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THE RAILROAD AND
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If we want to find how to spell a
word or how to obtain an authoritative
definition of it, we are in the habit of
looking in the dictionary, but if we
want to know the difference between
the British Parliament and the Ameri-
can Congress, or whether it is a green
light or a red light swung beside
a railroad track that means danger,
it would not probably occur to us
to consult a dictionary; in fact, we
would not know just where to find
out.

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into the world of letters that answers
just such questions as these—that
tells us briefly and concisely what we
want to know about the thousand
things that go to make up our every-
day life. This book is The Century
Dictionary, and in this little pamphlet have been
brought together some of the interesting items on
one topic, railroads, that are to be found within its
covers. It is a different kind of a dictionary from
any that has ever been issued before,—a good deal
more than a dictionary. Its subtitle is “an encyclo-
pedic lexicon,” and it has been made not only by
scholars, but by practical men in the trades and
professions. Railroad men have furnished the infor-
mation about railroads.

If you look at the word railroad in The Century
Dictionary you will find that “railroad” and “railway”
are synonymous, and that both words are of about
equal age. “The former is more commonly used in
the United States, the latter now universally in Eng-
land. In both countries steam-railroads are called
roads, seldom ways.” A number of interesting quota-

1. headlight; 2. front end; 3. signal-lamp; 4. spark-pipe; 5. smoke-stack; 6. pilot; 7. air-brake hose; 8. steam-chest; 9. cylinder; 10. oil-pipe; 11. cylinder-cocks; 12. engine-truck; 13. bell; 14. sand-box; 15. sand-pipe; 16. jacket; 17. valve-stem; 18. guide-cup; 19. cross-head; 20. guides; 21. link; 22. rocker-arm; 23. injector-check; 24. injector-pipe; 25. driverspring; 26. main rod; 27. forward crank-pin; 28. side rod; 29. back crank-pin; 30. back driving-axle; 31. driving-wheel brake; 32. steam-dome; 33. whistle and whistle-lever; 34. cab; 35. throttle-lever; 36. boiler-head; 37. gage-cocks; 38. donkey-pump; 39. reach-rod; 40. equalizer; 41. driving-wheel brake cylinder; 42. tank-valve; 43. tender hand-brake; 44. tank; 45. feed-pipe hose; 46. oil-box; 47. reverse-lever; 48. auxiliary reservoir; 49. main reservoir; 50. hand-hole. 51. cylinder (same as No. 9); 52. exhaust-passage; 53. steam-pipe; 54. branch pipe (end of dry pipe); 55. exhaust-pipe; 56. smoke-arch.
tions follow, among them one from an English newspaper of the year 1825, in which is the statement that "The American government has possessed itself, through its minister, of the improved mode of constructing and making railroads, and there can be no doubt of their immediate adoption throughout that country."

The Dictionary tells us further that: "The parts of an ordinary passenger- and freight-railway proper are the road-bed, ballast, sleepers, rails, rail-chairs, splices, spikes, switches and switch mechanism, collectively called permanent way, and the signals; but in common and accepted usage the meaning of the terms railway and railroad has been extended to include not only the permanent way, but everything necessary to its operation, as the rolling-stock and buildings, including stations, warehouses, roundhouses, locomotive-shops, car-shops, and repair-shops, and also all other property of the operating company, as stocks, bonds, and other securities."

There is a very interesting cut of a passenger-engine under that entry, with all the parts of the engine named, and if you turn to any of these parts in its proper place you will find a reference to this cut, so that you will have a diagram of that part in its relation to all the other parts. Under "locomotive" it is stated that "American locomotives are distinguished from those constructed in other countries by the exterior position of the cylinders, the absence of heavy framing," etc., etc. Here are definitions of various kinds of locomotives, — "compressed-air locomotive," "double-end," "fireless," "freight-locomotive," "Mogul locomotive" ("a type of freight-engine with three coupled driving-wheels on each side, and a swinging two-wheeled truck in front"), with many items of interest, such as, "speed is sought at the sacrifice of power in passenger-locomotives, the peculiar characteristics
of which are large driving-wheels and engines having short strokes in comparison with the diameter of their pistons." A "switching-locomotive" is "a freight-locomotive having the peculiarities of its class carried to an extreme point, to adapt it to the heavy work of starting and slowly moving trains in switching at stations." To which is added the statement that switching-locomotives are called "shunting-engines" in England.

Under switch the Dictionary defines the simple form of switch, and then goes on to say that the objection to it is that "a car moving on a track not connected with the switch is liable to be derailed by running off the open ends of the track. This has led to the adoption of safety-switches, of which there are various forms. One of the most common of these is the split switch, in which the ends of the rails, instead of being square, are drawn out (split) to a thin edge so as to lie close against the side of the next rail. The narrow rails used are flexible and are fitted with springs, so that in the event of the displacement of the switch the
AND THE DICTIONARY.

Lateral pressure of the wheels will cause the points to move back and thus keep the wheels on the line, the points returning to their original position by the recoil of the springs. Another form of safety-switch is designed to keep unbroken the track of the main line, so that the main-line rails are not cut at all. To use this form of switch the levers are moved, and the car rises on an inclined rail and passes over the main rails to the siding.

A great number of devices have been invented to make switches more safe, to render them automatic (as at the terminus of a line where the engine is to be shifted to the other end of the train), to render them interlocking, so that no one switch of a system can be opened without locking all others, and to connect them with signals and annunciators. Switches in one yard are now commonly controlled by means of long levers with a central tower from which one switchman can see and control them all."

A Y-track is "used instead of a turn-table for reversing engines or cars. In operating it, an engine or car advancing toward A (heading as shown by the arrow) is switched at A to the track B, and then backed up over the switch C to the main track again, heading now in the reversed direction."

Another interesting form of switch is the railroad gantlet, a diagram of which is shown here. The Century Dictionary describes it as "the running together of parallel tracks into the space occupied by one, by crossing the two inner rails so as to bring each side by side with the opposite outer rail. It is used chiefly to enable a double-track railroad to pass a single-track tunnel or bridge without breaking the continuity of either rail."
The general form of rail now most in use is the T-rail, shown in this diagram. "But," the Dictionary says, "though these rails all have a section vaguely resembling the letter T, the proportions of the different parts and the weights of the rails are nearly as various as the railroads themselves. In the accompanying diagram is shown a section of a rail weighing seventy-five pounds per yard in length, the weight of the length of one yard being the common mode of stating the weights of rails. These weights are in modern rails sometimes as great as eighty or eighty-five pounds per yard, the more recent tendency having been toward heavier locomotives and heavier rails."* There is a "compound rail," a "double-headed rail," a "fish-bellied rail," a "flat rail" ("first used in 1776"), a "point-rail," and many more. Under the word steel the process of making Bessemer steel (invented by Sir Henry Bessemer about 1856), so important in the development of the steel rail, is fully and entertainingly described in an article longer than this entire pamphlet. The principal use of Bessemer steel is for rails, and the Dictionary states that, during the past few years, from seventy to eighty per cent. of the Bessemer steel made in the United States has been used for that purpose.

In Great Britain railway-rails are secured to the sleepers by means of an iron block called a rail-chair. With the flat-bottomed rail common in the United States, chairs are not required, the rails being attached to the sleepers by spikes. This suggests looking up the word sleeper, and one finds that not only is wood used for sleepers,—and most extensively,—but also "stone, toughened glass, and iron, the last to a considerable extent. In some instances," the Dictionary says, "the sleepers are laid longitudinally with the rails and bound to-

*The New York Central Railroad has just adopted one hundred pound American steel rails as the standard, and these are now being laid on its lines.
A common use of the word "sleeper," applying it to a railway sleeping-car, is called "colloquial" by the Dictionary. It is not heard except in the United States; nor is "vestibuled-train," which is defined as "a train of parlor-cars, each of which is provided with a 'vesti-
bulé' at each end—that is, a part of the platform is so inclosed at the sides that when the cars are connected together, a continuous passage from car to car is formed." The words "drawing-room car," "parlor-car," and "palace-car" are also stated to be of United States origin.

A car-replacer is a device which The Century Dic-
tionary says is "carried on nearly all American rail-
way-trains for quickly replacing derailed wheels on
the track. It is used in pairs, one for each rail, and
consists of a short heavy bar of iron swiveling on a
yoke which is placed over the railhead. A sharp pull
of the locomotive pulls the derailed wheels up
the replacer, whence they drop upon the
rails."

A railway frog gets
its name from its resemblance to the frog of a horse's
hoof, the elastic horny substance which divides the hoof
into two branches, running toward the heel in the form
of a fork. The resemblance is readily seen in the cut.

There is a difference between the car-trucks used in
Europe and those of this country. Under car-truck it is
stated that, "In Europe the pedestals for the axle-
boxes are commonly attached to the body of the car.
In the United States the car-body is supported upon two independent trucks placed beneath it. The "pedestals" are shown by the letters u, u, in the upper cut. They hold in place the journal-box of the axles, which rises and falls with the springs.

A car-wheel is not perfectly flat, but, besides having a projecting flange on the inner edge, to prevent derailment, the diameter is greater on the flange side than at the outer edge. This is designed to counteract in part any tendency of the wheel to leave the rail. The Dictionary tells us just what is a "paper car-wheel." It is "a car-wheel with a steel tire and a web of compressed paper between plates which are bolted to the hub and the tire." So it is not all paper.

Under brake are definitions of the terms "automatic brake," "continuous brake," "double-lever brake," etc., and by a further reference we find the following definition of air-brake: "A system of continuous railway-brakes operated by compressed air. The air is compressed by a pump upon the locomotive, and conveyed, through
pipes beneath the cars and flexible hose between them, to cylinders under each car. The pistons of the cylinders are connected with and move the brake-levers,

The single lever, $F$, pivoted at middle-length, is operated by chains and rods from the brake-wheel on either platform. To the lever are attached rods $G$, $H$, proceeding to the brake-bars which carry the shoes, which transmit pressure to the brake-shoes. See vacuum-brake."

Here we can find out all about axles,—"driving-axles," "leading axles" (in British locomotives), "telescopic axles" (permitting the running-wheels of a car to be slipped in or out, thus making them adaptable to tracks of different gage†), "axle-boxes," and "journals" and "rubber cushions" and "buffers." The buffer shown in the cut represents the form common on British railways, and consists of powerful springs and framing to deaden concussion. Under the word coupling is a description of the self-acting and self-locking couplings used in America. These usually consist of "hooked jaws, which slide past each other and are self-locking by means of springs or their own weight. Levers are also used to operate the couplings from the car-platform."

*The brakes used on the New York Central Railroad are the Westinghouse quick-action air-brakes.

†The Century Dictionary gives a preference for the spelling gage over gage, stating that "the pronunciation and the regular former usage require the spelling gage."
The picture of a train of tank-cars explains the use of that term as well as a thousand words of text. One sees the cars being filled with oil from the pipelines at the side of the track. The centrifugal snow-plow shown in the cut on the opposite page is a very recent invention. These plows "are often of great size, sometimes weighing fifty tons, and can be forced through very deep drifts."

The subject of signals is an interesting one. Under "signal-lamp" it is stated that "white usually indicates safety, red danger, and green caution; but on the continent of Europe green is a safety-signal, and also on some American railways." The cut of "semaphore" is shown on page 3. The derivation of this word is from the Greek, and it means literally "bearing a sign." "The word is now confined almost entirely to apparatus used on railways employing the block system. The blade is a day signal, the lantern is used at night. A vertical position of the blade or a white light exhibited by the lantern indicates safety; a horizontal position of the blade or a red light indicates danger; an intermediate position of the blade or a green light demands a cautious ap-
proach with lessened speed." A good deal is told about "interlocking system of signals" under "interlock."

The "block system" is explained as "a system of working railway traffic, according to which the line is divided into sections of a mile or more, with a signal and a telegraphic connection at the end of each section; the principle of the system being that no train is allowed to leave any one section till the next succeeding section is entirely clear, so that between two successive trains there is preserved not merely a definite interval of time, but also a definite interval of space."

Under time-table we find the term "time-table chart." This is something with which the public is not familiar, but it is a very useful thing in railway offices. It is "a chart used for determining the times at which trains reach the various stations on a line of railway. The distances of the stations are laid down to scale, and, at right angles to this, divisions of time for twenty-four hours. Thus, if a train is to leave A at 10 A.M. and reach B at 6 P.M., a line drawn from ten at A to six at B will cut the cross lines so as to show the times at intermediate stations."

Under the word bridge in the Dictionary are definitions of all kinds of bridges—"arched-beam," "panel-truss," "lattice," etc., among them "cantilever," with a cut of the famous cantilever bridge below Niagara Falls. This word is frequently written cantilever or cantalever, but the Dictionary says that the form cantilever in Bailey's Dictionary, 1733 (Johnson, 1755, cantiliver), appears to be the earliest and is nearest the probable original, namely from the Latin quantu libra,
of what weight or balance,—not, as by some supposed, from cant, an angle, and lever, a support. A cantaliver bridge is "a bridge in which the span is formed by bracket-shaped beam-trusses, extending inward from their supports and connected at the middle of the span either directly or by an intermediate truss of ordinary construction. When piers are used to support the beam-trusses, they are placed near the center of each truss, and not, as in ordinary truss-bridges, at its ends. The strains due to a load upon the span are carried outward toward the ends of the bridge and beyond the piers by bracket-arms similar to those forming the central span, the extremities of which may be secured to other piers to serve the twofold purpose of resisting by their weight the uplift caused by the load when upon the central span and of themselves supporting vertical pressure; or they may form part of other spans similar to the central one. This form of bridge presents the great advantage of permitting the construction of the main span without scaffolding beneath. A fine example is the cantaliver bridge below Niagara Falls, built for the Michigan Central and Canada Southern railways."

Everything is here, even railroad euchre. And this is only a little of what the Dictionary has to say of that wonderful combination of science and skill and energy, the railroad of to-day.

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