a few inches, while the undulation may travel for hundreds of miles. The distance through which the individual molecules oscillate is called the "amplitude" of the wave.

With the effect of a seismical wrench determined, the next step is to invent some means of detecting and recording the waves, felt and unfelt, to which that wrench gives rise. Such means are primarily of importance for the purpose of determining the path of the wave. Naturally, the waves that can be felt are those most easily recorded. Every object that has been visibly affected by a seismic disturbance is a recorder, to a certain extent. Fractures and fissures in walls rent by an earthquake are of inestimable value to the seismologist, because they often indicate the direction in which the waves emerge at the surface and the manner in which they break. The simplest of all recorders, one which has been used in Japan for over twelve hundred years, is a lamp, which, when overthrown, is extinguished. Still another form of recorder, simple as it is rude, consists of a vessel containing some syrup-like liquid, which rocks as the earth rocks, and leaves its mark—a rough indication of the direction and extent of seismic motion. A device much used in Italy comprises a tray, formed in its sides with recesses which are filled to the brim with mercury. When the earth trembles, the mercury is spilled into small cups, hung beneath the recesses. By measuring the amount of mercury retained by the cups,

(*Continued on page* 346.)

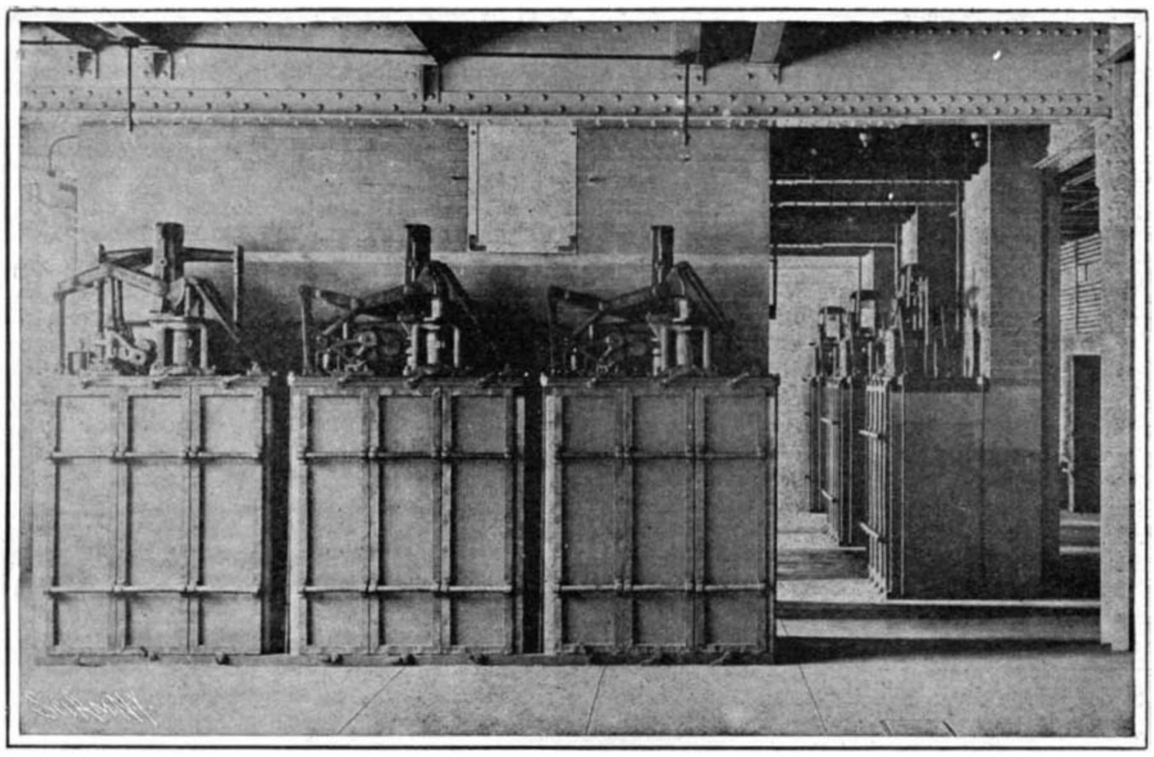

Fig. 4.—Feeder Gallery, Showing Type Coil Circuit Breakers for Feeders and Generators

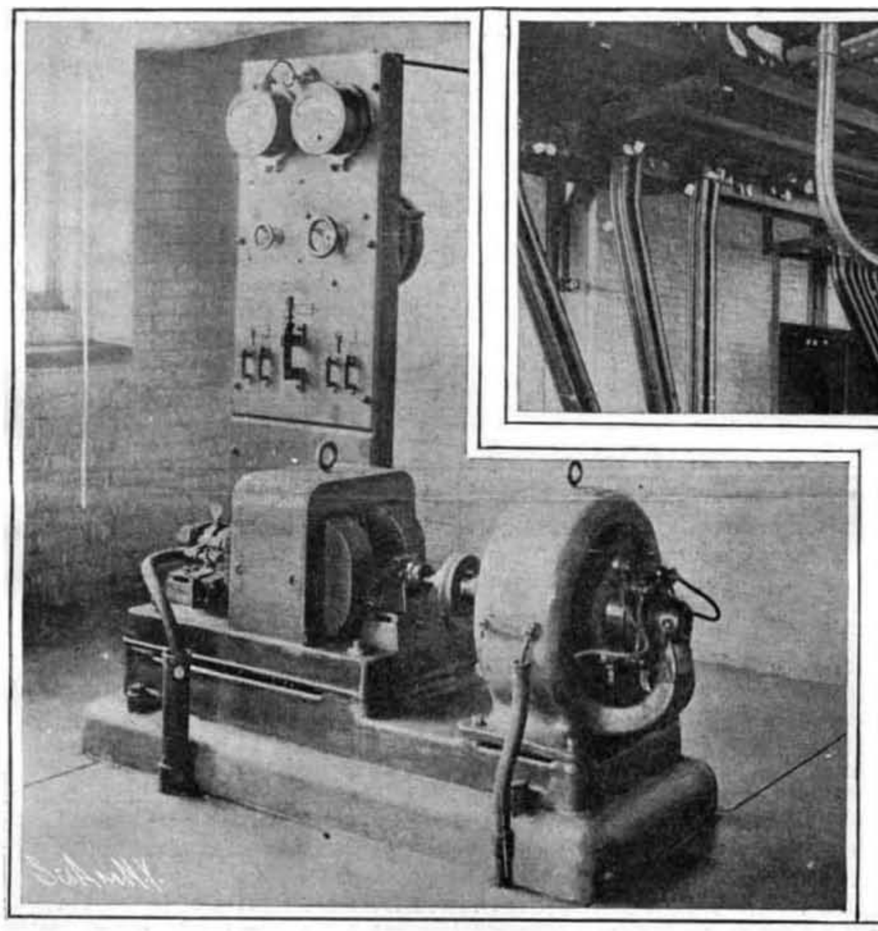

Fig. 1.—Booster for Preventing Condenser Electrolysis

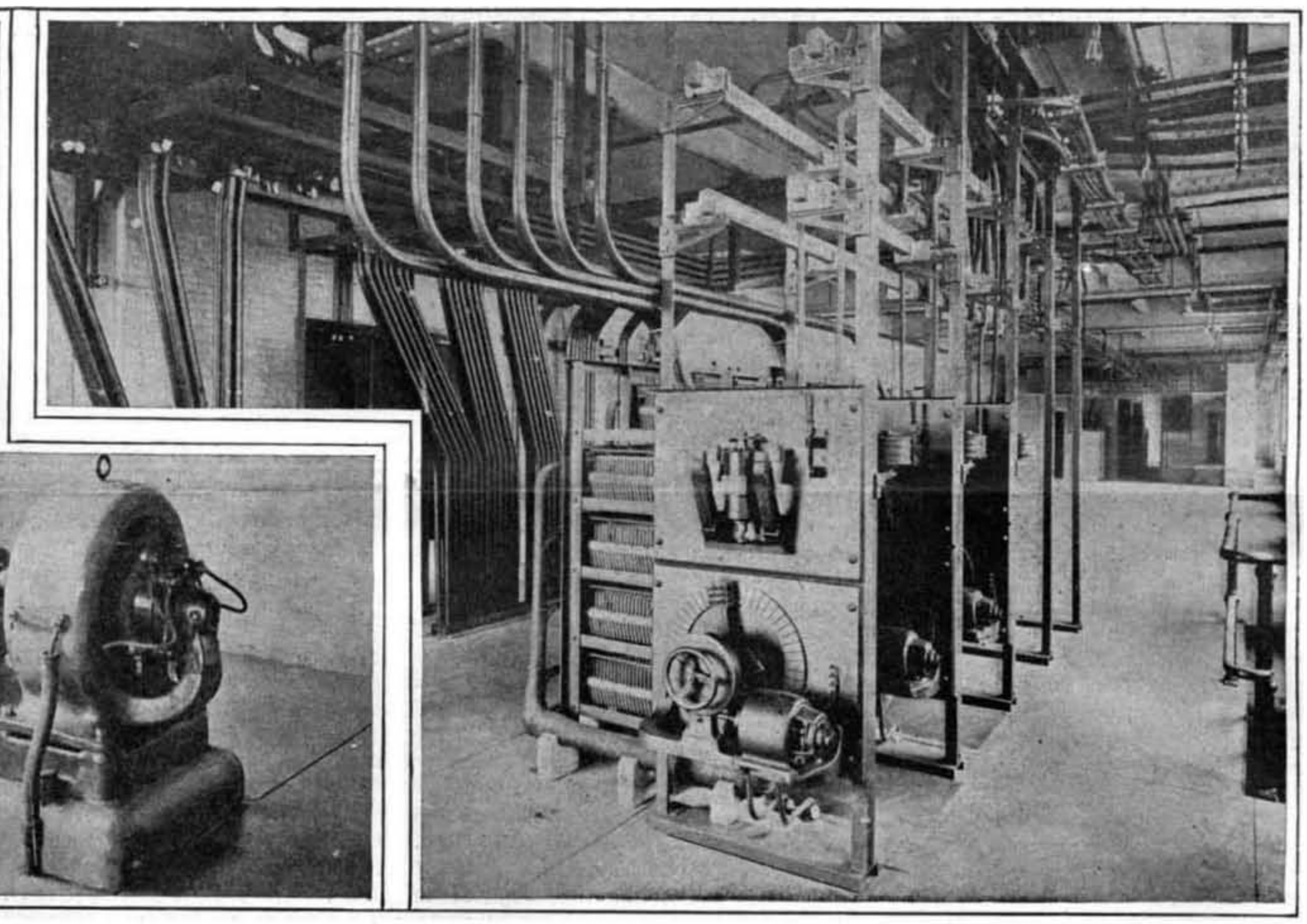

Fig. 3.—General View of Bus Gallery, Showing Main Generator Rheostats and Auxiliary Wiring.

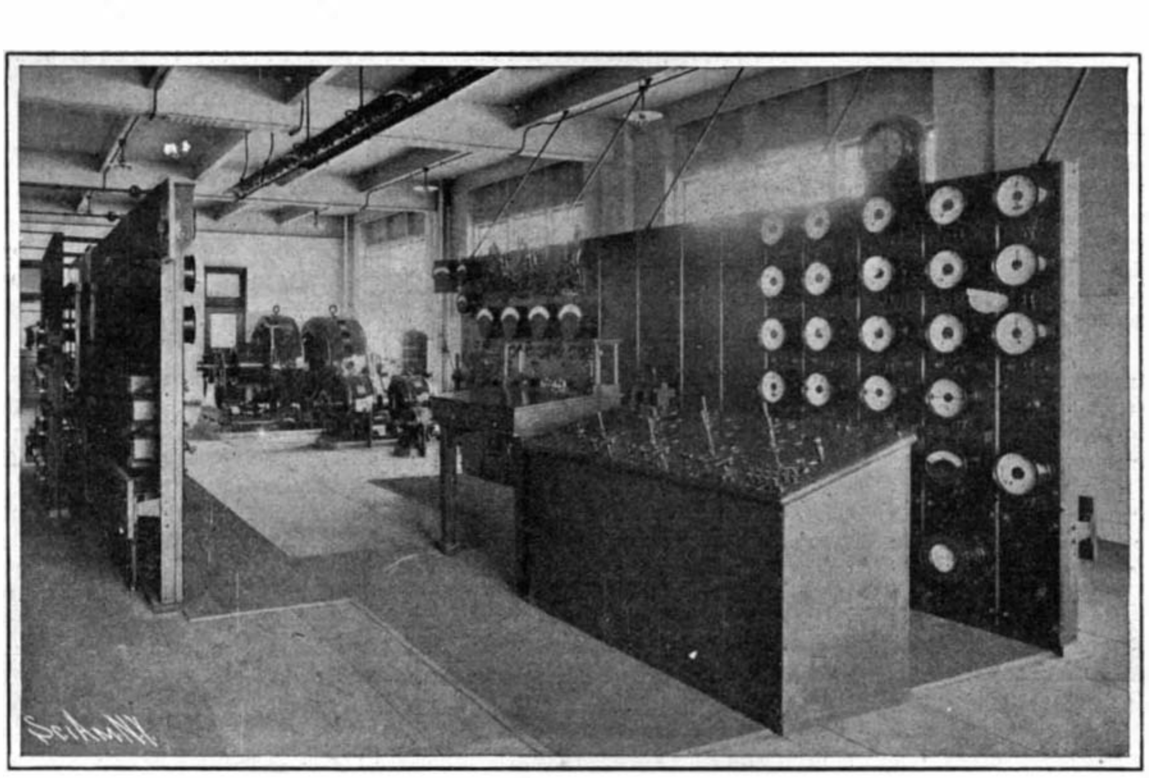

Fig. 2.—Electrical Operating Gallery.

ELECTRICAL EQUIPMENT OF THE LONG ISLAND CITY POWER STATION.

ELECTRICAL EQUIPMENT OF THE LONG ISLAND CITY POWER STATION.

In our issue of April 7 we published an illustrated article on the Long Island power station of the Pennsylvania, New York, and Long Island Railroad, which dealt with the building, coal-handling plant, turbines, and generators. In the present article we give some details of the electrical equipment of the installation, which will be of interest.

A somewhat unusual feature has been introduced into this station, to prevent the serious deterioration usually occurring where salt water is used for circulation in surface condensers. It is the universal experience that more or less galvanic action at the expense of condenser tubes takes place in any event, but this is often aggravated in large and important plants by the fact that the water and the body of the condenser have formed a convenient path for stray electric railway return currents getting back to their own power station some distance away through the condenser intake and the water of the harbor. In the case under discussion a sufficient number of voltmeter readings was taken between the river, the flume, and various parts of the piping about the building and in the streets to indicate that there was at all times difference of potential sufficient to make trouble, notwithstanding that its polarity was not always the same.

The metallic connections of the power station equipment to the city piping station are through two 14-inch connections to the water main; and on account of the proximity of the water mains to trolley tracks all over the city, there is a tendency for stray currents to flow into the piping of the building, and thus subsequently cause electrolytic corrosion in the condenser tubes. The method adopted to prevent this corrosion consists first in providing a shunt circuit between the incoming water pipes and the condenser flumes, in order to divert as large a proportion as possible of the current from the condensers. Thus, such current as may leak from the pipes to the water contained in them, has an opportunity to return into the harbor water without going through the piping system and the condensers.

In order to neutralize the effect of such current as might still leak past the insulating joints provided, a small booster generator is utilized. This is driven by a 220-volt motor, the positive pole of the booster being connected to the heavy grounded shunt cable above mentioned; the negative pole being connected to seven different points on each condenser. There is an adjustable rheostat in each of these branches of the negative circuit. By means of this superimposed voltage the destructive potentials can be counterbalanced, and the condenser is then in a neutral electric state which effectively prevents corrosion, and secures a far longer life than has hitherto been possible for this very important and highly vulnerable section of the steam equipment. The booster apparatus, shown in Fig. 1, is conveniently situated in the electrical bus gallery directly under the operating gallery.

The generator control bench with the instrument board and adjacent switchboard are illustrated in Fig. 2. The bench resembles a low desk with an inclined top, and accommodates three sets of operating handles for the generator main switches and selecter switches, one set for each unit, and two sets for the bus junction switches, which divide the main bus into sections. The apparatus on each generator panel of this desk consists of the various controllers, three sets of indicating lamps, and two synchronizing receptacles.

Directly opposite each generator panel on the desk is a vertical panel in the generator instrument board, which carries the various measuring instruments, as well as a synchronizing lamp, and a lamp indicating the position of the field rheostat, besides an illuminating visual indicator forming the return signal from the engine room. These instruments are all operated from current derived from shunt potential transformers and series transformers, suitably located in the leads from each machine.

The generator rheostats are mounted in a structural steel framework directly under the operating bench on the second or bus gallery, and are illustrated in Fig. 3. The rheostat proper consists of a series of cast-iron grids set in an iron frame. The face plate is mounted on a marble slab, and the contact arm is operated by means of a little direct-current motor receiving current from the 220-volt auxiliary bus and controlled from an operating handle on the generator panel. Reference to the photograph shows another panel mounted directly above the rheostat face plate, upon which is mounted an electrically-operated main field switch worked from the field switch-controller handle on the generator panel. The brackets supporting the 220-volt exciter and auxiliary buses are mounted on porcelain insulators carried on the steel framework directly over the generator rheostat and directly under the exciter switchboard.

The oil switches of the type used for the feeder circuits are shown in Fig. 4, two of those in the photograph being shown thrown in, while one is shown thrown out. The operation of opening and closing a switch is performed by the action of two separate solenoids, one for each function, situated on top of each switch structure. The larger of the two solenoids draws the switch up into the closed position, where it is held by a trigger, which is tripped by the action of the smaller opening solenoid. The solenoids are energized by 220-volt direct current from the auxiliary bus. The feeder circuit-breakers are fitted with both automatic and independent hand control. The former consists of an A. C. relay, receiving current from a series transformer situated in the feeder, the relay closing the 220-volt circuit across the opening solenoid on top of the breaker. Independent manual control is effected from the main switchboard by simply closing the 220-volt solenoid circuit by a switch that is in parallel with the automatic A. C. relay. All the outgoing feeder and main generator switches are fitted with both kinds of control, but all the selecter switches have manual control only. The indicating lamps for each switch are mounted underneath the bench, and indicate when lighted through different-colored lenses set flush with the top of the bench.

Very important improvements of the North Sea Canal from Amsterdam to the North Sea are in progress, and are expected to be completed in the course of 1907. When finished, the canal will be considerably wider and deeper, and altogether better navigable for the largest class of steamers.

FEELING THE EARTH'S PULSE.

(*Continued from page* 345.)

the intensity of the shock can thus be roughly gaged.

Such recorders are too crude for the modern scientists; they can never reveal those finer perturbations, which play so important a part in the study of earthquakes. For that reason the seismologist has been compelled to devise ingenious self-registering instruments which furnish us with permanent records of tremors, so exceedingly feeble in their effects that the particles of earth-molecules are not displaced more than a very small fraction of an inch in the transmission of the pulse.

The instruments in question are called seismoscopes and seismographs, and may be roughly divided into two classes. In the one class, the earth's motion is translated into diagrams written on stationary plates; and from these diagrams it is possible to ascertain with wonderful accuracy the extent and the direction of the principal vibration in a shock. In the other class, the movement of the earth is recorded on a surface traveling at a known rate; and from the tracing thus made the seismologist can deduce the period or the rapidity with which the earth's undulations follow one another. These latter diagrams are of extreme importance. They are the means of calculating the acceleration or suddenness of movements; in the hands of the engineer they are factors that enable him to erect structures capable of resisting known forces, and not structures simply strong enough to withstand an earthquake. To the man who knows an earthquake merely as a destroyer of towns, the diagrams written by the earth seem a tangled, hieroglyphic script. To the seismologist, they are as unmistakable in their meaning as printed words; they are autographs, as it were, written by the quivering earth at a time of great internal violence.

In order to obtain a complete record of every detail of a seismic disturbance, the movement of the earth, in one of the most approved forms of instrument, is resolved into three components, the one vertical, the other two horizontal, and all at right angles to each other. These three component movements are registered by three distinct pointers on a sheet of smoked glass, which is made to rotate at constant speed by clockwork. A single earthquake always consists of many successive displacements of the ground; hence the mark traced by each pointer on the moving plate is a line comprising many undulations, usually very irregular in character. The amplitude, period, and form of each of these tracings are measured; and by compounding the three the seismologist obtains full information of the direction, extent, velocity, and rate of acceleration of the movement at any epoch in the disturbance.

Instead of using a smoked disk of glass, a drum can be employed, the record being made on a band of smoked paper. The diagram is less difficult to interpret than that of a plate, because it is written on either side of a straight line, and not around a circle. In order to avoid the trouble of handling smoked paper, the diagram is sometimes written along a straight line with a pen or pencil. When the shock has passed, the drum stops. But if a second or third shock should occur, which is often the case, the drum is again automatically set in motion.

In order to record slight earth tremors, an instrument called a tronometer is used. Every five minutes, by clockwork contacts and an induction coil, sparks are discharged from the end of a long pointer, and perforate bands of paper. If the pointer be at rest holes are pierced, following one another in a straight line; but if the pointer be in motion, the bands of paper are perforated in all directions. The earth movements which cause these so-called tremors are apparently long surface undulations of the earth's crust, resembling very much the swell of the ocean. A more satisfactory record of this swell is made by a continuous photograph of a ray of light reflected from a small mirror attached to an extremely light horizontal pendulum.

Electrical seismoscopes are among the most delicate devices yet invented for the measuring of earthquakes. They are of such construction that they cannot be here described for lack of space. So sensitive are they, that the slightest disturbance closes an electric circuit, thereby actuating electro-magnets and liberating the driving mechanism of the recording surfaces on which the earth's signature is written.

In some Japanese observatories the time of an earthquake is recorded by a curious form of clock. When the ground trembles, the dial moves quickly back and forth and receives on its surface three dots from ink pads on the hands. Thus the earth is made to stamp on the dial the exact hour, minute, and second when it trembled.

The list of the instruments might be tediously multiplied. Enough have been mentioned, though, to show through what means our knowledge of the movements of the ground has been increased, and how we are investing earthquakes with a significance which they certainly did not possess for our forefathers.

The seismograph upon which the great San Francisco earthquake was registered at Washington, D. C., belongs to the Weather Bureau. It is installed in a small room and consists of a post having a horizontal pendulum suspended against it near its base by two inclined wires. The plumb line on the other side of the post shows that this stands exactly vertical. Attached to the large weight on the end of the pendulum is a horizontal stylus, which projects over a vertical drum that carries the band of paper. The drum is rotated at a uniform speed by suitable mechanism, and the recording pen traces a straight line upon it. When the vibrations of the earth occur, the pendulum, owing to its inertia and its method of suspension, remains stationary, while the drum carrying the band of paper moves back and forth beneath it. The movement of the earth is thus recorded as a series of oscillations on either side of the straight line which the pen would normally draw. Each band of paper lasts for a period of twenty-four hours and, as the drum is moved slightly along its axis throughout each revolution, twenty-four parallel lines are traced. A suitable electrical apparatus makes dots on the paper at intervals of one minute, so that the time is accurately checked from the observatory.

The record which we reproduce was started at 2:27 P. M. of Tuesday, April 17, about sixteen hours before the earthquake took place. The lines traced by the pen were as straight as usual up to 19 minutes and 50 seconds after 8 A. M. Wednesday. At this point the first vibration in the straightness of the line occurs, and, as can be seen, the oscillations are very slight for the first five minutes. About 8:25 they increased greatly in size for some two and a half minutes, diminishing again for the following two or three minutes, only to increase once more rapidly at 8:30, until, at 8:32, the motion was so great that the paper slipped out from under the recording pen, and the latter failed to make a record for the next three minutes, owing probably to its sticking on the edge of the band of paper. At 8:35 it began once more to record the vibrations, and these gradually diminished in strength until 9:10, when Prof. Marvin, who had charge of the instrument, noticed that the vibrations were increasing again enough to move the paper out of place. He consequently reset the cylinder with the line to continue at a higher level. The vibrations appeared to diminish, with the exception of one or two notable ones that occurred shortly after 9:45, and from then on the line began to resemble its normal appearance.

The record obtained at Washington was supplemented by more complete records made at the United States Coast and Geodetic Survey Observatory, at Cheltenham, Md. At the latter observatory an instrument was located, which registered not only the east and west vibrations, but the north and south ones as well. A complete record of the vibrations in both directions was obtained, and this showed that those in the north and south direction were of greater amplitude, but extended on the whole throughout a lesser period of time, although the individual vibrations were longer in duration. We give below the official statement of the Coast and Geodetic Survey.

"The record from a distant earthquake (one more than six hundred miles away) may conveniently be divided into several portions. The first portion, generally known as the preliminary tremor, consists of very small, irregular vibrations, with a period of two to four seconds. The duration of these preliminary tremors is believed to increase directly with the distance from the origin of the earthquake. Next comes the principal portion of the earthquake, which generally begins with three or four large waves of a period of fifteen to twenty-five seconds. Immediately following these waves come the large waves, generally lasting several minutes and producing the maximum motions of the recording stylus. After this the motion dies down slowly until the end.

"At Cheltenham the preliminary tremors began at 8 hours, 19 minutes, 24 seconds at a distance of 2,450 miles from San Francisco; assuming now the time of the first shock as 5 hours 12 minutes Pacific time, or 8 hours 12 minutes Eastern time, as given by Prof. Davidson, of the University of California, the velocity of these tremors is found to be five and one-half miles per second, about twenty-seven times the velocity of sound. The time taken for these waves to cross the continent was 7 minutes 24 seconds.

"The large waves began about 8 hours 30 minutes 13 seconds, or an interval of 18 minutes 13 seconds after the first shock, and the velocity of these waves appears to be about two and one-quarter miles per second.

"The duration of the earthquake was nearly four hours. The duration of the strongest motion, however, was only from 8 hours 30 minutes to about 8 hours 40 minutes; during this period the motion was too large to be properly recorded by the seismograph.

"The period of vibration in the preliminary tremors was about two to four seconds; in the principal portion it varied from ten to twenty seconds.

"The San Francisco earthquake, besides being recorded the world over on specially designed earthquake instruments called seismographs, likewise affected the self-recording magnetic instruments at the three magnetic observatories of the Coast and Geodetic Survey thus far heard from.

"At the magnetic observatory at Cheltenham, Md., this disturbance began about half-past eight A. M., Eastern time, on April 18, and continued for about half an hour. This disturbance began some time after the preliminary tremors, coinciding with the principal portion of the disturbance as recorded on the seismograph.

"It affected chiefly the horizontal and vertical components of the earth's magnetic intensity, the greatest disturbance amounting to one one-thousandth part of the horizontal intensity and about one two-thousandth part of the vertical intensity. It was not of the same character as that due to a cosmic magnetic storm or as that recorded in connection with the Mont Pelé eruption, but appears to be chiefly if not entirely mechanical.

"At Baldwin, Kan., where there is no seismograph, the magnetic instruments also recorded a similar disturbance, lasting from twenty-two minutes after eight to half-past eight, Eastern time, some time after the preliminary tremors of the earthquake had reached Cheltenham.

"At the Sitka Observatory this disturbance was also recorded by the magnetic instruments from twenty-four minutes past eight to thirty minutes past eight, Eastern time, somewhat later than the preliminary tremors recorded on the seismograph at this observatory.

"It is to be noticed that in each of these three cases the magnetic disturbance occurs at about the same time that the greatest motion is being recorded on the seismograph.

"The question whether the earthquake disturbed the magnetics in a purely mechanical way or by its action on the earth's magnetism is by no means settled. In fact, it is only recently that attempts have been made to study the phenomena. Up to the present the results are contradictory. At times the magnetic disturbance is simultaneous with or actually precedes the preliminary tremors. In other cases, like the present one, it accompanies the principal portion of the disturbance.

"In some cases of large earthquakes no magnetic effect can be detected and in a few other cases, notably March 21, 1904 (New England earthquake), the shock was recorded at Cheltenham by the magnetic instruments, but was not recorded by the seismograph either at Baltimore or Washington."

SAN FRANCISCO AND ITS CATASTROPHE.

Fortunately it is seldom that one great elemental catastrophe follows close upon the heels of another. Usually Nature seems to stop and draw breath before beginning a further alteration in the envelope which restrains her greatest forces. The full horror of the devastation which last week swept San Francisco and adjacent cities, burst upon us before we had even fairly concluded that the Neapolitan disaster had reached its full extent. The earthquake which was the ultimate cause of the destruction of the greatest American city on the Pacific coast was incomparably the severest ever recorded in the United States, and was accompanied by the loss of hundreds, if not thousands of lives, and the destruction of property valued at hundreds of millions. But the full extent of the cataclysm was hardly realized until it was found impossible to check the progress of the fires which immediately sprang up at innumerable points among the ruins of collapsed buildings. The earth tremor destroyed almost the entire water system of the city, and the local fire department, as well as the assistance sent from other cities, was practically helpless. Dynamite and even artillery were used without effect to stay the sweep of the flames, and at the present writing San Francisco is the scene of a conflagration which is said to overshadow even the recent great fire of Baltimore, and which has rendered over 300,000 people homeless and helpless. To the terror of fire has been added the suffering entailed by lack of food and water, for railroad communication with the wrecked city has been all but destroyed and even telegraphic connection was not re-established till hours after the first shock.

That the native energy, courage, and resourcefulness of the Californian will raise upon the ashes of San Francisco a greater and more splendid city is certain; nor will the lessons taught by the destruction be lost. As far as can be learned from the meager reports obtainable it appears that solid masonry structures collapsed like so many houses of sand while more modern structures with steel skeletons were damaged to a far slighter extent. If true, this is doubtless because of the elasticity of the riveted framework, while the rigidity of solid masonry was of no avail against the rising and falling of the earth under the foundations. The severest damage due to the shaking of the earth itself was caused in that part of the city that was built on reclaimed land, and it seems that here even modern structures were unable to resist the sinking of the earth.

It would seem that the disaster of San Francisco, following so closely upon the great eruption of Vesuvius, could, in some manner, be traced to an origin at least analogous to that which caused the latter. It is the consensus of opinion, however, of scientific men, that the earthquake on the Pacific coast is of local origin. It is probable that the tremor was due to the slipping or fracturing of some great stratum or of several strata of rock either directly underlying the city or under the Pacific Ocean nearby. That the center of the convulsion was either under the land, or not far from the shore, is shown by the fact that no great annihilating sea wave resulted, like that which made the great earthquake of Lisbon, in 1755, so terribly destructive. On that occasion a great tidal wave passed clear across the Atlantic Ocean in nine and a half hours, and the effect of the shock itself was felt even in England. The Pacific coast which lies in an earthquake belt quite distinct from that which includes Southern Italy is peculiarly susceptible to disturbances of this nature. The present configuration of the soil is of recent geological age, and the coast, unlike the Atlantic shore line, shelves rapidly to deep water, and thus the slipping of rock strata, which is usually the cause of non-volcanic convulsions, is greatly facilitated. It is for the same reason that the Japanese islands and the Asiatic coast are so frequently the scenes of earthquakes, some of which, especially in Japan, have been of terrific intensity. It is quite true that volcanic eruptions and earthquakes are liable to occur simultaneously, but in the case of California a connection should be sought between its earthquakes and the condition of the volcanoes, either along the Pacific coast, or on the groups of volcanic islands in that ocean. In the last great earthquake of 1868, in which San Francisco suffered severely, there appears to have been undoubted connection between the tremor and the intense volcanic outburst in the same year of the Hawaiian volcanos, Kilauea and Mauna Loa, which probably directly caused the strata settling which give rise to the surface movement.

That the earth is extremely sensitive even to the slightest shocks, contractions, or alterations is shown by the tremendous rapidity with which the indications of these are transmitted to various parts of the globe. A few minutes after the first shock was felt in San Francisco the seismographic instruments at Washington recorded the tremor. A tremor of slight intensity would be sufficient to start the rearrangement or readjustment of a poorly balanced or heavily strained mass of strata underlying the earth's crust, and so, while we cannot directly blame Vesuvius for the Californian catastrophe, it is quite possible that an earth wave emanating from the labor of the mountain and traveling for thousands of miles through the solid mass of the crust provided the necessary initial agitation to start the movement of the strata.

Prof. John Milne, the great English seismic authority, has advanced a theory to account for recent disturbances of this character manifested here and abroad in various parts of the world, which has been held tenable by Sir Norman Lockyer and Prof. Archenbold. Prof. Milne declares that the disturbances are due not to a merely normal readjustment of the earth's strata or to the shifting of the surface to meet a gradual contraction in the size of the globe, but are caused by displacement of the globe itself from its true axis and are really due to the jar incident to the subsequent swinging back of the earth upon that true axis. It is conceivable that such a return movement to the axis as well as the original distortion would cause a tremendous strain upon the crust, and could easily account for the most terrific seismic convulsions imaginable. Sir Norman Lockyer declares further that the deviation from the true axis, a fact which, by the way, can be scientifically proven, is due to the great sun spots which at present are sending more energy to the earth than at any other time during the thirty-five years sun-spot period, and which through the great differences in the corresponding temperatures cause the formation of vast ice-masses at one or the other of the poles, of such weight that the distortion takes place, to be subsequently remedied by other variations.

The consideration of the terrible calamity which San Francisco has suffered immediately calls to the mind of the New Yorker the thought of what would happen should a similar disturbance occur on the Atlantic coast. From the experience to be gathered in the present earthquake and from what has been learned on other occasions, it would seem that many of New York's great modern buildings would stand a fair chance of immunity unless the convulsion were one of extraordinary violence, for not only is the great majority of the later structures of the riveted steel-frame type, but the underlying formation, particularly of the island of Manhattan, offers a solid rock foundation of the most substantial nature. Little apprehension need be felt however, for it is generally conceded by authorities on the subject that the city is not in any one of the various earthquake-belts and that this vicinity is part of an area which, considered geologically, is past the formative period by many thousands of years.

The Death of Prof. Curie.

Prof. Pierre Curie, whose researches on the radioactive elements have earned for him a worldwide reputation, was killed in Paris on April 11 last by a wagon as he crossed the Place Dauphine. His untimely death has terminated a career of unusual scientific brilliancy.

Prof. Curie was the son of a Paris physician and was born in Paris in 1859. He was educated at the Sorbonne and began scientific research on his own account while working as an assistant in the School of Chemistry of Paris. He became a professor in 1895 and at about that time he married Marie Slodowska, a Pole, one of his pupils. She had studied physics and chemistry both in Warsaw and Paris and thereafter shared with her husband the labor and honor of his most difficult experiments. It was she who discovered radium.

She and her husband spent several years in the laboratory of the School of Physics and Chemistry studying uranium and thorium and finally, in 1898, they announced to the Academy of Sciences that they had found a new and strongly radioactive substance in pitchblende. Radium was discovered in 1903. Two years before that the French Academy of Sciences had recognized the work of the Curies by awarding to Curie the La Caze prize of 10,000 francs and commending his wife for her part in the discoveries. In December, 1903, the couple received the Noble prize for chemistry and a few days later they received 60,000 francs as part of the Osiris prize of France—all in recognition of their radium discoveries.

The Current Supplement.

An article on some German electrically-operated cranes, well illustrated, opens the current Supplement, No. 1582. Mr. J. J. Carty, a telephone engineer of authority, writes on how a great telephone system is designed. The article on reservoir, fountain, and stylographic pens is continued. Mr. H. E. Field writes instructively on molding sand. The article by Mr. Alexander G. McAdie on lighting and the electricity of the air is continued. Celluloid and galalith (milk stone) are admirably discussed. Mr. William L. Price contributes a thoughtful review of the possibilities of concrete construction from the standpoint of utility and art. "Surveying on the Farm" is the subject of a well-written account by A. S. Kenyon. Perhaps the most valuable contribution which appears in the current Supplement is that by Livingston Wright and Gordon Johnson on "How to Make a Gliding Machine." The article is so thorough and so clearly illustrated, that by following its directions an aeroplane can be easily built. A third installment of valuable alloys is published.

Automobile Notes.

The Automobile Club of America will conduct a "Two-Gallon" contest on May 5. To the weight of each car loaded 800 pounds will be added, and the product of this figure multiplied by the number of miles run will give approximately the number of pound-miles run per two gallons. The weight of double-cylinder cars will be taken as 75 per cent of their actual weight, and that of single-cylinder cars at 70 per cent. This attempt at handicapping makes it almost certain that a large 4 or 6-cylinder car will win. In fact, upon the pound-mile basis, the large car always makes the most economical showing, as the fuel consumption does not increase in direct proportion with the weight by any means. A $500 cup will be presented to the winner, which will be the car making the most pound-miles per two gallons. The entries close May 2 and a fee of $10 will be charged.

The Grand Prix international automobile race will be held in France on June 26 and 27. This race is to take the place of the Bennett Cup race, which has been held for the past six years. It will be run on two successive days, and the rules which govern it are rigorous, requiring the driver and mechanic to do all the work of changing tires and making necessary repairs. The race will be run over the Sarthe circuit, the total distance being 750 miles.

Canadian mica has been increasing steadily in value from 1895 to the present time, and that of India has been almost as steadily decreasing in value; so that, where in 1895 the imported value of Indian mica was nearly three times that of Canadian mica, in 1904 Canadian mica stood higher than Indian.