is now Marlborough Avenue to University Avenue to develop real estate sales in the Steiner, Klauber, Choate and Castle or City Heights Addition. A loop was formed by returning roughly along University Avenue, swinging north to about Howard Avenue and returning south about Florida Street, only a few blocks from the college campus. Crossing University Avenue it turned west to Fifth Street and down to Fir Street.

The railroad was named City and University Heights Motor Road but it was commonly called the Park Belt Motor Line

A small steam engine towed a horse car over the route and horses of the San Diego Street Car Company pulled the car from Fifth and Broadway to 18th and A Streets and returning headed it down Fifth from Fir to Broadway.

Construction was completed and the first trip was made on July 6, 1888. According to the timecard, 3 trains a day in each direction made the loop, practically running parallel with the Electric Rapid Transit from the campus to town.

LAST HALF OF 1888

Just as the Park Belt Line began operating, the Electric Rapid Transit shut down "for several weeks for alterations, repairs to motors and tracks." Also the rails were connected (bonded) with copper jumpers. Trains were run on July 12 to test the track and the regular schedule was resumed from and after July 26.

In September, an application was filed for a franchise to operate from Fourth Street on K Street; to Fifth Street to L Street, to provide better service to the new Pacific Coast Steamship Depot and those of the National City & Otay Railway and the Coronado Railroad. This request was approved by the City Council but Mayor Hunsaker pocket-vetoed it. The ordinance was passed over the veto. Immediately conflicts arose over the use of Fifth Street jointly with the San Diego Street Car Company and the Pacific Coast Steamship Company. In October the track on Fifth Street had to be torn up and relaid to conform with the pavement.

Ceremonies in connection with the laying of the corner-stone of College of Arts and Letters were held on September 21. Extra trains were operated to handle the crowds

In October service was interrupted on the 14th by an oil famine. The usual trains were again running hourly to University Heights on the 16th.

On the 30th, a new timetable went into effect. Trains left for University Heights at 6:30 a.m.; 9 a.m. and hourly to 3 p.m. and 4:10 p.m. - Fare 5 cents.

ELECTRIC LIGHTS

December began with another stoppage on the 5th. "Will not operate today account moving machinery". Since no street car service was provided after 6 p.m. and in order to utilize the steam boiler and the engine more efficiently, Copeland installed an incandescent electric light plant using the Westinghouse System. The energy was supplied by two alternating current "dynamos", each with a capacity 650 - 16 candle power carbon-filament lamps. The shut-down was made to rearrange the machinery for driving the new generators. Poles were placed and heavy insulated copper wires were strung starting from the Electric Rapid Transit works. Service was inaugurated on December 15. "Every lamp has been sold and is now burned nightly." All

this was accomplished in the brief space of four months.

Thus Copeland entered into competition with the San Diego Gas & Electric Light Company's Jenney System. The latter company installed an incandescent dynamo and served customers with 20 candle power lamps. "The light given is particularly brilliant."

Shortly the San Diego Gas & Electric Light Company filed a complaint alleging that the Electric Rapid Transit's wires were interfering with its system.

G. STREET TRACK

Going back to April 1887, it was declared that, after the Old Town road is running, G Street will be next. Rails are being manufactured. Poles had been strung as far as Eleventh Street by December 21. It had been the expectation that operation would begin January 1, 1888 up to the time of the route change extending the Fourth Street Line down Fourth to the Steamship Depot.

By January 14, the wires had been strung and rails were laid from the foot of the street (probably meaning from Kettner Blvd.) to Fourth Street. Then came the seemingly insurmountable problem of how the trollers could cross the trolley wires of the Fourth Street Line. No practical solution was proffered.

The first car over G Street as far as Fourth Street ran in the evening of February 28, 1888.

Two days later an injunction was served on the claim that there was bribery in connection with the obtaining of the franchise from the waterfront to 21st Street. A demurrer was sustained.

On March 15, the company asked for the right to use horses temporarily.

By the 7th of April it was indicated that the line will extend from 21st Street to B Street; to 30th Street, serving the Golden Hill area. On July 16, Copeland announced that he expected to build an extension on 17th Street from G Street to L Street; and east to the City Limits. A connection would be made with the National City & Otay Railway's original track at 17th and L Streets.

No further references have been found on the G Street Line.

1889 AND FINIS

"Electric Science has made rapid strides!"

The San Diego Union of January 1 reviewed the progress, crediting the Electric Rapid Transit with being the first to negotiate 9% grades but mentioning that now a Richmond, Virginia, line climbs 15½% slopes but uses sprocket wheels.

Rumors were current in February that the Sprague Electric System was angling for control of the Electric Rapid Transit. Nothing materialized.

A real estate advertisement on the first revealed that the road was not operating. "While the railroad is torn up on account of laying water pipes, carriages will leave the Methodist-Episcopal Church (northeast corner of Fourth and Broadway) to the campus - 5¢."

Boys delighted in throwing stones at the trolley wires. When the marksmanship was accurate, the resulting noise was unpleasant to others and frightened horses.

Dr. R. M. Powers, of the San Diego Gas & Electric Light Company, succeeded in inducing the City Council to pass an ordinance, over the opposition of Mr. Copeland, requiring 45 foot poles for light wires. Copeland was granted the period of one year to change his poles to the required size. He stated that he would be ruined by the drastic specifications.

On June 22, he told of the losses, amounting to \$20,000 a day, on the Fourth Street Line. The Electric Rapid Transit, with its one line to the terminus on Normal Street, folded up but the electric light plant continued operations for several years.

Then Copeland, John C. Fisher, D. D. Dare and others proposed to build a cable railway over the same route. The San Diego Cable Car Company was incorpora-

ted in August 1889 and took over the franchise of the Electric Rapid Transit Co.

ON THE RIGHT TRACK

The Henry System had many inherent weaknesses, particularly with the "trollers", mechanical transmissions and the low voltage.

In the meantime, beginning in November 1887, in Richmond, Virginia, Frank J. Sprague had "installed the world's first comprehensive city-wide street railway system", according to "Ride Down Memory Lane". By mid-1883 there were 40 4-wheeled double-end cars, each powered by two $7\frac{1}{2}$ horse power motors, nose mounted in the truck and geared to the axles. A single wire over the track was connected to six 40 kilowatt, 500 volt Edison dynamos (direct current generators) with negative return through the running rails. A pole trolley on the roof of each car conducted the electric energy to the controls and motors. The system totaled 12 miles.

Here was the practical method of utilizing electric propulsion which was almost universally adopted and which resulted in the successful operation, other than financially, of the San Diego Electric Railway in 1892.

Richard V. Dodge
9-13-59
Rev. 10-18-59
Add Denver 4-18-60

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The greater part of the historical sequence was obtained from the files of newspapers: The San Diego Union

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INSTITUTIONAL

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SOUTHWEST NEWS

Santa Fe San Diego City Planning Commission stated that Santa Fe would eventually establish a "Linda Vista" railroad station to serve the new University City area. Santa Fe and Railway Express were denied the right to close Encinitas. PUC felt that present and future population in the area plus distance from Del Mar and Ocean-side warranted continuation of service.
Arizona Report from Dick Guthrie In the Williams-Flagstaff area observed Mail Train No. 8 with five passenger units. Then came the second section with six freight units - both had 19 cars. Observed six units coupled together at Winslow (ABBBBA). In September observed four SD-24 blue-yellow jobs pulling and five FT units pushing a 55 car train. Most freights were headed by FT, F-3 units with GP-9's occasionally sandwiched in between. No lack of motive power. Also observed were 13 GP-9's, FT's, and SD-24's (probably some deadhead) on one train, six 2400 hp. diesel units on another train. Five units power freights northbound from Phoenix. Southwestern is (was?) running an Apache diesel. Dick also saw an ABBA combination pulling 100 cars with ABBA pushing. Another arrival - one girl tagged Stephanie to the Guthries.
Corky Thomson report Santa Fe has gone to 6 units on freights, A-B-B-B-A-A, and pairs of the new low hood geeps, back to back, Race trains on Labor Day: two trains, 18 cars each, 4 unit #40 and a three unit, all heavyweight equipment. Two extra race trains during preceding week, one with Super Chief dome, both with old San Diegan round end observations. Both were lightweight; one with dome also had three diners and three lounge cars. San Diegans southbound have headend cars at rear. Never can tell these days about ATSF consist.

New Santa Fe 44 mile line Williams to Crookton, Arizona, will eliminate steepest ruling grade east of Barstow. Present mains excepting eastward main Williams - Ash Fork will be retired. On the old line westward freights were limited to 15-20 mph for 19 miles. Steep canyon wall maintenance for 10 miles is ended. One tunnel had restricted clearance and line would need to be up-graded.

San Diego & Arizona Eastern Observed Train 452 eastbound from SD&AE's 8th St. yard at 10:15 a.m., Wednesday August 24 with diesels 5656-5681-5615, 65 cars and caboose 812. Loaded cars 17; empty 48. Five minutes later Roustabout departed for El Cajon with diesels SP 5101-5102, 13 cars and caboose SD&AE 402. Nearby was SP 1037 switching. Ringling Brothers and Barnum & Bailey circus train came into San Diego over Santa Fe rail but left via the San Diego & Arizona Eastern.

Southern Pacific. SP's passenger and freight station at Beaumont closed in September with traffic now to be handled out of Colton. Banning closed some years back and Palm Springs may close. SP cannot now abandon the Overland, West Coast, Del Monte, Commute 155-156, Senator and El Dorado as it wishes. Shasta Daylight is again three-a-week. Highway underpass near Glendale station is now in use. Work is underway at Fletcher Drive (SC-RLHS). A new one-spot car repair facility is now in operation at Taylor Yard, Los Angeles. This facility which expedites running repairs to freight cars moving through the LA terminal, is similar to those at Roseville and Houston. One due also at Eugene. State PUC is checking SP's plans to increase coach seating capacity from 50 to 58. Pixley Chamber of Commerce wants to lease the site of the abandoned station for a park and parking lot facilities.

Union Pacific. Ticket offices are now located at Alhambra, Beverly Hills, Glendale, Hollywood, Huntington Park, Lakewood, Long Beach, Pasadena, San Pedro, Santa Ana, Santa Monica, Los Angeles 6th & Olive and San Diego as well as at main line spots.

Ferrocarril Sonora-Baja California Renovacion, house organ, for the Ferrocarril del Pacifico, August 1960, ran an article, "The Port of Ensenada Needs A Railroad." Article disclosed that President Mateos promised Ensenadans a railroad to connect their town with the FSBC. To date only a preliminary survey has been made. Line would either parallel the border or would take off at Victoria (on the FSBC line) to the Sierra de Juarez mountains. Then the route would generally work through the mountains in a southwest direction emerging on the Pacific shore just north of Ensenada. (See Issue 35 for further details and for Kubach's information about buying tickets and making reservations on the FSBC. If in a hurry, write the Dispatcher.

General railroad and traction. Western Pacific Trains 1 and 2, Zephyrettes, made last runs on October 2. Disposition of the Budd cars is not known. Santa Fe will probably gain control of the WP. Sacramento Northern abandoned end nine miles of the Colusa branch. New diesel engine maintenance facility is being built just north of the Stockton roundhouse. Northwestern Pacific Budd car (the Redwood) hit a truck and has been temporarily replaced by SP combo-lounge 3078 and diesel SP 5317. City of Long Beach will join the Los Angeles Metropolitan Transit Authority in attempting to keep the interurbans rolling on the Long Beach line. A second car has had some reconstruction - window sashes, anyway.

SHOP TALK. Issue 35 will be a news and short feature issue. RHSofSD has purchased United States Gypsum narrow gauge "passenger car" used on several Society excursions. Car was built in 1947 for a visit by the late Sewell Avery and the Board of Directors. It is still stored at Plaster City. RHSofSD Calico Excursion train consist was: locomotives 951 and 953B, baggage 1752, coaches 5357, 5324, 5363, 5333, baggage (snack) 1756, coaches 5332, 5345, 5314. An ex-Rhode Island tank locomotive has been purchased by a private party and is now located on Cleveland Ave., National City.

THE DISPATCHER. Four issues for \$1 (usually quarterly). Official publication of the Railway Historical Society of San Diego. Circulation: Dick Pennick, 8689 Lamar St., Spring Valley, Calif. Editor is Eric Sanders, 7861 Normal Ave., La Mesa, Calif. This issue and most other issues are available at 25¢ a copy.