New York City Railroad Company is anxious to build, will extend from Montague Street, Brooklyn, under the East River, to Old Slip, New York, to connect with a subway under William Street. It is probable that all of these tunnels and the connecting subways beneath the avenues and streets of Manhattan will be in a condition for bids by the spring of 1906, and although only a part of them may be undertaken at once, it is probable that before another decade has passed, everyone of the lines indicated on our map will be in active operation.

Engineering Notes.

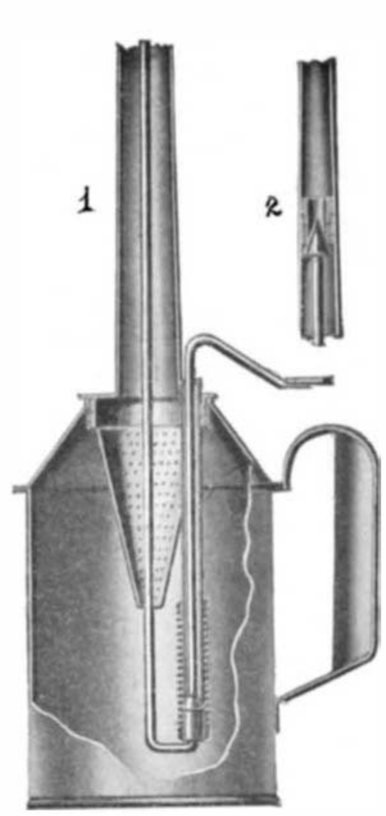
About 1890, some railroads commenced to build small spans and plate girders of steel, and, for eyebars, steel was almost exclusively used. At that time most of the rolling mills, which had formerly manufactured wrought iron, were equipped with steel furnaces, but continued for some time to make both kinds of material, until they found it more profitable to confine themselves to the manufacture of structural steel only, and discontinued the manufacture of wrought iron. In 1894, it was practically impossible to obtain wrought iron shapes, and from that time forward steel entirely superseded wrought iron as the modern structural material. The year 1894, therefore, may be considered as the commencement of the present epoch—the steel age.

There are different methods of executing laboratory instruction in engineering schools, and these range from the complete written-instructions method, which might be carried out by any intelligent man, to the pure research method, in which a problem is assigned and no assistance given for solution except facilities of laboratory and library. Equipment for such laboratory instruction is also quite various in kind and excellence, but on the average represents large outlays of money for installation and maintenance. It is difficult to see how all the schools with variety of apparatus and method of using the same can accomplish the same ends, and it may be that much of our apparatus is useless, as charged by some English critics. From the discussion, however, it does seem that the aim of the instruction, or the object to be attained by the student, may justify both method and apparatus, and that old, worn or small pieces will suffice when the aim is to teach the commercial tests, in which case also the complete printed report form is satisfactory. When, however, it is the aim of the instruction to make useful engineers, in the highest sense, by sending out bold and clear-thinking men, well equipped with the fundamental principles and their application, then the modified research method in some form is absolutely necessary. In this case the great range of problems and variety of the scientific foundation material make the most complete laboratory none too good nor need any part of it lie idle for want of usefulness.

At a recent meeting of the Belgian Electrical Society, J. Carlier reviews the different apparatus which have been designed for taking the speed of locomotives. The "kinemometers" of Richard and Jacquemier are not easily applied to locomotives, on account of the fragility of the different parts of their mechanism. But for experimental cars they have a better chance of succeeding, as the latter are less subject to heavy shocks. M. Hayne has devised a registering speed indicator for locomotives which is of strong build. It has a revolving disk, which turns proportionally with the time by a clockwork movement. It works by friction against a roller, which is mounted on a shaft carrying a screw-thread. The screw works in a nut, which is drawn in the opposite direction by the movement of the car wheels. Thus the roller moves over the disk at a distance from the center which is proportional to the speed. The Hausschelter register is used to indicate upon a dial, in front of the engineer, the speed of the locomotive in miles per hour. Besides, it registers on a band of paper, which rolls out proportionally with the time, the speed, the duration of the run, and of the stops. When the speed exceeds the proper limit, a bell is rung. Dr. Hasler, of Berne, has devised an instrument which may be an improvement on the above. It is a totalizing speed counter, indicating the speed at intervals of time which are three times nearer together than the above instrument. It registers the speed of the train, the total time of the locomotive, the length of the distance passed over, and is also to be adapted for recording the air-brake pressure. The speed of the train is represented by an irregular curve, which utilizes nearly the whole width of the paper band, and the point works every three seconds. In the Pennati tachymeter, the pencil-holder is raised along a vertical rod by means of a half-nut running upon a screw. At intervals of twenty seconds an electro-magnet works the pencil lever, so as to separate the nut from the screw. The speed is taken by a wheel running upon the rail, and its shaft operates the gearing of the apparatus. Electric tachymeters have been made, but these have not been applied with much success upon locomotives, excepting the Scholkmann system, which has been used on the Prussian state locomotives.

A NOVEL OIL CAN.

Pictured in the accompanying engraving is an oil can of novel construction recently invented by Messrs. Frank W. Clow and Joseph Brooks, of Livingston, Mont. The oil can is of the type used in oiling locomotives and large machinery, in which a long spout is provided to permit of reaching parts which would be inaccessible if the ordinary oil can were used. One of the principal objections to oil cans with long spouts is that in reaching distant bearings or oil cups, a large amount of oil is usually spilled out before the nozzle can be inserted to the desired spot, because, owing to the length of the spout, the can must be tipped up to pass between the various parts of the machine. The present invention seeks to overcome this objection by providing a valve which normally closes the spout, so that the can may be entered into the machinery without spilling a drop of oil, and then when the proper bearing is reached, a thumb piece is depressed, opening this valve and permitting the oil to flow out. In our illustration the spout of the can is broken away, and also a portion of the body of the can, in order to bring out the details. A portion of the upper end of the spout, with the nozzle screwed on, is represented in Fig. 2, and shows the valve that closes the end of the spout. The valve stem passes down through the spout to the bottom of the can, where it is bent upward again to pass through an air-inlet tube to the outside of the can. Here the valve stem terminates in a thumb piece. The bottom of the air-inlet tube is closed by a second valve formed on the same valve stem. A coil spring on the tube is connected to this valve and serves normally to hold it and the flow valve closed. When the thumb piece is depressed, both valves are open and air enters the can through the tube to replace the oil which passes out of the spout. An inverted conical strainer is set into the mouth of the can to exclude all foreign matter from the spout. This strainer is attached to the cap which carries the spout and also the inlet tube, so that the entire mechanism may be removed by unscrewing this cap, and this leaves a large opening through which oil may be poured in without danger of spilling. The construction is such that the oil will not collect in and clog up the spout; but if the valve becomes clogged in any way it may be readily cleaned on unscrewing the nozzle from the spout.



A NOVEL OIL CAN.

Official Meteorological Summary, New York, N. Y., July, 1905.

Atmospheric pressure: Highest, 30.17; lowest, 29.58; mean, 29.97. Temperature: Highest, 96; date, 18th; lowest, 61, date, 27th; mean of warmest day, 86, date, 18th; coolest day, 66, date, 23d; mean of maximum for the month, 82.6; mean of minimum, 68.3; absolute mean, 75.4; normal, 73.9; excess compared with mean of 35 years, + 1.5. Warmest mean temperature for July, 78, in 1901. Coldest mean, 70, in 1884. Absolute maximum and minimum for this month for 35 years, 99 and 50. Average daily deficiency since January 1, — 0.4. Precipitation, 6.01; greatest in 24 hours, 2.74, date, 10th and 11th; average of this month for 35 years, 4.51. Excess, + 1.50; deficiency since January 1, — 1.71. Greatest precipitation, 9.63, in 1889; least, 1.26, in 1893. Wind: Prevailing direction, south; total movement, 7,358 miles; average hourly velocity, 9.9 miles; maximum velocity, 46 miles per hour. Thunderstorms 8th, 9th, 10th, 11th, 13th, 19th, 20th, 30th, 31st. Clear days, 5; partly cloudy, 17; cloudy, 9.

The celebrated grape vine in the conservatory at Hampton Court, England, planted in 1769, had in 1830 a stem 13 inches in girth and a principal branch 114 feet in length, the whole vine occupying more than 160 square yards; and in one year it produced 2,200 bunches of fruit weighing on an average a pound—in all, about a ton of fruit.

Correspondence.

New Nomenclature.

To the Editor of the Scientific American:

Permit me to suggest two names for new "articles" in daily use.

1. Kinetograph: A photograph or series of photographs for use in kinetoscopes or like machines.

2. Aerogram: A message sent by wireless telegraphy.

C. G. Dickson.

Washington, D. C., August 3, 1905.

The Danger of Lightning in Armored Concrete Constructions.

It is a well-known fact that any constructions made entirely of iron are practically immune against the effects of lightning, as the amount of electricity accumulated in the case of a lightning stroke is allowed to distribute itself over the large surface of the roof, and to flow off to the earth at many places with greatly reduced intensity. As pointed out in a recent article in Beton und Eisen, conditions are quite similar in connection with buildings made entirely of armored concrete, as the discharging current will find the roofing iron and distribution rods of an armored concrete roof, struck by lightning, a good conductor of electricity, so as to flow off to the more substantial girder iron with which the roofing iron is connected by wire meshes. Now, as experience has shown lightning not to be discharged to the earth in a concentrated jet from the place of striking, but to have a tendency to distribute itself to all sides if possible, the electricity will be diffused throughout the roof traversed by a network of iron rods. The electricity being greatly reduced in intensity, will have an excellent opportunity of flowing off to the ground through the round irons inserted in armored concrete columns, thus being communicated to the foundation of the current column, which in turn transmits it to the ground. This shows that neither artificial lightning arresters nor their parts will be required in connection with any construction consisting entirely of armored concrete.

Tests with Haulage System to Economize Air.

At the Fürstlich von Plesschen Colliery, in lower Silesia, electricity has been used extensively underground, but with the idea of avoiding firedamp explosions it has been found necessary to use air motors in all such places that were in the return air-way, or such places that were not directly reached by fresh air. The installation at the Fürstensteiner mines is very extensive, and owing to the use of coal cutters these latter mines have been provided throughout with air mains, and to connect with this system was convenient, whereas it would be necessary to use lengthy cables should the introduction of electricity be contemplated. The material that is derived from the seam or measures having a thickness of 23 feet must be hoisted on the incline and for this purpose it is necessary to use a motor of some kind. The system which has here been introduced is the endless-rope system so that whatever motor is used it can run continuously. A duplex air hoist of the ordinary type with slide valves, is installed but it is impossible to use a cut-off so as to expand the air to any great extent on account of the formation of ice in the exhaust. The motors, therefore, do not work economically and use a great deal of air. To overcome this, as has been tried in other districts, the use of reheating was not deemed advisable on account of the danger from explosions.—Translation of article in Gluckauf, Mines and Minerals.

The Current Supplement.

The current Supplement, No. 1545, is commenced with an interesting article on "The Kazarguene Bridge." This Russian bridge is the longest reinforced concrete bridge in the world. "The Steam Turbine As Applied to Electrical Engineering" is by the Hon. Charles A. Parsons, and Messrs. Stoney and Martin. "The Winning Automobiles in the Sixth International Cup Race for the Bennett Trophy" describes the Italian cars. The usual scientific, electrical, and engineering notes will be found in their accustomed places.

John Carbutt.

John Carbutt died July 28 at his home in Philadelphia, aged seventy-three years. Mr. Carbutt went to that city from Sheffield, England, in 1853. He was a chemist, and made scientific photography his life study. The Photographers' Association of America chose him as its first president. He made several inventions, chief of which was the orthochromatic plate. In 1879 he perfected the Carbutt dry plate.

Probably the first iron railroad bridge was built on the Philadelphia and Reading Railroad at Manayunk by Richard B. Osborne, Chief Engineer, in 1845. It was a double-track through bridge, of 34 feet clear span, of the Howe truss type, with cast-iron chord and web braces, the bottom chord and vertical web members being of wrought iron. This bridge was followed by several others of the same type.