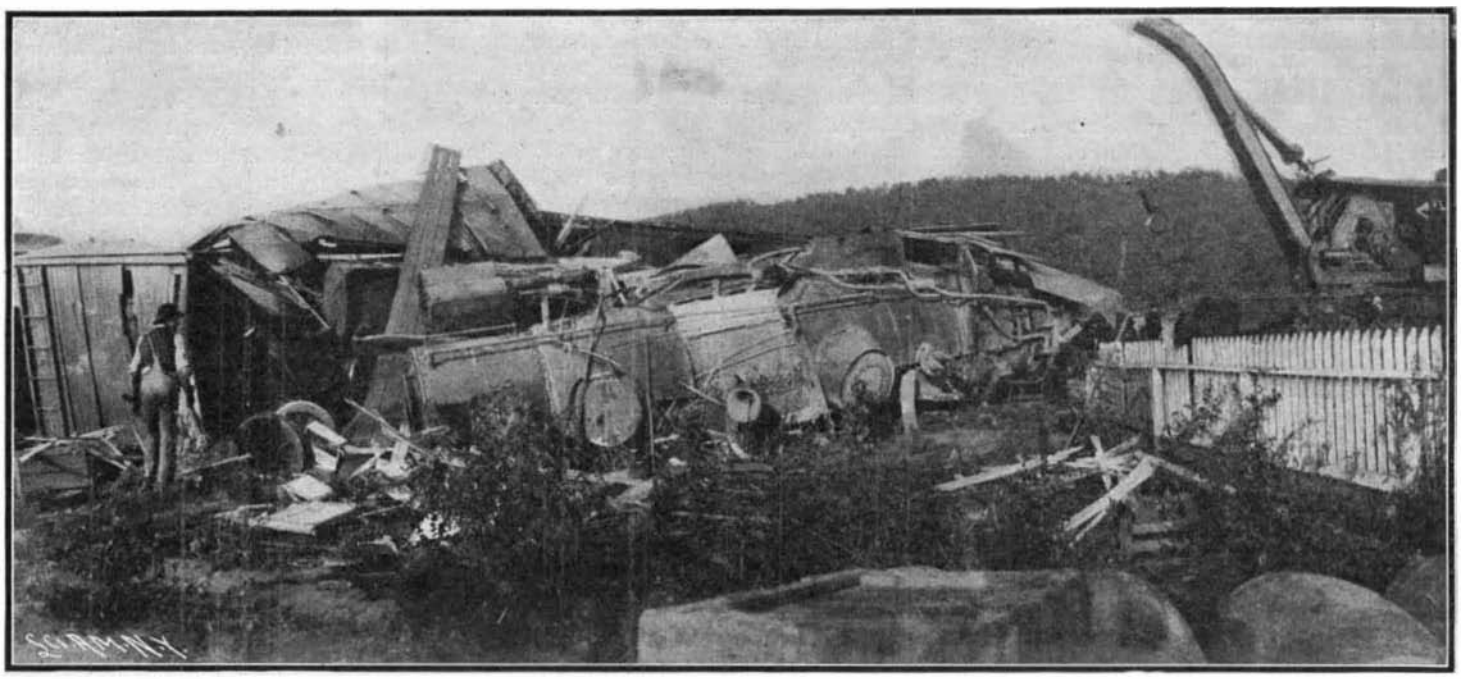
TRAIN WRECKED BY COLLISION WITH DYNAMITE.

BY W. L. RADCLIFFE.

On Friday afternoon, September 23, just as an eastbound freight on the Baltimore & Ohio Railroad was approaching North Branch, a little station five miles east of Cumberland, Md., a teamster with a two-horse wagon, hauling a load of 800 pounds of dynamite, attempted to cross the track. Unfortunately his team was just a trifle too slow, and the on-rushing locomotive struck the rear end of the wagon, hurling it nearly a hundred yards along the track. The terrific explosion almost totally demolished the nine houses in the little hamlet, threw the heavy locomotive a hundred feet from the track, completely turning it around, and reduced seven loaded freight cars to kindling wood in a twinkling of an eye. One of the brakemen was instantly killed; seven other persons were seriously hurt, and the engineer, one of the oldest and most skillful employes of the Baltimore & Ohio, was found in the demolished cab of his engine unconscious, with the scalding steam and water pouring over him, but still firmly gripping the throttle. He died while being removed to the hospital.

The signal tower, in which were the Baltimore & Ohio operator and his brother, was completely wrecked, and its occupants were badly cut by the glass and splinters.

The windows of nearly every house within half a mile of North Branch were shattered; while the explosion was plainly heard and the concussion felt in Cumberland, five miles distant. Strange to say, the horses which were attached to the ill-fated wagon were not injured at all. The driver was rendered unconscious by the explosion, but received no other injury. The wagon was totally annihilated, and the only part of it which could be found was a tire from one of the wheels, which was discovered wrapped as tightly around a neighboring telegraph pole as though fastened there by a blacksmith. The dynamite was being hauled to the camp of McArthur Brothers, who are constructing a portion of the Wabash Railroad. Their commissary department, offices, and hospital were badly wrecked. Considering the great destruction of property caused by the catastrophe, it seems almost a miracle that the loss of life was so small.



TRAIN WRECKED BY COLLISION WITH DYNAMITE.

TESTING MACHINES AT THE BOSTON INSTITUTE OF TECHNOLOGY.

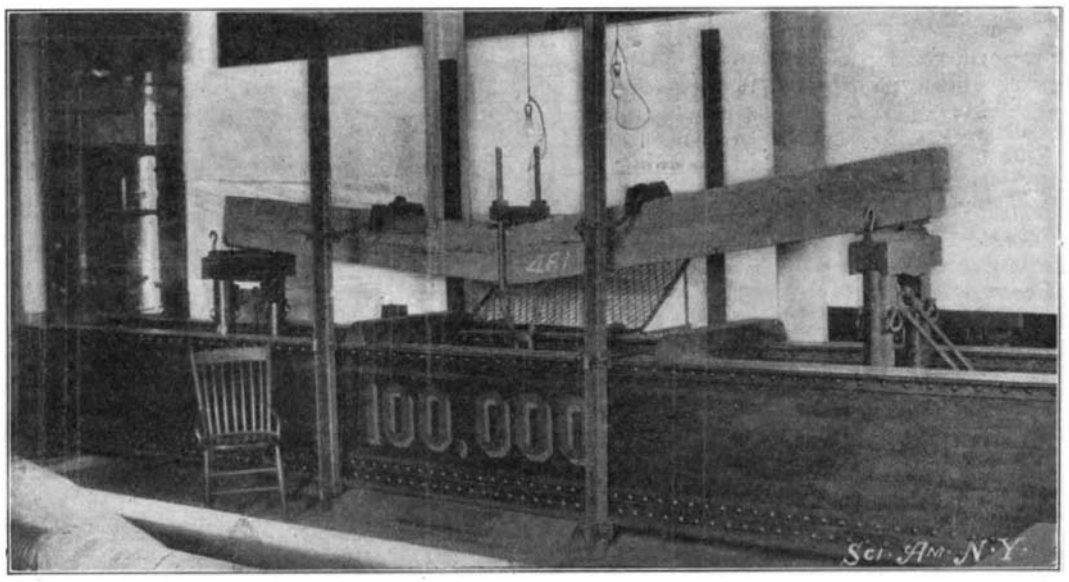
BY DAY ALLEN WILLEY.

Within the last few years some very interesting apparatus has been utilized at the Massachusetts Institute of Technology, to determine the strength of materials when subjected to strain under various conditions. The installation of this machinery originated with Prof. Gaetano Lanza, who has been conducting such experiments for a period of years. Prof. Lanza at first made tests with small pieces of wood, iron, and other substances. His experiments were attended with such success that it was decided to work with material of sizes regularly utilized in building and other operations, such as wooden beams, arches, columns of brick and stone masonry, and shafts and pillars of iron and steel. The different tests, which are applied by means of the apparatus now in use, are to determine the tension, compression, transverse strength, torsion, impact, and repeated stress.

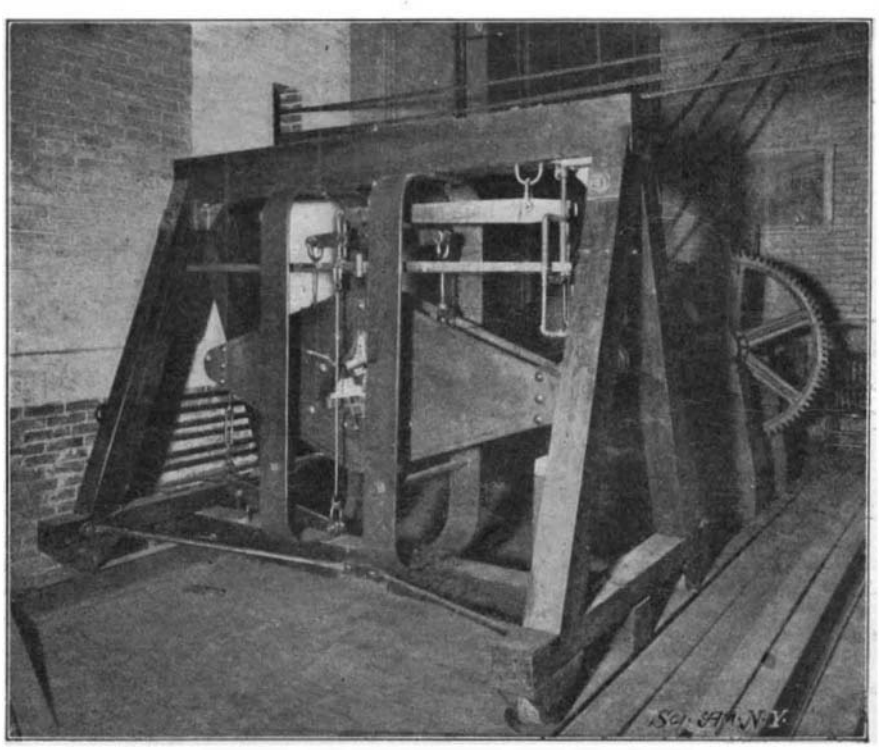
For the purpose of determining the strength of masonry in various forms, the test laboratory is equipped with an arch-testing machine, representing a capacity of 400,000 pounds. It can be utilized in connection with an arch having a maximum length of ten feet and a minimum rise of one in ten. As is indicated by the photograph, the machine consists of a framework of eye-beams and plate girders, through which pass a series of rods. The testing load is applied by two hydraulic rams, each of 100 tons capacity. The upward reaction of the rams is against a system of scale levers, which weigh the load. The downward force of the rams is taken by the series of two-inch steel rods, which pull down on the I-beams, used to distribute the load to the blocks. The latter are of wood, one foot in length and of a width proportionate to the size of the arch, being fitted to its top. The thrust of the arch is measured by noting the extension of four of the three-inch steel rods. These have been tested, and the moduli of elasticity determined, so that each rod indicates the load it is carrying by measuring its stretch. This stretch is measured to one ten-thousandth of an inch in a length of one hundred inches. The casting at the right hand of the machine rests on the I-beam frame. The left-hand casting, against which the arch bears, is mounted on rollers 17½ inches in diameter, so as to allow the three-inch rods to stretch to the extent required. The photograph shows the machine in operation with an arch of brickwork.

The principal transverse test-

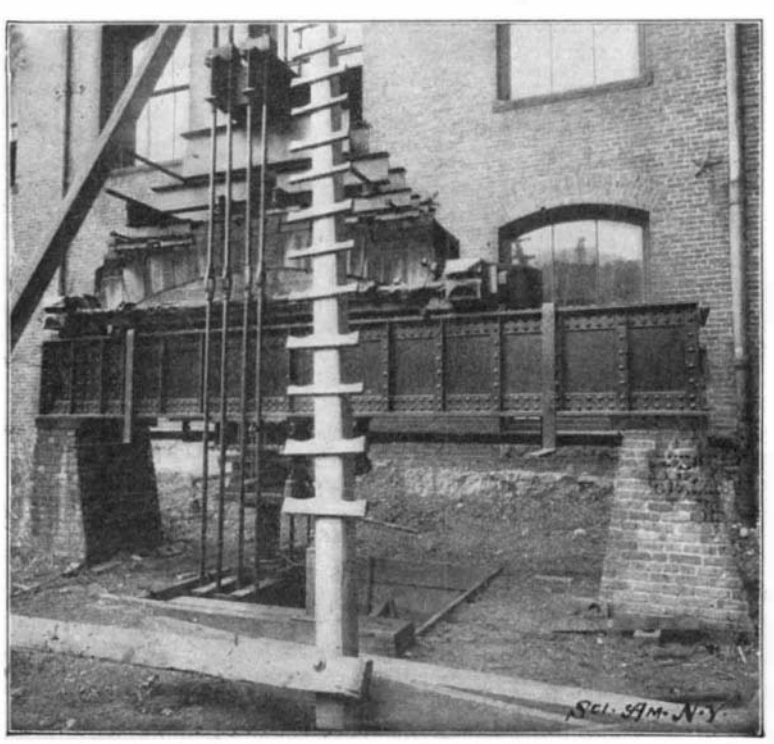
(*Continued on page 282.*)



TRANSVERSE TESTING MACHINE; CAPACITY, 100,000 POUNDS.



MACHINE FOR TESTING TORSIONAL STRENGTH.



ARCH TESTING MACHINE; CAPACITY, 400,000 POUNDS.

be wholly switched off by covering the last hole. The path followed by the current in the Wodal interrupter is as follows: The current is supplied to the motor through a variable resistance allowing regulation of the number of revolutions of the motor and, hence, the number of interruptions being readily altered. No special regulating resistance is necessary for the primary of the induction coil, even the most delicate regulation of the current supply being secured by means of the interrupter itself. The Wodal interrupter, like other interrupters, is inserted between the source of current and the primary of the induction coil, the current being conveyed to the mercury jet, and thence through the contact fingers and revolving shaft to the induction coil.

In order to insure more rapid interruptions with a minimum sparking, the reservoir is filled with a quantity of petroleum. As compared with electrolytic interrupters, the Wodal affords the advantage of being perfectly noiseless in operation, and of consuming very little current (about 1½ to 3 amperes). It can be used with any high-tension direct currents.

A NEW ENGLISH TELEPHONIC FIRE ALARM.

BY FRANK C. PERKINS.

A new English system of street fire alarms has recently been brought out by the General Electric Company, Limited, of London, which comprises street alarm and telephone posts located at various points in the city and an annunciator switchboard for the fire station, as shown in the accompanying illustrations, Figs. 1 and 2. As usual the functions of the post are to act as fire-alarm pulls to be operated by the public in the event of fire and to serve as street telephones for the use of the fire brigade in executing their duties, while they may also be employed if desired as police telephones.

The calls are received from the street posts by the annunciator switchboard, which indicates from which post the call is given. The function of the annunciator switchboard is also to discriminate between genuine and accidental calls, such as "grounds"; to allow the lines being tested; and, where required, to serve as a switch for connecting any street post with the police station, or with any official on the system.

The post is fitted with a locking pull to be operated by the public, a vibrating bell, which rings when the pull is operated and indicates that the call is passing through the station, while the stopping of the bell indicates that the call has been attended to. A replacement movement for the pull is provided, as well as the usual telephone receiver, water type microphone transmitter, and induction coil. There is also provided the usual automatic switch hook, call key, lightning arrester, and a two-microfarad condenser which is used in the line test.

The switchboard at the fire station noted in the illustration, Fig. 2, includes an annunciator drop and jack for each post, an 8-inch alarm bell, and an answering plug, also a control indicator, enabling a line which has been used to be kept under observation until the pull in the post is replaced. A control bell gives an audible signal when the pull in the post is replaced, and a discriminating buzzer is provided to allow of determination between real and accidental calls. In addition to the hand combination telephone and magneto generator for the purpose of testing the lines and when required to call any department, a perpetual calendar is provided, as well as an English timepiece, as noted at the top of the switchboard. The Tottenham Urban District Council has installed this system of electric fire alarms, as shown in the accompanying illustration, with thirty-five fire-alarm posts, each fitted with a telephone plug box. When the pull in the post is operated, the battery current passes through the indicator drop, closing the local alarm bell circuit, and the bell in the post at the same time rings.

The fireman attendant in the watchroom inserts his answering plug in the spring jack underneath the fallen shutter, and the discriminating buzzer at once emits a loud buzzing sound. If the alarm were caused by "ground" on the line, the buzzer would not operate, and the brigade would not be called out unnecessarily.

If, on inserting the answering plug, the discriminating buzzer does not operate, it indicates either that someone wishes to telephone, or that the line has become earthed and requires attention. The attendant can ascertain which by listening on the telephone and making the usual inquiries.

After calling out the brigade, the attendant withdraws the answering plug and inserts in its place a plug belonging to the control indicator. This stops the bell ringing in the post, and the control indicator pointer is deflected to the "on" position. The answering plug is now available to receive further calls.

When the post-handle is replaced, the control indicator returns to the "off" position, and the control bell rings continuously until the plug is withdrawn and placed in its normal position. The attendant now inserts his answering plug and listens on the telephone to ascertain if the person replacing the pull wishes to speak to him.

To test the lines from the station, the answering plug is inserted in each spring jack successively and the generator handle turned. If the line is in proper order the discriminating buzzer will be actuated, but if the line is discontinuous, it will remain silent.

At the post, if it is required to speak to the fire station it is only necessary to hold the receiver to the ear and press three or four times on the small push button for the purpose.

TESTING MACHINES AT THE BOSTON INSTITUTE OF TECHNOLOGY.

(*Continued from page 280.*)

ing machine in use at the Institute is of 100,000 pounds capacity, and will test specimens of material up to 26 feet span.

The machine is quite simple. Two steel girders rest at the center on a framework raised 4 inches above the floor. These girders support two movable carriages, which hold the jackscrews used for applying the load. At the center of the machine there are three levers used in weighing the load. Two of these levers are beneath the girders of the machine, and do not show in the cut. The main lever gives a multiplication of 10 to 1. It is of steel, about 6 feet long, and at the larger end it is 13 inches deep and 2¼ inches thick. The load is applied by raising the jacks at the ends of the specimen, and it is weighed through the pull exerted on the levers by the yoke attached to the center of the specimen. The steel girders forming the bed must carry, without undue fiber stress, the maximum load which the machine can exert.

The photograph shows a white pine beam which had been in service at least seventy-five years. The stick is 15 inches deep and 15⅞ inches wide. The span was 20 feet. In the test made on this beam in the testing machine, the load was applied at two points, 1 foot either side of the center. The manner of distributing the load is shown by the beams at the center of the machine. The deflection of the beam was measured in the following way: On either side of the beam a fine steel wire was stretched over pins driven into the beam directly above the supports and at the center of the depth. A ten-pound weight on the end of each wire kept the wire in tension. A micrometer was fastened to each side of the beam at center of the length and depth of the specimen. The faces of the micrometer screws were set parallel with the wires, the screws being perpendicular. To take a set of readings, the screws were turned down till contact was made with the wires.

In determining the torsional strength of substances, three machines are utilized by the students, being of 150,000 inch-pounds, 60,000 inch-pounds, and 6,000 inch-pounds capacity. The accompanying photograph is of the most powerful machine.

The specimens commonly tested in it are from 1½ inches to 2½ inches in diameter and of lengths varying from 3 to 12 feet. The power end of the machine is driven by a 4-inch belt running from a countershaft overhead. The gear is keyed to a 4½-inch diameter steel shaft, which turns once in about fifteen minutes. The holder is a massive piece of cast iron, reinforced by two bands of wrought iron three inches wide and one inch thick, shrunk on the outside. The grips are made of cast iron, faced with cast steel which is fluted on the outer surface. These grips are cams which tend to bite the specimens harder and harder as the twisting head turns to the right. The grips do not require a shouldered specimen. Steel bars 1½ inches in diameter, containing 1.10 per cent carbon, have been gripped without the least difficulty. A handwheel is attached to the driving shaft, so that any desired twisting movement may be held on the specimen. This is also used in adjusting the load accurately, when the angle of twist of the specimen is being noted.

The weighing end is held in a movable carriage which runs on I-beam tracks. A casting, with grips similar to those described above, is attached to a hollow frame made of boiler plate, which is hung from the carriage by an equal-arm lever and links, all turning on hardened steel V-shaped knife edges. From a knife edge at each end of this frame a link runs to a lever, one lever being near the top of the carriage and the other near the bottom. The free ends of these levers connect with the weighing beam shown running across the carriage. As the power end holder turns toward the right, the twisting movement, transmitted through the specimen, will tend to rotate the frame so as to cause the right-hand end to go down and the left-hand end to go up. This causes the free end of the weighing beam to lift, and poise weight must be moved to the right to bring this lever level again.

Two processes, dependent upon the fact that some oils, when brought into contact with finely-crushed ore in water, have the remarkable power of absorbing the particles of certain minerals to the exclusion of others, have been developed.

Engineering Notes.

In Belgium about 85 per cent of the navigable waterways are under the direct control of the state, which is also a large shareholder in the canals conceded to private companies.

Stamped sheet zinc is rapidly coming into use for metal ceilings in places where wood has heretofore been used. In some cases the material is even copper-plated and given a beautiful finish. Those who have had experience with other material will readily appreciate the advantage of using zinc.

Overhead electric trams on the Madeleine-Colombes line have been responsible for an extraordinary accident. The conductor, at the end of his journey, was about to turn the arm from front to rear when, in the act of swinging it by the cord, something caused the springs to act as a powerful catapult, lifting the man 18 feet in the air and hurling him a considerable distance on the roadway. When picked up he was found to have sustained a fracture of the shoulder and both wrists.

A method proposed for testing wood treated to resist fire consists in suddenly heating ½ gramme of the wood by means of an electric current—120 volts, 7 to 10 amperes—to a temperature of 700 to 800 deg. C., and measuring the volume of gas liberated in the course of two minutes. The wood is contained in a platinum wire basket, and the weight of ash and charcoal left can also be determined. A good sample should yield a smaller volume of gas and a larger weight of ash than an untreated sample.

The French Admiralty has quickly recognized the possibilities of the gasoline motor for the propulsion of small war vessels. A vessel intended for police purposes upon the rivers in the French Congo has been launched from Bangui, built under the supervision of the Admiralty, and fitted with two 30-horse-power gasoline engines. The boat is 97 feet 6 inches in length, and is armed with quick-firing guns. It is the largest gasoline-propelled boat that has yet been constructed in France and is purely an experimental vessel to demonstrate the capabilities of this type of engine for small craft of this type.

In Umea, Sweden, there has recently been installed a factory for the dry distillation of wood, by means of superheated steam, where, in addition to wood coal, wood tar and turpentine oil are recovered. According to the process invented by Mr. Elfström, the steam, superheated to some hundreds of degrees, is conveyed into a tightly-closed horizontal retort of a capacity of 15 cubic meters, filled with resinous wood, when the wood tar, mixed with condensing water, is deposited on the bottom of the latter, the volatile portions being removed with the steam generated by the moisture of the wood. On their way, they are once more highly superheated, and are allowed to exert their effect in a second similar retort. The water vapors, strongly saturated with turpentine oil, are eventually condensed, the turpentine oil being separated readily from the water, while the combustible wood gases are being used for heating the steam producer and the superheater. The wood-tar discharged from time to time from the retort is separated by an addition of common salt from the condenser water, the density of which is thus increased to such an extent as to cause the tar to accumulate on the top. The process is said not only to afford a large output of wood coal, but in addition, wood-tar and turpentine oils of far greater purity than in distillation plants with immediate retort firing, the process being much more uniform in the retorts and too high retort temperatures being avoided.

The Current Supplement.

The current SUPPLEMENT, No. 1503, contains an unusual variety of interesting scientific articles. Mr. Joseph Horner describes at length, in an excellent review, modern methods of steel casting. His article will be concluded in the next number of the SUPPLEMENT. Many illustrations accompany the text. H. W. Buck, electrical engineer of the Niagara Falls Power Company, outlines in an instructive way the method of utilizing Niagara power. Prof. Holden's splendid appreciation of Copernicus is concluded. It has been suggested (and the theory has received to some extent the support of experimental proof) that certain kinds of insects derive protection from the grotesqueness or hideousness of their appearance; Mr. Percy Collins convincingly proves the theory in an article entitled "Terrifying Masks and Warning Liveries." Numerous photographs of insects accompany his article and bear out his contentions. Just where King Solomon's Mines may have been situated no one knows. In an excellent article published in the current SUPPLEMENT, the location of this fabled land of wealth is given on the basis of modern explorations. Prof. Rutherford's painstaking discussion of the radio-activity and emanation of radium is concluded. Prof. Neesen contributes a valuable paper on "Protection from Lightning." The usual notes are likewise published.