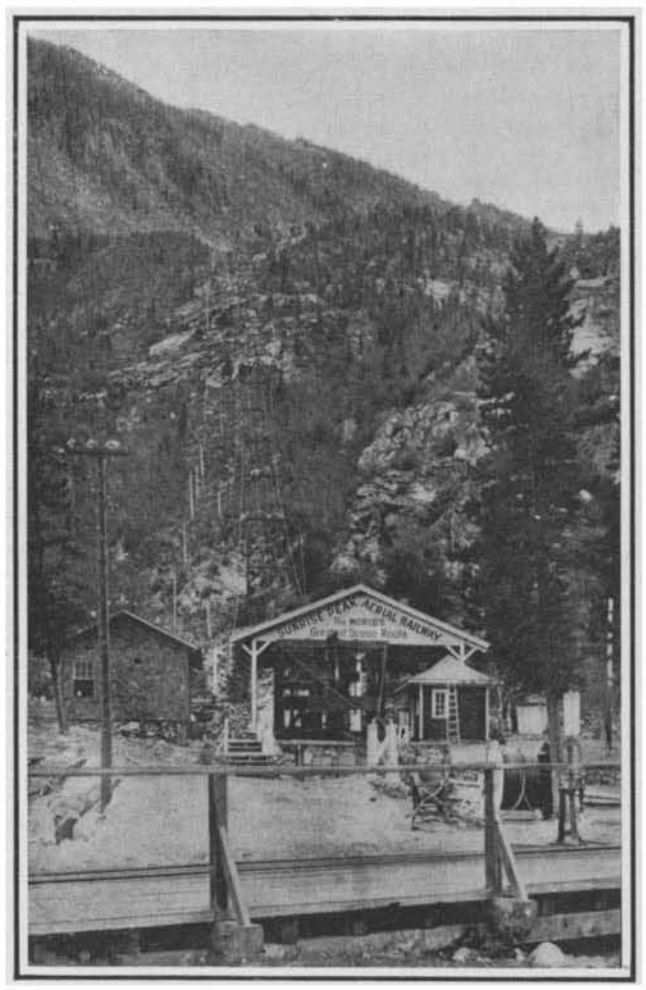
AN AERIAL PASSENGER RAILWAY.

BY ROLAND ASHFORD PHILLIPS.

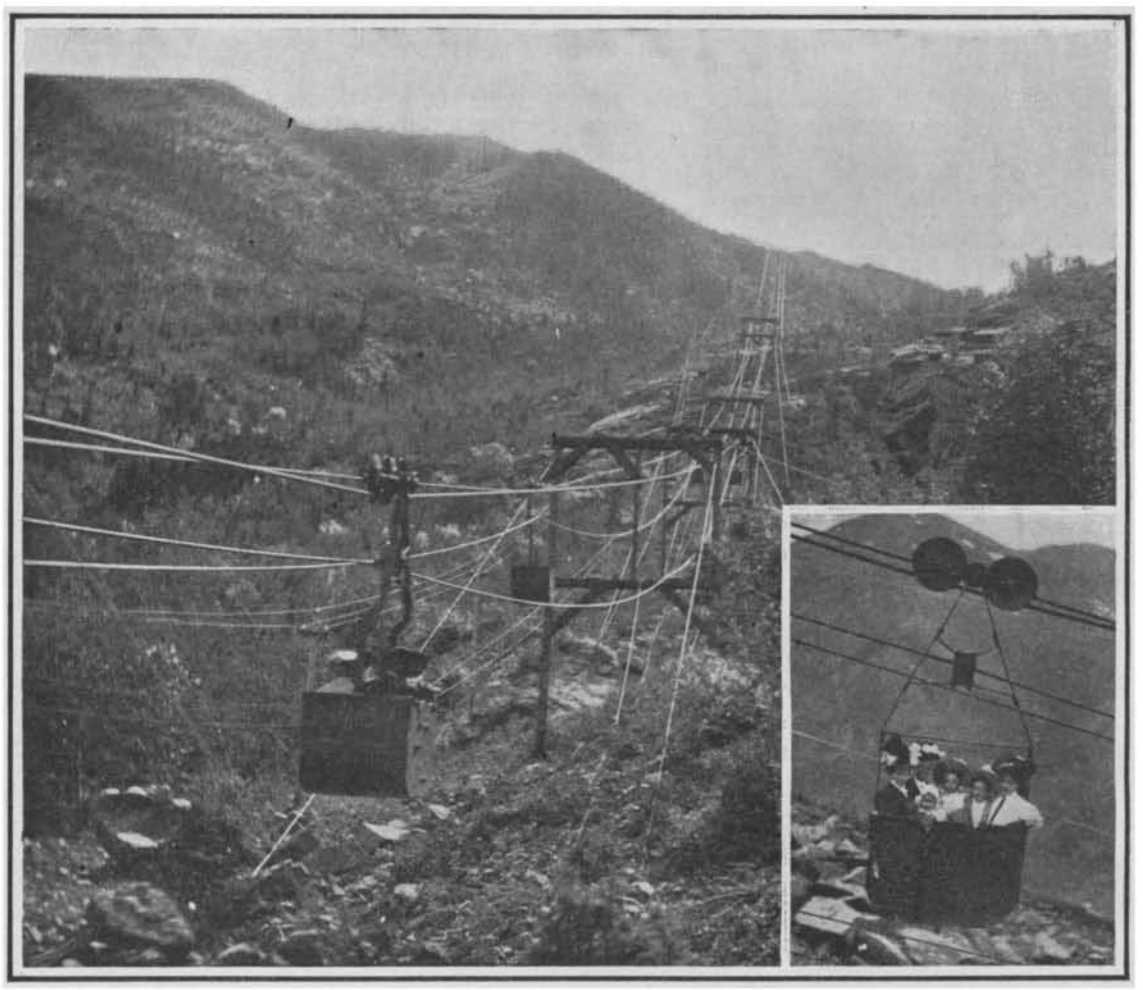
It is as easy now to ride in a bucket from the base to the very summit of the loftiest mountain chain in the Rockies, as to trolley across Brooklyn Bridge.

To take this wonderful ride on the Sunrise Peak road, you leave Silver Plume and walk a few blocks to the aerial station. Under this cover you wait for your bucket. As it swoops down and stops, you step into it. The man shuts the door and locks it secure. A bell clangs, and you are off. The bucket swings away, and you hold tightly to the iron rim. The little depot with its crowd slips away below. You look around. There are no confining walls—nothing but clear Colorado air. Your sensations are comparable with those of a balloonist.

You begin to gather a bit more courage. You look around. There to your right are towering cliffs, a dozen times as lofty and as massive as the tallest sky-scraper. In another direction are deep cañons, rocky gorges, and steep, verdant slopes. Still you go up. Sometimes you clip the swaying tips of a monster primeval pine tree, and again you are swaying over an all but bottomless cañon. Then a broad green valley slips along below you, colored with myriads of wild flowers. Now, marked like some gigantic belt, comes the timber line. The flowers give way to stunted brush and barren stretches of dull rock. And both of these in turn are soon hid from view by a mantle of snow. A wonderful, bewildering half hour is gone. The bucket stops, and you step out upon the cold, snow-clad summit of the peak. At intervals fleecy clouds drift across your vision, blotting out the valley below.



The station, showing the cables leaving the drum.



The bucket has just left the power house. An empty bucket is seen coming back.

You have gone to the sky in a bucket; you are standing above the clouds, two and one-half miles higher than New York city.

When the clouds clear away, you note the filmy line of cables stretching down, from tower to tower, not unlike the silken web of some gigantic spider, swaying in the sunlight, finally to dip over a ragged shoulder of a ridge and disappear.

The idea of these traveling buckets is by no means new, particularly to readers of this journal, since the identical principle is in use throughout the mining world as a means of transporting ore from the mines to the mills. In some instances these are worked by gravity, and in others by motive power.

It remained, however, for a western engineer to utilize this system of carriers, not for business but for pleasure. For a good many years Sunrise Peak was a noted attraction for the tourist, but all methods of reaching its lofty summit were crude indeed. Confident of his success, the engineer interested a few wealthy men. The aerial railroad is the result. In Italy this method of transportation is largely in favor, especially across bodies of water, but the Sunrise Peak line is the only one in America.

There are two main cables, the stationary and the

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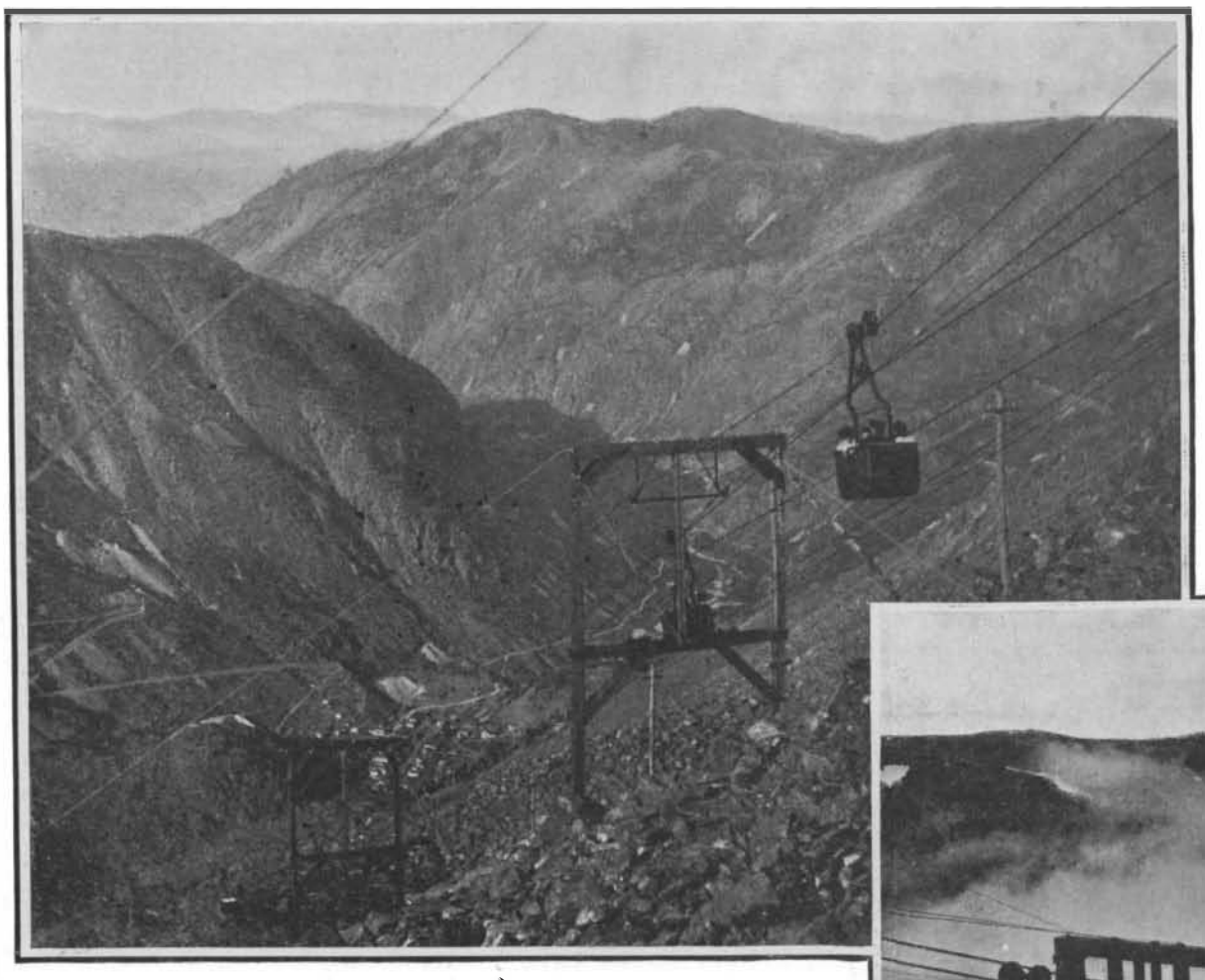
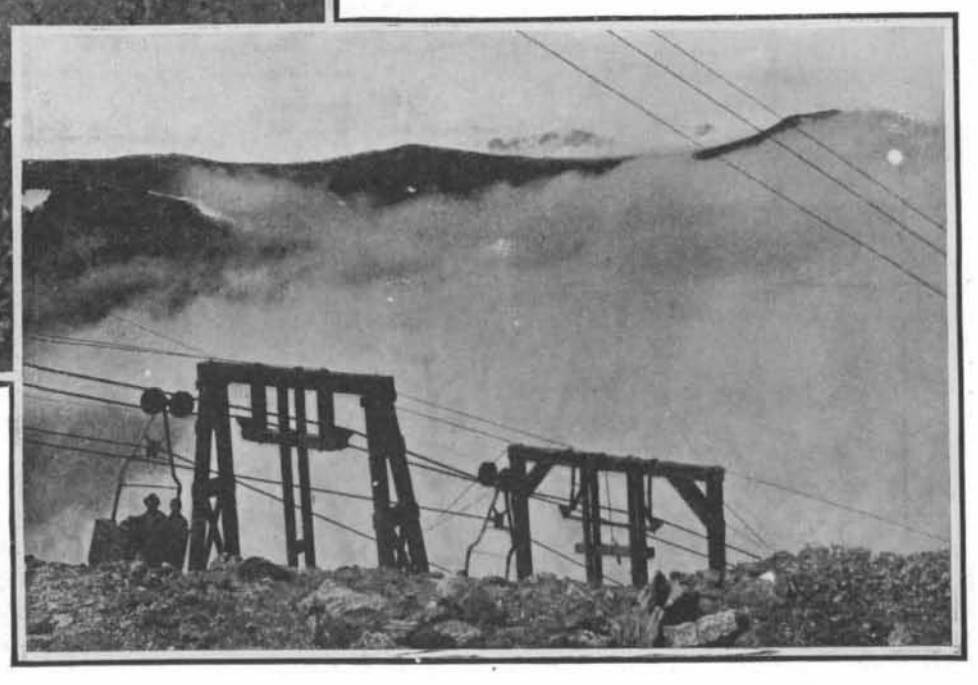


This picture was taken about half way to the summit. Silver Plume looms in the distance. The wagon road is seen winding up into the hills; also the creek, down the cañon of which the railway runs which connects with Denver.



At the summit, Sunrise Peak, high above the clouds. Elevation, 12,500 feet.

AN AERIAL PASSENGER RAILWAY.

Classified Advertisements

Advertising in this column is 75 cents a line. No less than four nor more than 10 lines accepted. Count seven words to the line. All orders must be accompanied by a remittance. Further information sent on request.

READ THIS COLUMN CAREFULLY.—You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. There is no charge for this service. **In every case it is necessary to give the number of the inquiry.** Where manufacturers do not respond promptly the inquiry may be repeated.

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Inquiry No. 8918.—For manufacturers of "Wydt's Electro-Catalytic Sparking Plug."

ITALY.—Important technical office, having widest connection in Italy, is prepared to treat with a first-class Machine-manufacturing firm. For full information and particulars, write to Ing. Michele S. Foa, Turin (Italy), Corso Oporto 31bis.

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CIVIL SERVICE EMPLOYEES are paid well for easy work; examinations of all kinds soon; expert advice, sample questions and Booklet 40 describing positions and telling easiest and quickest way to secure them free. Washington Civil Service School, Washington, D. C.

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FOR SALE.

FOR SALE.—Engine lathe, swings 9¼ in., takes 25 in. between centers. Complete with full set change gears to cut all size threads, 3 to 40 in. Price only $43.50. Address L. F. Grammes & Sons, Allentown, Pa.

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WANTED.

WANTED TO BUY Water Cooled Stationary Gasoline Engines, from 1 to 10 h. p. from manufacturers of same willing to furnish under our own name, in carload lots, or large quantities, for cash. Manufacturers state full particulars to Water Works, Box 773, New York.

Inquiry No. 9023.—Wanted, to buy silk machines from re-reeling, twisting, doubling, to the final process of making it into clothes.

LISTS OF MANUFACTURERS.

COMPLETE LISTS of manufacturers in all lines supplied at short notice at moderate rates. Small and special lists compiled to order at various prices. Estimates should be obtained in advance. Address Munn & Co., Inc., List Department, Box 773, New York.

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Inquiry No. 9029.—Wanted, catalogues and all information on machinery for braiding straw in manufacturing straw hats.

Inquiry No. 9034.—For manufacturers of machinery that could reduce stumps to kindling wood.

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Inquiry No. 9038.—Wanted, the address of the Chipman Electric Purifying Co.

Inquiry No. 9042.—Wanted the address of Farney Safety Razor Co.

Inquiry No. 9044.—Wanted to buy outfits necessary for agate polishing.

Inquiry No. 9046.—Wanted, machinery used for the manufacture of all kinds of fruit boxes, baskets and crates.

Inquiry No. 9048.—Wanted, address of manufacturers of metal table slides for extension tables.

Inquiry No. 9049.—Wanted, to buy rotary brushes suitable for a shoe shining machine.

Inquiry No. 9052.—Wanted, to buy machinery, etc., for a beer plant, that manufactures beer by means of glucose.

Inquiry No. 9053.—Wanted, address of firms who install plants to manufacture nitrogen.

Inquiry No. 9054.—Wanted, address of manufacturers of articles made from mica.

Inquiry No. 9055.—Wanted, address of parties interested in Log Cleaning Machines.

Inquiry No. 9056.—For manufacturers of window shades.

Inquiry No. 9057.—For manufacturers of glass and china balls, used as fixtures or ornaments on lightning rod equipment, also weather vanes for same purpose.

Inquiry No. 9058.—Wanted, firms who make machinery used for pulverizing soap-stone.

Inquiry No. 9059.—For manufacturers of flexible steel chain mail.

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work but eight hours. But he would be obliged to resign from the union in the winter time; for observing starts at five in the evening and continues till seven the next morning, fourteen hours without a break. And how pleasant this is with the thermometer twenty-six degrees below zero! It needs quite a deal of enthusiasm to keep one from freezing to death!

To photograph the spectrum of a star, a spectroscope or rather spectrograph is attached to the eye end of the telescope. The object glass focuses the star's light on a fine slip not more than one hundredth of an inch in width and one-eighth of an inch in length. After the light passes through this slit it passes through the collimating telescope, then through the prism or prisms which break the star's light up into its component colors or spectrum, then through the camera lens and is finally brought to a focus on the photographic plate where is obtained a photograph of the star's spectrum. Much careful thought and many refinements were necessary before the spectroscope was brought to its present great degree of precision. To mention a few of them. How is it possible to keep the great telescope tube so accurately directed to the star that its light is focused on the center of the slit one-hundredth of an inch wide, for if the light does not pass through the slit it will not fall on the photographic plate. This was made possible by making the slit jaws of polished silver, and watching the stray light reflected from the silver jaws by combining prisms and lenses in a rather curious fashion. The observer keeps his eye at an eyepiece where he can see the star image on the slit, and causes the star image to remain centered there by using the slow motions of the telescope. The exposure necessary to make a photograph depends on the brightness of the star and may last from a few minutes to two, three, or five hours, or in some few cases to eight or ten hours. During this long exposure the temperature has probably fallen a number of degrees, and the instrument has been affected by all its parts contracting. This might result in a change in the prisms with the consequence that the photographed spectrum will not be sharp and in as good definition as it might be. To overcome these difficulties, the whole spectrograph was inclosed in a tight aluminium case lined with glass work so as to be non-conducting. Fine wires were placed inside this case. While the exposure was being made a thermometer inside the case was watched through a glass window, and if the temperature dropped, a current of electricity was turned through the wires inside the case, and kept turned on till the proper temperature was reached. Within the past year a thermostat has been introduced and the temperature is automatically kept constant. And hence while the exposure is being made the spectrograph is kept at a constant temperature, there is no change in its several parts and a sharply-defined spectrum will result. A wonderfully accurate instrument this makes leading to results of the highest degree of precision.

AN AERIAL PASSENGER RAILWAY.

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haulage. From the haulage cable, which is one and one-half inches in diameter, the buckets are suspended, their entire weight being sustained by two steel four-inch flanged wheels running over the stationary cable.

These buckets are constructed of heavy wrought iron, six feet long and four wide, with a door opening on the right side, which door is securely bolted when the bucket is *en route*. There are twenty-six buckets on the line, carried by the haul-

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Potato sorter, W. Pertzsch	943,097
Power transmission mechanism, E. E. Keller	942,913
Printing machine, L. W. Southgate	942,980
Printing press, G. E. Pancoast	942,923
Printing press, W. F. S. Ferry	943,629
Printing press brake, C. A. Wright	943,507
Printing press ink fountain, A. M. Cottrell	943,218
Propeller, marine, D. Urch	942,986
Propeller, vibrating, E. Hildebrandt	943,074
Pulp digesters, charging, E. F. Parker	942,924
Pulp feed regulator, A. Schultz	943,165
Pulp, machine for saving waste, E. F. Parker	942,925
Pulverizer, land, L. Traub	943,490
Pump attachment, oil, Aggas & Rabbitt	942,954
Pump, double acting, R. G. Holekamp	943,018
Pump, governed, N. McCarty	943,095
Pump rod coupling, C. L. Kenyon	943,080
Pump, vacuum, T. W. Lowden	943 556
Pumps, automatic device for controlling the operation of, W. F. Otto	943,369
Pumps, operating mechanism for double-acting, C. F. Preslar	943,201
Puzzle, J. F. Collins	943,390
Puzzle, A. Weigt	943,496
Rack. See Display rack.	
Rail bonds, manufacture of, G. A. Mead	943,438
Rail chair, A. Wardle	943,206
Rail clamp, guard, M. Burpee	943,138
Rail frog, continuous, Suverkrup & Owens	942,947
Rail joint, Deer & Smith	943,394
Rails, step joint for, J. H. Allen	943,057
Railway construction, E. D. McDonald	943,198
Railway crossing gate, H. J. Richendrfer	943,566
Railway crossing gate, electrically operated, T. Hummel	943,352
Railway fastener, C. H. Cornell	943,520, 943,521
Railway fastening, C. H. Cornell	943,522
Railway lining block, A. Barnhard	943,295
Railway rail splice, I. N. Prenovich	943,619
Railway rails, nut holder and joint supporter for, G. W. Henry, Sr.	943,543
Railway switch, F. Bayless	942,996
Railway switch, P. E. Vail	943,053
Railway switch, Reinoehl & Weaver	943,269
Railway switch mechanism, F. P. Perkins	942,927
Railway system, electric, G. H. Maire	943,196
Railway tie, C. A. Reed	943,268
Railway tie, H. L. Hollis	943,409, 943,410
Railway tie, metal, L. J. Sparks	943,048
Railway tie plate, T. A. J. Hendricks	943,073
Railways, junction signal for mining, W. Kleman	943,114
Range finders, means for supporting and working heads of, Barr & Stroud	943,296
Razor blade stropping device, O. Kampfe	943,355
Razor stropping device, C. F. Benedict	942,880
Refrigerating apparatus, ammonia, T. C. McKee	943,040
Registers, wall frame for air, R. O. Brown	943,298
Rein holder, A. Bing	943,376
Rein holder, H. Green	943,537
Resizer, F. W. Moore	942,921
Ribbon feeding mechanism, Craig & Coffman	943,624
Rifle rear sight, W. R. Hatfield	943,542
Road-bed cutting apparatus, L. D. Craig, reissue	13,055
Rock crusher, E. S. Philips	943,455
Rolling mill, H. Grey	943,633
Rope coupling, Shufflebottom & Kenworthy	943,168
Rotary gasoline engine, T. E. Braley	943,592
Ruling device, E. A. Auerbach	942,877
Sad iron, J. Kadiera	943,254
Sad iron, F. W. Emerson	943,302
Safe, protecting, Martin & Smith	943,437
Sardine tins and the like, key for removing lids from, Read & Miles	943,459
Sash and door check, combined, G. F. Ehemann	943,401
Sash balance, window, Greear & Cox	943,014
Sash fastener, J. A. Dillow	943,301
Saw blade, R. E. Martin	942,920
Sawmill stock lifter, E. J. Gibson	943,304
Scaffold, flying, Martens & Schulz	943,436
Scale, D. C. Stauffer	942,945
Seeding device, combined disk and shoe, N. L. Heckman	943,406
Self-adjusting wrench, R. H. Anderson	942,992
Sewing machine, C. F. & M. T. Goforth	942,899
Sewing machine structure, V. Bloom	943,623
Shade machine knife, window, E. O. Engberg	943,221
Shade supporting device, E. H. Lunken	942,967
Shaft or pulley coupling, T. White	943,209
Shaft reversing means, H. F. Seybert	943,477
Shaft support, Stansbury & Hutchison	943,576
Sharpener, knife, B. F. Emery	942,959
Sheet metal culvert, corrugated, H. W. Harry	943,306
Sheet metal, galvanizing, A. Niedringhaus	943,264
Sheet metal wiring machine, W. R. Magie	943,118
Shock absorber, J. H. Friedenwald	942,896
Shock deadener, Mayesky & Boileau	943,119
Shock loader, J. B. Schuman	943,473
Shoe tree, A. H. Taft, reissue	13,057
Shoe trimming machine, A. Vose	942,987
Sifter, ash, S. J. Phreaner	943,457
Sign, electrically illuminated, J. H. Goehst	943,246
Signal light apparatus, G. Dalen	943,300
Signal system, automatic, P. O. Adams	943,587
Signaling apparatus, selective, O. M. Leich	943,115
Siphon for dispensing liquids, A. Kleinfeldt	943,421
Sled, resilient, F. G. McPherson	943,448
Sled runner, D. L. Blocher	943,513
Slime separator, centrifugal, O. M. Kuebs	943,083
Snow sweeper, W. J. Cooke	942,888
Sockets, detachable chain guide for pull, H. Hubbell	943,077
Sound box, W. A. Chapman	943,339
Sound reproducing machine records, manufacture of, R. L. Gibson	943,631
Sounds, apparatus for receiving submarine, Garrett & Lucas	942,897
Spectacles, eyeglasses, and the like, S. S. Lawrence	943,085
Speed mechanism, E. E. Keller, 942,910 to 942,912,	942,914
Spittoon, J. Escuder	943,527
Sprag remover and retainer, J. T. Harcarik	943,538
Spray burner, A. Rohrbach et al	943,567
Spring. See Window spring.	
Spring wheel, J. A. Dieterich	943,397
Square, T. C. Howland	943,351
Stair tread, R. T. Kanski	943,418
Stall, cow, C. S. Torrey	943,489
Stamping devices, cushioned support for, J. Dubisee	943,342
Staple forming and discharging mechanism, V. Hoxie, 942,904 to	942,906
Staple machine, J. Buckley	943,235
Steam boiler, J. C. Parker	943,452
Steam generator, B. F. Silliman	943,277
Steam generator for submarine boats, R. D. Montjustin	943,153
Steam generator, superheater, and feed water heater, F. A. Haughton	943,189
Steel, making, L. M. Atha	943,171
Steel, refining, E. Humbert	943,192
Stool and foot rest, combined, M. L. Porter	942,975
Stool, shoe fitting, H. H. Kramer	942,965
Stop mechanism, automatic, V. Hoxie	943,411
Storage battery, L. H. Flanders	943,345
Stove, pocket, B. Scamardi	943,569
Stovepipe anchor, J. Murchie	943,037
Street sweeper, J. R. Pollock	943,122
Stropping machine, J. Lorenzen	943,311
Stuffing box bland, F. Keeler	943,356
Suction apparatus, M. Lebenberg	943,426
Suit case, B. F. Becker	943,333
Superheat gage, Lothrop & Bradshaw	943,260
Superheater, F. D. Potter	943,606
Support or bracket, J. H. Cook	943,237
Surface gage for parallel lining, C. O. Dost	943,010
Surgical forceps, E. Moraweck	943,263
Sweeping machine, Nathan & Heuser	942,970
Switch handle, C. Schuster	943,124
Swivel, detachable, Carson & Gilkerson	943,299
Tapping and drilling tool, J. H. Dorman	943,009
Tar and debris trap, G. R. Evans	943,628
Tarsia work, manufacturing, F. Kohn	943,309

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age cable, spaced at equal distances of 485 feet apart. These buckets are held to the runners by a one-half by two-inch steel frame, allowing it to swing freely on an axle between the flanged wheels. The seating capacity of each bucket is four.

In the entire distance there are fifty towers, built of eight by eight timbers, most of which were cut within a mile of the road. Over these towers run the cables. The stationary cable is the higher one, the haulage cable being two feet below and carried midway in the frame that supports the buckets. This haulage cable is endless, winding about a huge drum at either terminal. The towers are not placed an equal distance apart, but according to the slope and the contour of the ground. On the longer stretches they are frequently two hundred feet between, while at the base and summit they are within a few feet of one another. Perhaps the best example of the entire simple working plan may be found in the large stores of a city, where package carriers are in use. The little wire baskets that carry your purchases from the clerk to the wrapper are in miniature duplicates of these huge, man-carrying buckets, save where the former are operated by springs, the latter are moved by electric power.

The entire distance covered, from base to summit, is one and one-half miles, and in traveling this you are raised from nine thousand feet at Silver Plume to something greater than twelve thousand five hundred feet at the summit. This is, approximately, one foot lift for every two feet covered. In order to attain the same elevation, any road in the world—Pike's Peak cog road a possible exception—would have to traverse several times the distance. The time is thirty minutes each way.

The motive power is electric, the current being transmitted from Georgetown, four miles distant. Two motors are used, both of thirty-five horse-power each, and both located at the upper terminal. One motor is sufficient to operate the endless cables on an average haul, but on other occasions, where the buckets are filled, both are thrown in.

The entire road is equipped with electric signals and telephones. In its length are five stations, built about the towers, each with its watchman. The slightest accident is promptly telephoned to the engineer, and the buckets stopped.

The plans were first drawn up late in 1905, and the construction commenced the year following. It was not until the summer of 1908, however, that the road was in full running order. The total cost was slightly in excess of $70,000.

A MACHINE FOR SIMULTANEOUSLY FIRING MANY BLASTS.

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by the shaft. When the switch is thrown to the lower contact, the fuse circuit receives the whole current from the electric generator.

All of the fuses are melted instantly by the heavy rush of current accentuated by the inductive kick of the coil, thus producing a simultaneous firing of all the charges of explosives used. In deepening the river at Sault Ste. Marie for the United States government, the contracting firm used three similar machines, but larger and more powerful, operated by compressed-air engines. These machines were perfectly automatic and unfailing in operation. In all cases the fuses were arranged in parallel circuit between the two mains of the dynamos, the pressure being 12 volts. It is stated that these devices operated so simply that it required only the opening of an air valve to fire three hundred charges of dynamite at one time.

Oleat Maury.—A preparation for greasing wool, according to a French patent, is made by the saponification of mixtures of mineral oils and vegetable oils by alkaline carbonates.

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Teeth, mounting for artificial, E. J. Greenfield 943,113
Telemeter, O. Eppenstein 943,109
Teleobjective, E. Wandersleb 943,105
Telephone call registering system, W. J. Kibbe 943,081
Telephone currents, method of and apparatus for repeating, P. A. Campbell... 942,885
Telephone dial, illuminated, R. B. Hallock 943,305
Telephone receiver support, W. J. Mogridge 943,033
Telephone transmitter mouthpiece, J. A. Jamieson 943,169
Telephone transmitter, sanitary, M. Y. Calcutt 943,386
Tempering furnace, electric, V. & V. E. Royle 943,272
Test indicator, R. L. Smith 943,282
Textile machinery, cloth clamp for, T. W. France 943,067
Theodolite, etc., L. H. Cooke..... 943,063
Thiosalicylic compound and making same, E. Munch 943,560, 943,561
Timing and ignition device, W. H. Saunders 942,936
Tin scraps and producing tin compounds, detinning, O. K. Zwingenberger 943,508
Tire, P. W. Litchfield 943,358
Tire armor, S. S. Childs 943,002
Tire, automobile, I. B. Kempshall 943,025
Tire, automobile, W. G. Dicker 943,396
Tire, automobile, C. E. W. Woodward..... 943,505
Tire, elastic, A. Bonnaz 942,881
Tire, pneumatic, A. F. Angelicola 943,371
Tire, pneumatic, A. Latimer 943,640
Tire protector, C. E. King 943,026
Tire protector, J. Richardson 943,463
Tire supporter, Coate & Saris..... 943,341
Tire, vehicle, T. H. Banks..... 943,173
Tire, vehicle, T. W. Lucke..... 943,430
Tire, wheel, H. L. McDuffee 943,446
Tires, apparatus for manufacturing wheel, J. K. Williams 943,054
Tires, woven wrapper for, J. Marcet y Marti 943,557
Toaster, H. P. Knoblock 943,555
Tool, electrically heated, G. E. Stevens.... 943,483
Tool holder, A. F. Liden 943,087
Tool holder, C. B. Wells 943,499
Tooth, artificial, J. W. Ivory 943,354
Toy, P. Phillips et al..... 943,456
Toy, B. B. Exline et al..... 943,528
Toy, J. G. Sinclair 943,575
Toy, basket ball, E. S. Staples..... 942,944
Toy, mechanical, E. J. Pearce..... 943,096
Toy, sounding, M. P. Exline et al..... 943,529
Track sander, H. Vissering 943,288
Track sander, D. Tauriello 943,487
Transformer furnace, E. A. A. Gronwall et al. 942,961
Transmission mechanism, E. Bonneau..... 942,882
Trestle, folding, E. F. Whitehead..... 943,328
Triangles, apparatus for solving spherical, French & Frederick 943,532
Truck, hand, G. D. Parker..... 943,265
Trunks, skirt supporting attachment for wardrobe, A. M. Moorman..... 943,154
Truss frames and the like, cushioning device for, J. S. E. Freel..... 943,244
Tube. See Collapsible tube.
Turbine blading, F. Hodgkinson 943,347
Turbine, elastic fluid, F. Hodgkinson..... 943,349
Turbine, elastic fluid, W. J. A. London.... 943,359
Turbine, elastic fluid, C. Roth..... 943,465
Turn table, G. A. True..... 943,491
Turpentine hack, N. B. Stone..... 943,050
Type casting and composing machine, W. G. White 943,612
Type, plates, etc., machine for sawing and trimming, G. H. Vining 943,129
Typewriter, justifying, W. G. White 943,502
Typewriter keyboard, S. W. Rowell..... 943,466
Typewriter touch key finder, G. A. Cage.. 943,108
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