FIRST TRIAL OF THE TROLLEY

Difficulties Encountered and Overcome by the Inventor of the System.

FINAL SUCCESS OF THE EXPERIMENTS

Built a Model Road in the Rusement of a College and Installed the Underground System in Denver in 1885.

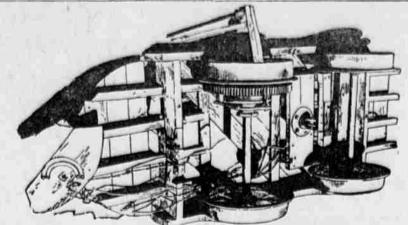
The first electric road in the United States, built in Denver in 1885, was, strangely enough, an underground trolley system, almost exactly like the one now adopted as the last development of electric railroading in 1899. There is always difficulty in a cor rect statement of priority of invention. Millions of dollars are spent every year to establish this claim in behalf of patents. I happen to know the facts about the first electric railway commercially operated in this country, because I built it. I designed the cars, made and wound the motors and ran the line at a time when the cable was being substituted for horse power on the surface roads of Philadelphia-now the great overhead trolley city of the country. An overhead trolley even was then unknown. The steam cable, which had been in successful operation in Cincinnati, San Francisco and perhaps other American cities, was generally considered in 1885 to offer the most efficient substitute for horse cars.

I was led to a different conclusion, although I was then only twenty-seven years of age, and by no means willing to pit myself against practical railroad experts. convinced electricity could be safely and securely harnessed I had made experiments with the electric current from boyhood, having first had my curiosity excited by watching sparks leaping over a break in a lightning rod. I was brought up, I might say, along a railroad, my father being superintendent of the Little Miami line, running from Columbus to Cincinnati.

Soon after my matriculation in the Ohio the Western Union telegraph office in Columbus. He permitted me to use the comp- introduced in the middle and eastern states,

Fremont street, and in Fifteenth street from show the exact date.

ompany was at once organized. A closed batteries, at the rate of four miles an hour, yards, when my friend, the brakeman, would onduit system was thereupon installed in | In 1879 at the Berlin industrial exhibition, Siemens & Halske exhibited an elecgeared to the axle. The slot was only half The great Thomson-Houston system was



SIMPLE MECHANICAL CONSTRUCTION OF THE FIRST CAR. BOTTOM VIEW.

ters of the Rocky mountains this slot would | Van De Poele. contract until it almost closed, thus interfering seriously with traffic. There were no sewerage connections in the streets and the in the respects mentioned was the only reason why a cable was, after some years, subthe Budapesth sub-trolley system, which by the Metropolitan Traction company in the was not in existence. But the Denver subtrolley was in actual successful commercial operation.

Nor is it strange that a Rocky mountain State university in 1875 I was fortunate community to use electric traction. The enough to make a friend of the manager of electric light was geneaally in use in Rocky mountain towns long before it was

The result of my own investigations has inclined me toward the separate equipment of each car with electric motors, according problem of drainage bothered us. Yet the to what is now called the multiple-control ond was, in spite of all, a commercial suc- system, rather than to the construction of cess. It paid. The condition of the streets a heavy electrical locomotive, which should draw a number of unequipped cars. Yet each of these systems has its special uses stituted for this sub-trolley, and over-head and advantages. The motors and genertrolley afterward for the cable. At that time ators used on the pioneer line in Denver were modifications of the famous Brush are with improvements is now the one adopted light machines made in Cleveland. The motors were first placed on a separate city of New York as the best in the world, truck and suspended independently of the springs which carried the car body.

The next or second conduit road constructed in the United States was laid on the Bentley-Knight system in Allegheny, city should have been the first American Pa., and in 1887 the third commercial electric rallway was installed by F. J. Sprague in Richmond.

> Certainty of Success. By this time it was evident that electric railways were successful and popular, and three companies, the Thomson-Houston, the Sprague Electric Railway and Motor company and the Short Electric Railway company, began the manufacture of electrical

railway appliances.

In 1890 the Edison General company absorbed the Sprague interests and the Westinghouse Electric and Manufacturing company took up railway work. Improvements were making constantly. Mild steel was found to be the best material for motor construction, its permeability being double that of cast iron, so that an equally strong magnet could be made of half the metal. The Short company now began producing a motor which operated directly on the axle without the use of gears. By a spring system the armature could start suddenly without encountering the inertia of the entire

car. The Walker Manufacturing company evolved motors so much more powerful, and at the time so much simpler, than any heretofore in use, that long-distance railroading came to be regarded as the next great problem to be overcome by electrical engineers. The enormous electrical locomotives designed to pull heavy railroad trains through the Baltimore & Ohio tunnel in Baltimore were built and equipped with the Short gearless motors. The problem of long-distance rallroading seemed one step nearer solution, for these electrical locomotives haul the heaviest freight trains with ease. The Pennsylvania railroad, on its Burlington and Mount Holly branch, and the New York, New Haven & Hartford railroad, on its Nantasket beach and other branches, introduced electrical traction for standard gauge cars, equipping each car at first with its own now being equipped with the heavy Walker motors, and the introduction of electricity

now living breakfasted in New York and lunched in Chicago. S. H. SHORT. THIS WAS WORSE THAN WAR.

on the New York elevated railway systems

Footprint's Night Ride in a Box Car with Two Mountain Mules. "Well," said the Footprint to Slug Seven

as he settled down on his stool and hegan to throw in a handful of type, "if I didn't have a time of It getting down here out or those mountains!" "Been up in the mines?" inquired Slug

"Yep," replied the Footprint, "just came out. Footed it from Angels to Milton yeaterday and rode into Stockton on a sidedoor sleeper last night. A sidedoor sleeper. continued the Footprint, "is not the most comfortable mode of traveling. Personally, I prefer to ride on a red cushion, but the heartless and exorbitant demand of the railroad trust for spot cash and the war tax

which plutocratic greed has put on whisky compelled me to walk or come as freight. I came as freight." "Sure," said Slug Seven. "The unpleasant feature of the trip," con-

tinued the Footprint, "was the base betrayal of confidence on the part of the brakeman with whom I negotiated for an undisturbed passage. For a cash consideration of six bits and a drink of liquor he verbally contracted to waybill me from Milton to the division end at Stockton. We went up street to take the drink and-well. you know how one word brings on another. By train time the \$4 I had sunk in my jeans had been fished to the surface and sent across the bar for red liquor. The brakeman was full when he started for the yards. So was I when I started after him. The brakeman confided to me on the way through the yards that he owned the whole train and I could ride anywhere and any way I wanted to. I told him that I was surrounding about a quart of Milton whisky, and if it was all the same to him and he had a nice, dry empty box car I would be shipped as an unbroken original package. He agreed and we went over where the train was standing made up to find that empty. The brakeman ran a door open, gave me a hurried boost in and fan the door shut and locked it. After a bit I the work that men from the Emerald isle

you suppose that cuss had done?"

"Give it up," said Slug Seven. "Billed me as live stock, by gum! Fact. There I was, locked in a box car with two that the Japanese will work cheaper than mules, loose, and all of us good to keep com- white men that they are being hired in pany to the division end. What was that such numbers, but because they are more Sherman said about war? Said it was hel, reliable. It is a well known fact among didn't he? Well, it ain't. It's only an imitation. The real, orthodox, rose-colored h-1 will do more work in a day than a Japanese, is to spend a night in a locked boxcar with and that the increased pay a white man two mountain ranch mules. It isn't a long run from Milton in, and I concluded, after the train had bumped along about three miles and those scared mules had begun place, and will not hold a job long and are to charge around and kick a rat-a-tat, tattat on the sides of the car, that the only plan of campaign left to me was a flank movement and a sudden mounting of one has been bothered especially in this reof the animals. It wouldn't be a dream gard, and that is the reason i of pleasure on that mule's back, but it would the wholesale employment of Japanese. Said be safer than dodging four rapid-fire hind an official of the Great Northern the other heels unlimbered for action. I got on the day: "When we send Japs out for section

"Well. I was chuckling to myself over the

open the door, when the train stopped, evidently at a siding, as I knew we weren't Capitel hill to North Denver, in the sum- trical railroad. In the fall of 1883 Leo near a station. We bumped about a bit and mer of 1850. The municipal ordinances will Daft operated an electrical locomotive I took a double wrap on the mule's cars; cailed the Ampere, on the little railroad up | then we stood still while some other cars Five regular standard size street cars Mt. McGregor, New York. In 1884 E. M. were bumped about, and then I heard two with a controller on each plaiform were op- Bentley and W. H. Knight ran experiment- short toots of the whistle and a rumble that erated on this line in Denver for three ally in Cleveland, O., an electric railroad gradually grew fainter. The train had years. There was one motor to each car, with motors under the floors of the cars. pulled out and we were side-tracked! We stayed there till morning, too, and I rode that son of a Jackass, with a backbone like the ridge of a church roof, up and down and around that car every weary minute of all that weary night. To quit riding meant to go to sleep, fall off and have the liver and lights and half-tones trampled and kicked out of me by two scared muntain mules. estimate that I rode that mule 136 miles and three furlongs in that car and the car traveled seventeen miles before being sidetracked. The remaining three miles of the twenty between Milton and Stockton I made on toot, thus completing a journey of 156 miles three furlongs in a straight line between two points that were twenty miles apart, a mathematical impossible feat accomplished by one jackass with the aid of two relatives on the male side of the house.' The Footprint sighed as he paused to bite off a chew of tobacco, relates the Chicago Inter Ocean, and Slug Seven took advantage of the opening to remark that a man who

LIGHTNING STRUCK HIS FOOT.

Remarkable Escape from Instant

had traveled so far under such circumstances

Death in East St. Louis. Jesse G. Vincent, a nephew of J. Frank Vincent of Smith, Vincent & Co., and an employe of that concern, was struck by lightning Monday afternoon while in the office of the firm's warehouse in East St. office of the firm's warehouse in East St. Louis. The bolt tore a hole six feet square through the roof of the bullding, knocked a stove into a thousand fragments, and after tearing up a section of heavy flooring, dislodged a dozen big stones in the foundation.

But Vincent was not injured. Vincent was sent over to East St. Louis to check a shipment of hay, relates the St. Louis Republic. He had been at the warehouse about ten minutes when the storm which struck St. Louis about 1 o'clock broke. It was more severe on the east side than it was here.

Vincent had just left the telephone and was walking across the floor when there was a blinding flash, the room was filled with a white light and there was a terrible crash. The peals of thunder were mingled with the breaking of timbers and a rattle like the discharge of a volley of musketry.

Vincent was stunned, but was not knocked

down. Employes from other parts of the building came rushing into the office. They could see but dimly through the dust and smoke. A great tiole through the roof showed the sky above, and the floor was torn up, as if by a dynamite explosion.

Those who knew Vincent was in the office expected to find him dead. But he was standing against the wall trying to collect his eenses. A torn trouser leg and the remains of his right shoe were the only apparent signs of injury.

He walked over to the sink, douched water in his face, and finally realized what had happened. He rolled up the torn trouser leg, removed what was left of the shoe and ooked to see if his foot was still there. It was. It was as black as if bathed in lampblack and had no feeling, but otherwise it was all right. An hour later it was as good as ever before, save for a numbness.

"I didn't know what had happened," said Vincent, shortly after the accident. blaze of light, as if an arc lamp had been turned on in front of my face, and then it was some minutes before I knew where I Hire a lot of Japs and you have your gang was. I felt as if I had been standing on a 'copper' hits him on the feet with his

"Of course I was frightened. But I didn't less in the end than the Japs." yell. I didn't have time. The whole thing happened so quick I didn't have a chance to say a word."

at \$100. The telephone was torn from its gods. place on the wall, and the only whole part of the stove were the two lids, which were sent whirling through a window. The bolt cannot long be deferred. The achievements of lightning struck the metal top of the of the past fourteen years read like a fairy chimney, tore its way through the roof, ran tale. But it would not be strange if men down the stove, jumped to Vincent's feet and then went through the floor.

JAPANESE ARE IN FAVOR.

Section Hands in the Northwest.

train Friday and the next morning relieved one was more forward in insisting that the the section hands of the Grantsdale section, law should be observed, and he was the white foreman alone being retained. All frequently called upon to help in the execualong the line of the western railways the track repairing work is now done by Italians, Japanese and Chinese, usually under white by the hundreds by contractors who make a big rake-off. The Japs on the local branch and again been warned, but to no purpose port themselves. The Japa differ from Chinese laborers in that they 'blow in' every cent they make, having a strong penchant

for lots of grub and 'booze.' " Discussing the matter at greater length, the Spokane Review of recent date says: "The coming of the little brown men from Japan is proving a source of worriment to many. In the last year or two they have been swarming into the Pacific northwest in great numbers, and the rate of their coming

is constantly increasing. "The railroads have tried the Japanese workmen and found them most satisfactory. Last year their use as section laborers was an experiment, this year it has passed that stage. Unless all signs fail it will not be many months before all the railroads in the Pacific northwest will be using Japanese exclusively as section laborers, retaining white men only as bosses.

"On the Northern Pacific it is estimated that already 800 Japanese are employed on track work in the Pacific northwest, comparatively few white men being left. The Oregon Railway and Navigation company has a large number of Japanese section men. The Great Northern has 200 in its employ in the same line of work, and is now rapidly replacing white men with Japanese By some time in June it is thought the Great Northern will have 500 subjects of the milkado doing struck a match to look about, and what do from the Scandinavian kingdoms and from Italy have been doing heretofore.

> "A little inquiry among the railroads brings out the fact that it is not entirely the employers of fabor that a white man demands over a Japanese laborer fully earned, but the railroads may the men are constantly shifting from place to forever wanting their "time" and the accompanying time check.

"It is stated that the Great Northern mule all right, and after a little bucking he work we know they will stay all summer. steadied down tolerably well. The animal If we are employing say forty white was evidently scared to death and seemed in a gang at some point, at the end of the to take comfort in being straddled by a month there will be 150 names on the pay roll. Men will go out, work a day or two and then quit. This makes a vast amount of state of affairs in the live stock department extra cierical labor, besides being an annoy**Three Great Features**

IN THE NEXT ISSUE OF

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complete for the summer. They go out and plank, and someone had hit it a tremendous stay there until they are fired. There is no blow. I can imagine how a man feels when bother with extra pay rolls and no extra passing. White men can do more work but are more bother and really accomplish

Waiter! A dozen on half shell, some ay a word."

The damage to the building is estimated pagne Extra Dry. I wish to dine with the

> HOW TELLER PRAYED. Florid Appeal for Salvation at a

Lynching Bee. The senior senator from Colorado, with the exception of the period he served as secretary of the interior in President Arthur's cabinet, has represented his state in the senate since its admission to the union Finding Employment as Railroad in the Centennial year. He is one of the most dignified members of that body, says the Mention was made in a recent issue of the Philadelphia Post, a man with whom it is Butte Miner that the Great Northern was difficult to connect a romantic episode, and using the Japanese to a large extent as section men and laborers along its line. Upon in Gilpin county, Colorado, at the time of this subject the Hamilton (Mont.) News the silver excitement there, he was a says: "Five Japs dropped off the evening participator in many thrilling incidents. No

tion of justice. It is told of him that on one occasion he took part in the lynching of a Mexican who bosses. The little brown men are furnished was caught robbing the sluice boxes. It was not the first offense, and the man had again receive \$1.20 per day, out of which they sup- The trial was conducted with all order and propriety by the miners about there, and it was decided that the culprit must hang. Senator Teller took a prominent part in the debate, and while he regretted the necessity, he still advocated the hanging as important

> in maintaining law and order. The preparations were made, the rope fixed around the prisoner's neck, and everything was ready for his execution; at this moment Senator Teller, who is a deeply religious man, asked for a stay in the proceedings, and suggested that a chance be given the Mexican to pray, a privilege the poor wretch declined, but Teller, determined that he should not swing into eternity without a prayer being offered up in his behalf, bowed his own head and earnestly besought the Almighty that the offending brother should not be punished in the next world for the crime for which they were sending him out of this one. After the hanging, Tom Bowen who subsequently served in the upper house

with Teller, came up and said: "Old man, that was a great prayer yo put up. That Mexican ought to have felt flattered, and would if he had understood I couldn't help but think, however, that there was a certain amount of sarcasm in it. It struck me that you displayed a fashion of insolent effrontery in urging the admission to heaven of a Mexican whom you had already condemned as not good enough for Gilpin county, Colorado. was a great petition, and ought to go a long way toward getting the Mexican through the Great White Gate.'

with a torpid liver, which produces constition. I found CASCARETS to be all you cle

tion. I found CASCARET'S to be all you calm for them, and secured such relief the first trial, that I purchased another supply and was com-pletely cured. I shall only be too glad to rec-ommend Cascarets whenever the opportunity is presented."

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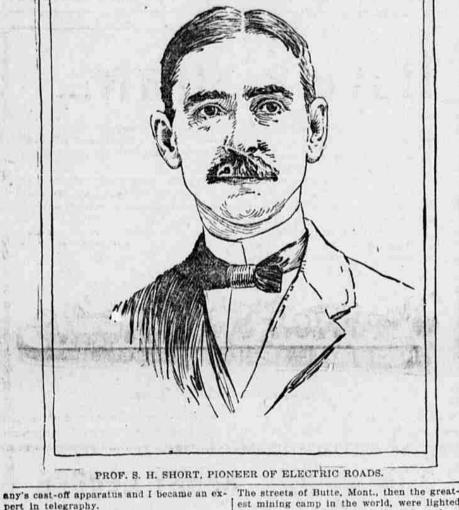
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pert in telegraphy.

Model Road in a Basement. In the basement of the college building, Denver, I constructed from my own designs an electric railroad. The motors were unlike any other ever built and the two cars which I built, wood, metal and all, were for some time operated on this track, a

in by may people. This was in 1884. erstanding of what an electrical motor is becomes necessary when one would comprehend just what takes place in a car moved by electricity and how and why the Sprague.

single line, with turn-outs, and were ridden

Everybody knows that two magnets placed exerts a distinct force, which can be meas- land, Los Angeles, Buffalo, Cincinnati, Pittsured. Now a motor is two magnets. One of burg, New Orleans, Boston, Kansas City, these magnets is fixed and is called the Rochester, Muskegon, Johnstown, Norfolk called the armature. When a pole of the was scarcely a town of commercial size in armature or revolving magnet approaches a the country that hadn't its electric railways. pole of the field or fixed magnet the latter Yet fourteen years have hardly elapsed since pulle the former toward itself. When the the first one was built. It is as a result two get into line, the electric current is of my own experience that I am confidently changed by the cummutator into another looking to see the operation of trunk line pole of the armature and the same process railroads of standard gauge by electricity. is repeated. The more poles the greater the

by arc lights in 1881, actually before there was a steam railroad within many miles of the camp. People who arrived in old fashioned Focky mountain stage coaches were surprised on alighting to find the streets brilliantly illuminated by electricity.

Returning to Columbus in 1886, I built two miles and a half of overhead trolley in that city from the North High street railway to the fair grounds. Shortly after that the overhead trolley was put in operation in Richmond, Va., built by Frank J.

Since that time I have devoted myself especially to electrical railroading and have near each other attract each other. Each constructed trolley lines in St. Louis, Cleve-The other magnet revolves and is and San Francisco. In the year 1898 there

Future Possibilities. pull. Now when the armature is fastened Yet it must by no means be supposed to the axle of a car naturally the axle has | to move when the armature moves in obedi- that the application of electricity to street ence to this pull and when the axle moves rallway traction was made entirely successthe wheels must revolve and when they re- ful in the brief period outlined here. Nor



The First Road.

The vast possibilities of electric railway traction gradually grew on me. In the So great is the gulf between fifty and 150 meantime I went to live in Denver, where I miles an hour. This would be the crownaccepted the professorship of physics and ing achievement, or rather the supreme rechemistry in the University of Denver, sult of the labors of those pioneers who, trolley car, with five-horse power motors ago as 1838 what might some day he reaand ren it on an elliptical track. So im- lized. Just half a century has elapsed since pressed were the capitalists then interested Davidson moved by electricity a ten-foot of the Espee railway, and figuring that an-is my experiments that the Denver Framway car equipped with forty cells of primary other hour would see us in the division passing a large number of men to the work.

we the car moves shead. And it is al- | am I disposed to maintain that electri ways to be borne in mind that these mag- street railway traction has even now reached nets are only magnets while the electric a state of perfection. And yet within the current is passing through them, so that, as lifetime of the generation now living equal soon as the connection is broken they cease progress should be made in the application to exert their force. In other words, they of electricity to the hauling of trunk line

trains on long distance railroads. The problem is a fascinating one, involving almost a revolution in our social life.

There I built the Joseph Henry, a double like Robert Davidson, foreshadowed as long rider.