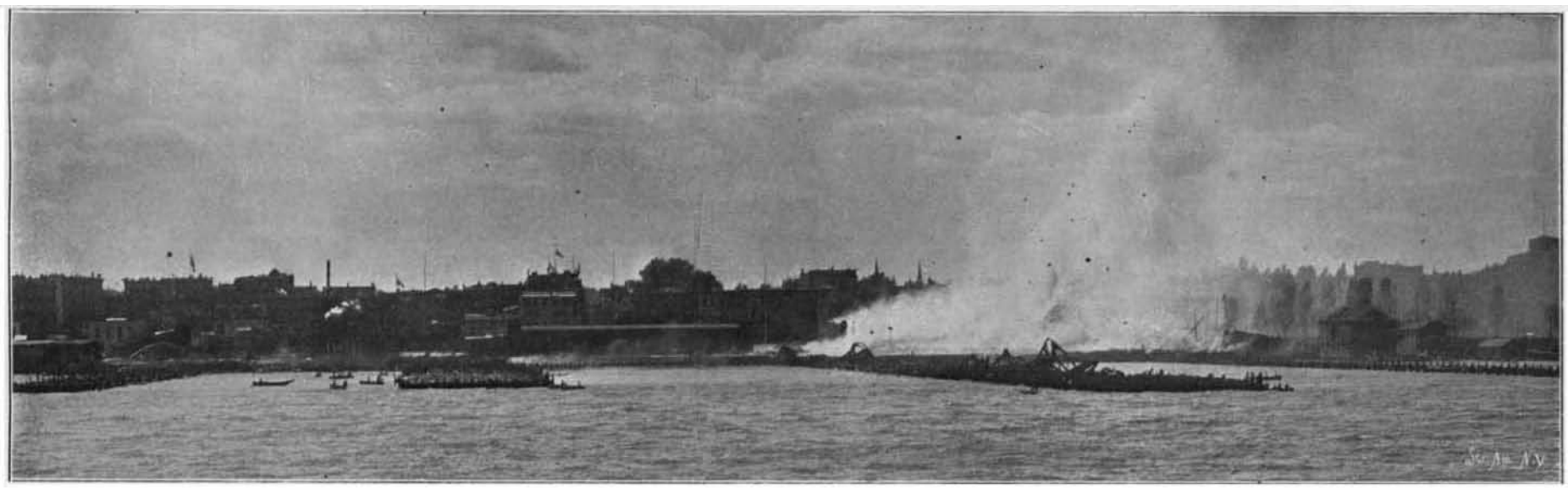
opening in the smaller cylinder. Attached to the air-pipe connection are two lugs which are adapted to lock with the lugs, *E*, on the left part.

When two cars are brought together, the left part enters the orifice of the right part which is funnel-shaped to insure the entry should the cars be unequally laden or located on a curve. The horizontal cross-pins, *D*, enter the helical slots provided for them; and at the same time the nozzel at the end of the tube, *B*, enters the hollow piston, *G*. The continued pressure of the two cars causes the cross-pins, *D*, to travel along their helical slots, causing the left part to rotate in one direction, while the forward pressure of the left part forces the sliding piston back, carries the air-pipe connection previously referred to along its left-handed helical opening, so that the piston, *G*, is caused to rotate in an opposite direction. These two opposite rotary movements force the lugs, *E*, under the grips on the air-pipe connection, thus forming a tight joint. The mere acts of separating the cars, causes the movable parts to rotate in the reverse direction to uncouple the pipes.



REMAINS OF THE FOUR NORTH GERMAN LLOYD PIERS AFTER THE FIRE OF JUNE 30, 1900.

THE BURNING OF THE NORTH GERMAN LLOYD STEAMSHIPS AND DOCKS, HOBOKEN, N. J.

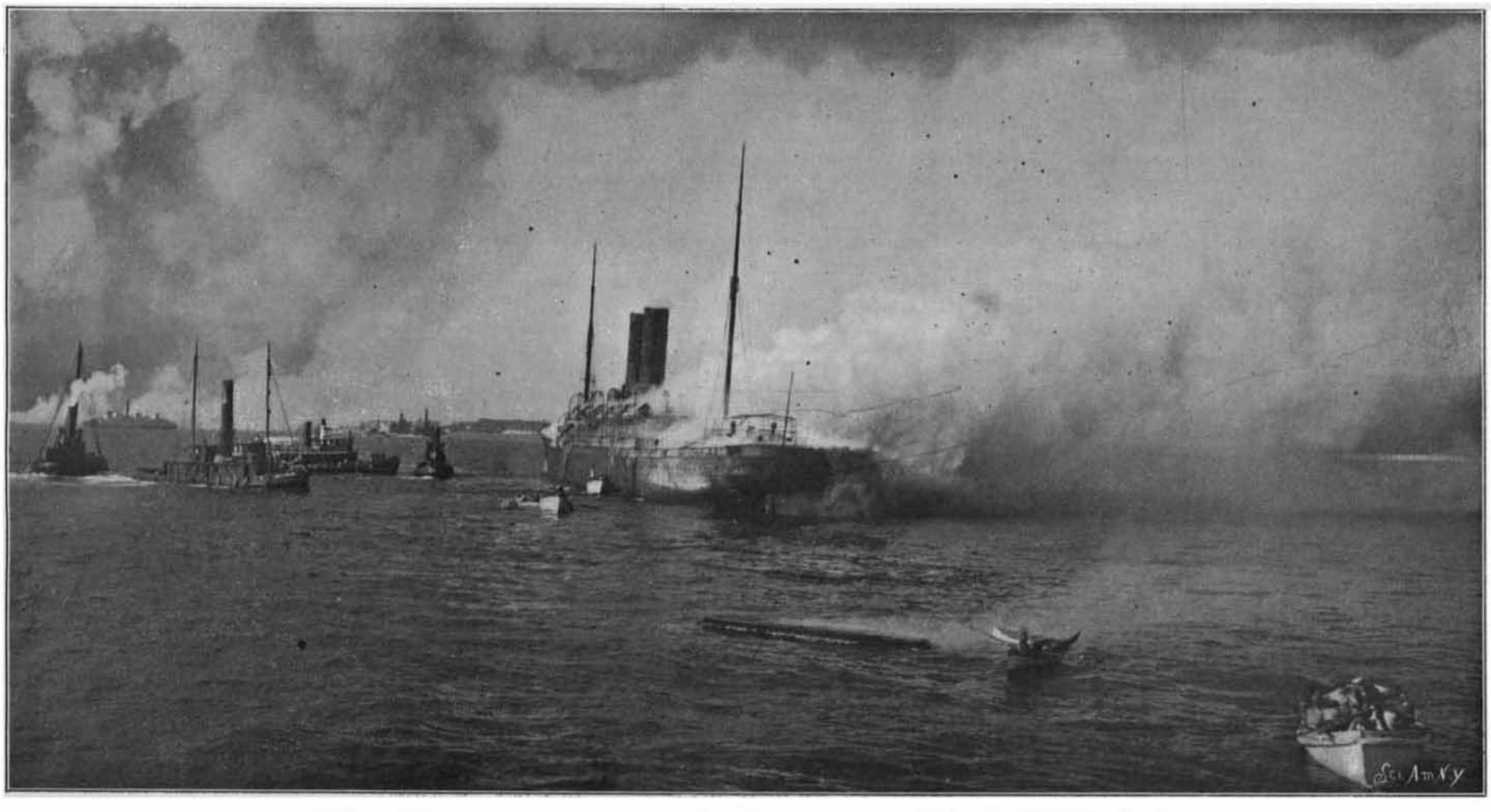
The record of disasters from fire in New York contains nothing more terrible than the conflagration which occurred on the afternoon of Saturday, June 30, by which between three hundred and four hundred lives were lost, many of them amid circumstances of unspeakable horror, while three of the largest steamships, of the North German Lloyd Company, and the four piers which constitute the landing facilities of the company at this port, were destroyed.

The docks of this great company, which together with those of its rival, the Hamburg-American line, are located on the New Jersey shore of the North River, at Hoboken, consisted of four large piers carried upon piling. The largest of these was a new double-deck structure, only recently completed, while the others had been more or less renovated, and in one case considerably lengthened. Most of them were of the standard type of construction, which, unfortunately, in the light of the recent disaster, is used almost exclusively on the water front of New York harbor. Piling is driven over the whole area to be covered by the piers and capped with 12 by 12 timbers, upon which are laid the joists and wooden flooring. The sheds on the majority of the older piers are built with wooden posts and roof trusses, and are wood sheathed.

At the time of the outbreak of the fire, which, according to eye-witnesses, started about five minutes to four on the afternoon of June 30, the situation at these docks was as follows: To the north was the new pier, about 800 feet in length, recently completed by the company, and generally known as the Thingvalla pier. On the south side of it was lying the steamship "Main," a new vessel of 6,398 tons, recently constructed by Blohm & Voss, of Hamburg, which came to New York on her maiden trip only last April, and on this fatal afternoon was loading for her second return voyage across the Atlantic. She had accommodations for 300 cabin and 800 steerage passengers, and was in every respect a first-class ship. Next to the steamship "Main" was pier number 1, with the steamer "Bremen" lying to the north of it, and the celebrated "Kaiser Wilhelm der Grosse" moored on its south side. The "Bremen," built in 1896 by Schichau in Germany, was one of four huge vessels constructed to carry a large quantity of cargo and a considerable number of passengers. She was 500 feet in length, 60 feet in beam, and had a register of 10,000 tons, and a speed of 15 knots. The "Kaiser Wilhelm der Grosse" is to-day the fastest of the great ocean liners, and one of the most popular passenger vessels afloat. She holds the eastward record to Southampton of five days seventeen hours and eight minutes, and a westward record of five days twenty hours and ten minutes. She is 648 feet in length, 66 feet in beam, and has a displacement of 20,000 tons. With a horse power of 27,000, she has a record speed across the Atlantic of over 22½ knots an hour.

The next pier to the south, Number 2, was accommodating the steamer, "Saale" of 5,267 tons register, one of the older vessels of the Company, which was constructed in 1886 at Glasgow. She is 455 feet in length and 48 feet in beam, and was known as one of the popular vessels of the line. Only a few hours before the disaster the steamer "Aller" had sailed from her birth between piers Nos. 2 and 3. At pier No. 3 there were several lighters and barges. It should be mentioned that all of these steamers had coal barges and canal boats alongside, from which they were taking coal and cargo, in preparation for the return trip across the ocean.

It seems that on the fatal afternoon there was lying in the middle of pier No. 3 a large quantity of cotton bales, and it is said that not far from this were over a hundred barrels of whiskey. It is generally agreed that the fire originated in the cotton, and it is supposed that the extraordinary rapidity with which it spread was due to the explosion of the whiskey and the scattering of the inflammable contents over the cotton. Be this as it may, it is certain that the fire swept through the whole length of the pier with extraordinary rapidity. It is stated by a captain of a tugboat, that although he was only a quarter of a mile from the pier when the smoke first appeared and made all haste across the river, the structure was wrapped in fire from end to end by the time he reached it. The spread of the fire was greatly accelerated by a strong westerly wind, and it is stated by eye-witnesses that within nine minutes from the time the first blaze was seen, the whole



THE "SAALE" BURNING IN MIDSTREAM AFTER DRIFTING OUT FROM THE BURNING DOCKS.

four piers and the steamships adjoining were ablaze. So swiftly did the flames leap from pier to pier, and to the adjoining ships, that within a few minutes the "Main," "Bremen," "Saale," and even the great "Kaiser Wilhelm der Grosse" were afire. On account of her extreme value, the efforts of the tugboats that rushed to give assistance were directed principally to saving the "Kaiser Wilhelm der Grosse," and, although she was dragged out into the midstream with her upper works ablaze, the fire was got under control before very serious damage was done. Not so, however, with the other vessels. Although the moorings had been immediately cast adrift by the crew when the fire started, the concentration of effort on the "Kaiser Wilhelm der Grosse" and the efforts of the tugs to save the people who had leaped from the burning piers into the water, resulted in these three vessels being left to the mercy of the fire, until, under the action of the tide, two of them, the "Bremen" and the "Saale," drifted out, blazing from stem to stern, into the Hudson River. The "Main" was burned at her dock.

While the loss of property was enormous, the magnitude of the disaster is to be measured by the awful loss of life and the aggravated horrors that attended it. Scattered over the ships, the piers, and the lighters were the crews and longshoremen, busy at the work of loading; and the spread of the fire was so sudden that escape from the piers to the shore was impossible. As a consequence, the majority of those who were cut off from escape by land leaped into the water, many of them being drowned before they could be picked up; but even this relatively merciful form of death was denied to many unfortunates who were working in the holds and lower decks of the vessels, and only discovered what was going on when they found their escape through the hatches cut off by a sea of fire which was raging in the upper works. Many of these were doubtless suffocated by smoke or burned as the vessels sank under the streams of water which were being poured into them from the fireboats and tugs. A feature which rendered the disaster particularly horrible was the fact that many of the imprisoned people could have been rescued had the portholes of the "Saale" been a few inches larger than they were. As it was, many victims died before the eyes and within actual touch of would-be rescuers, who were quite powerless to help them.

Within a couple of hours the whole four docks of the North German Lloyd Company and their warehouses were completely destroyed, and three of the passenger steamers were so far burned that it is as yet questionable, in the case of some of them, whether they will be worth refitting. The total loss of the company, including cargoes, is estimated by the general agent of the line to be about $5,000,000, while the present indications are that between three and four hundred souls perished. Of our illustrations, one shows the "Saale" when the fire was at its height. It was taken shortly after the vessel had drifted out from her pier into the river. The other photograph shows the present appearance of the water front, which was formerly occupied by the piers and the sheds of the company.

Geology and Geography at the Forty-ninth Meeting of the American Association for the Advancement of Science.

BY E. O. HOVEY.

According to the plan always followed at the annual conventions of the American Association for the Advancement of Science, practically the whole of the first day's session of Section E, that of geology and geography, was given up to the summer meeting of the Geological Society of America. The number of papers presented to the two bodies was unusually small this year, only ten being read before the Geological Society and seventeen before Section E, aside from the vice-presidential address of Prof. Kemp, an abstract of which has already been given in the SCIENTIFIC AMERICAN SUPPLEMENT. The attendance of active geologists at these summer meetings was rather small, on account of so many of them being engaged in field work, but it was representative, geographically, including as it did men from many of the States from Maine to California, and from Canada.

The meeting of the Geological Society of America was called to order in the geological lecture room of Columbia University, Tuesday, June 26, with the president, Dr. G. M. Dawson, director of the geological survey of Canada, in the chair. The secretary announced the election to fellowship of L. C. Glenn, of the North Carolina survey, T. L. Watson, of the Georgia survey, and Stewart Weller, of Chicago University. The secretary further stated that the next winter meeting of the society would be held in Albany, N. Y., and then the society proceeded to the hearing of the papers.

The first on its programme was by H. W. Turner, of the United States Geological Survey, and was entitled, "The Geology of the Silver Peak District, Nevada." This district lies in Esmeralda County, in the western edge of the Great Basin, and is characterized by isolated ridges and wide valleys. The lower portion of the valleys are playas or dry lake beds. The playas are often covered with incrustations of salt and much of the mineral is sufficiently pure to be used for domestic purposes without refining it. Some of the playas, however, like the Columbus playa and one in Fish Lake Valley, are rich in borax salt. The oldest rocks, except some gneisses of doubtful age, are Lower Cambrian. The middle Cambrian and the Ordovician strata are also represented, but then there is a great break to the tertiary beds. Volcanic activity began in Paleozoic time, and, after a long interval of rest, was renewed in Tertiary times, when a lake covered a large part of the district and deposited several thousand feet of strata. The chief economic interest in the region centers in the gold and silver veins in Mineral Ridge, an east spur of the Silver Peak Range. These veins occur usually at the contact of the granite and gneiss with the overlying Cambrian rocks and are of two kinds, quartz veins containing, for the most part, pyrite and free gold with a little silver, and quartz veins, which contain lead sulphides and silver, with a comparatively small amount of gold.

Erasmus Haworth, of Kansas University, presented a paper on "Native Copper from Garfield County" (Oklahoma). The native copper occurs in thin leaves in the "Red Beds," at a depth of about 32 feet from the surface of the ground. They seem to be confined to a stratum of red clayey shale six inches thick, and lie therein at all angles to the bedding, approaching parallelism thereto near the middle of the bed. They occupy fissures due to the drying of the beds, and are, therefore, of later date than the deposition of the beds themselves. The beds are utterly destitute of fossil remains, so that the reduction of the metal can hardly be ascribed to the action of organic matter. Furthermore, the rock is entirely unaltered, and the nearest igneous masses are at least one hundred miles distant. The author refers the native copper, therefore, to a possible chemical reaction between copper sulphate, iron oxide, and calcium carbonate, with traces of free sulphuric acid.

C. H. Hitchcock, of Dartmouth College, in a paper on the "Evidences of Interglacial Deposits in the Connecticut Valley," reported that he had found eskers and other glacial deposits in such relations to the earlier glacial beds near Hanover, N. H., as to convince him that there had been at least two advances of the great ice sheet over the region.

A second paper by Prof. Hitchcock described some of the volcanic phenomena connected with the eruption of Mauna Loa, on the island of Hawaii, in 1899. The first indication of activity was seen on the morning of July 4. It was the reflection in the sky of the light from the molten lava in the great pit 14,000 feet above sea level. A day later the first outbreak began with an explosion, about 3,000 feet below the summit on the eastern side. The melted lava discharged itself in a column thought by some to be 500 feet high at first. The material falling to the ground around the vent gave rise to the formation of a cone. Later a second vent discharged a similar flood half a mile from the first opening and not far from 10,000 feet above the ocean. Both these discharges were clearly visible from the Volcano House, near Kilauea, twenty miles away. Clotted lava blocks of considerable size and stones were freely emitted from these vents, while the lava flow followed down the north side of the mountain for fifteen miles. In three weeks' time the flow ceased. The stream was eighty feet wide and ten feet deep at its start, but was a mile wide lower down. The place of discharge was just above the upper limit of the northeast trade winds, consequently the column of steam and dust ascended vertically and spread out laterally, like the trunk and foliage of a large tree. The fine particles of dust spread in all directions and obscured the sky for a thousand miles on every side. At Honolulu, 150 miles distant, people could feel the impact of the particles on their faces. Old beds of ashes on the island indicate previous explosive activity at both Mauna Loa and Kilauea. Their decomposition has furnished the soil for the forests and now for the sugar plantations. The Hawaiian volcanoes were active in Tertiary time. On Oahu different sections are classified by the amount of erosion effected since the basaltic outflows. Mauna Loa shows no marks of erosion. It is a gigantic basaltic dome, which has required millions of years for its formation, judging from the comparatively small quantity of lava discharged in the present century.

W. H. Hobbs, of the University of Wisconsin, presented and discussed "A Theory of the Origin of Systems of nearly Vertical Faults, with Application to the Newark Basin of the Pomperaug River (Conn.)." This was related to an elaborate paper presented to the Society at its meeting last winter. He finds that the rocks of the region have been broken into rhombic prisms standing on end. The author thinks that the numerous faults are due to dislocation along joint planes and relief from pressure horizontally applied and that the superposed load must have been comparatively small.

Rudolf Ruedemann, of the New York State palæontological survey, delivered a paper on the Hudson River beds of the vicinity of Albany, in which he showed that these strata, which have been rather neglected by geologists on account of their faucity of fossils, are not to be regarded as representing one age. On the contrary, they contain beds belonging to several horizons. The other four papers on the society's programme were read by title.

One of the papers of most popular interest delivered before Section E was that by F. H. Newell, hydrographer of the United States Geological Survey, upon the progress being made in the measurement of streams and determination of the water supply of the country.

He showed that the water resources are being studied in a manner comparable with that in which the metals and ores are being examined, and official data collected concerning the occurrence and value of this important natural product.

On important streams in various parts of the United States systematic measurements are being made showing the variations in discharge from day to day throughout several seasons and years; in this manner the quantity and time of occurrence of flood is made known and the duration of seasons of drought. By having this information engineers and others concerned in the development of water power can determine the degree of reliability of various streams, and ascertain the available power.

Not only are the surface streams being measured, but examinations are being carried on of the occurrence of water underground, especially that reached by deep artesian wells. The importance to the public health of a water supply from these sources is well known. Applications are received from all parts of the United States for definite facts concerning the quantity and quality of waters occurring in pervious strata far underground. Throughout much of the United States the only mineral of economic value is water. This is particularly the case on the High Plains west of the Missouri River, where settlement is dependent wholly upon the ability to obtain water by the means of wells.

The subject of water storage is also being considered by the United States Geological Survey, and reservoir sites are being selected and surveyed in various parts of the West, particularly in the Rocky Mountain region, and in the high Sierras of California. Detailed surveys are made and estimates prepared of the cost of construction.

In the State of New York about twenty rivers are being measured—these being mainly tributaries to the upper Hudson, Mohawk and Black Rivers. Characteristic fluctuations of these streams were exhibited by means of diagrams. The catchment area tributary to various reservoir sites is being surveyed and shown upon the contoured maps prepared in coöperation with the State engineer and surveyor.

The information obtained concerning the flow of streams and the possibility of regulating the floods by means of storage reservoirs has peculiar importance in New York State, through the rapid development of electrical plants and the probable need of increased supply for the Erie Canal. The subject of the influence of forests upon the water supply can be thoroughly understood only when definite knowledge is had of the behavior of the streams. For this reason rivers issuing from the Adirondacks are being carefully studied, while the character of the timber on the watershed is being examined by foresters.

Another paper, the narrative portion of which will be read with widespread interest when it appears in the Century Magazine, was that by R. T. Hill, of the United States Geological Survey, describing the great "Chisos Rift" in Texas and the author's dangerous and thrilling journey down the wonderful cañons of the Rio Grande. This stream receives practically no tributaries for several hundred miles of its course and has carved its way through Cretaceous strata of different kinds, leaving vertical and even overhanging walls, hundreds of feet in height, turning sharp corners and giving surprises in the shape of rapids in the most bewildering manner. One of the cañons has received the suggestive name of Murderer's Cañon, on account of fatal encounters with Mexicans at its entrance. This paper, like many others on the programme, was elaborately illustrated with stereopticon views.

Prof. Hitchcock's paper, on the "Ice Age in New Zealand," gave the section a brief resumé of the observations he was able to make a year or more ago. The glaciers now existing among the high mountains of the Middle Island are the remnants or descendants of those of the great ice age. All were of Alpine character and were not continental like those of northern Europe and North America. The present glaciers have an average length and area at least 10 per cent greater than the existing glaciers of Switzerland, but they do not cover more than 30 per cent of the area occupied by ice at the maximum of the glacial epoch. The Tasman glacier is 20 miles long and 2 miles wide. The deposits of the glacial epoch in New Zealand are characterized by a general absence of ground moraine, eskers and drumlins, and there are very few large erratics. The lower portions of the subglacial streams spread cobble stones over wide areas. The great glacial epoch was in Tertiary time, according to the New Zealand geologists, who base their determination upon the stage of decomposition of the gravel and the association of the glacial

deposits with beds known to belong to the Tertiary. There are thirteen fjords on the southwestern side of the island, the topography is very rough, and the scenery is equal or superior to that of the Yosemite region in California.

John M. Clarke, State paleontologist of New York, brought out by means of diagrams and cross-sections the lenticular character of the Oriskany sandstone deposits in this State and showed how they filled depressions in the water-worn, but nearly level, Helderbergian rocks beneath. In some of the cement quarries near Buffalo the Oriskany sands are exposed, filling water-worn joints in the cement rock.

In the paper of A. A. Julien, of Columbia University, on the Genesis of the pegmatite in North Carolina, it was held that the origin of this rock has not yet been satisfactorily explained, and that the difficulty may be in part due to variation of conditions in the genesis of the aqueo-igneous magma. This is the rock which has furnished so many rare minerals to cabinets all over the world and is the source of some of the substances used in the making of mantles for incandescent gas lamps. Three hypotheses regarding its origin are in common acceptation, viz.: intrusion as dikes, infiltration as veins, and segregation. When examined, in view of the known characteristics of each of these forms, most of the pegmatites of North Carolina do not appear to conform to any one. In the author's opinion, they should be considered as aggregates of the very schist material which incloses them, softened to a plastic condition by thermal or superheated waters, and afterward consolidated with the concretionary structures which they now present. The phases of concentration of the more basic minerals (mica and feldspar) were discussed and note made of the significance of their close association with smoky quartz. The pegmatites of the region seem to mark the initial metastatic changes which accompany the birth of granite, rather than, as in some other regions, the phenomena which indicate the exhaustion of the process.

W. H. Hobbs, of the University of Wisconsin, described two rivers in western Connecticut in respect to the history of their drainage. They both have the same name, Still River, though they are only twenty-five miles apart. Both flow northward and one empties into the Farmington River, while the other empties into the Housatonic. Before the glacial epoch they flowed southward, but dams of gravel left by the great ice sheet changed their course to that which they have at present. R. D. Salisbury, of the University of Chicago, discussed at some length the yellow loam which occurs as a surface formation over a large part of New Jersey and adjoining States and which he has found to cover all strata from the most ancient rocks to the latest glacial beds with a thin mantle which is evidently a still water deposit. Prof. Salisbury holds that this is a marine deposit and that it indicates a subsidence of the region of not less than 240 feet since the retreat of the ice sheet and a subsequent elevation of a corresponding amount.

Papers were also read by W. J. McGee, on "The Occurrence of the Pensauken (?) Formation in the District of Columbia"; by D. S. Martin, on "The Geology of Central South Carolina"; by J. M. Clarke, on "The Fauna of the Arenaceous Lower Devonic of Aroostook County, Maine"; by J. P. Smith, on "The Principles of Paleontologic Correlation"; and by E. B. Mathews, on "A Simple Modeling machine."

The officers of the section for the next meeting, which takes place at Denver, are: chairman, Prof. C. R. Van Hise, and secretary, Prof. R. A. F. Penrose, Jr.

A TERRIBLE explosion occurred some days ago upon the premises of a large firm of manufacturing chemists in Huddersfield (England), when a large quantity of lyddite which was in process of manufacture for the government blew up with a tremendous report. The accident fortunately did not occur in the main portion of the factory, but in one of the out-lying buildings, and was separated from the main works by a river; otherwise the loss of life would have been appalling. The lyddite was undergoing the steam-drying process when it suddenly ignited through, it is believed, a spark from the chisel of a mechanic. The man lost his presence of mind, and instead of smothering out the fire with his cap, which he could easily have done, he ran away, probably thinking that the substance would explode. The explosive burned fiercely, and set fire to the building. Presently the roof of the structure collapsed upon the burning mass and compressed the gases. Consequently in a very few seconds there was a terrific explosion. The building was absolutely demolished, scarcely one brick being left upon another. Windows in the town were broken wholesale by the force of the concussion, and the débris hurled for a considerable distance in every direction. Fortunately there were few injuries to individuals, since all the workpeople had had ample time to clear out of the building. Only two hours previous to the catastrophe, it is said that 25 tons of lyddite had been removed from the very building in which the explosion occurred, so that it may be truly said that the inhabitants of Huddersfield had a very narrow escape from destruction.

Science Notes.

A fisheries exhibition will be held at Salzburg, Austria, on September 2.

The shipping of monazite from Brazil to Europe has almost been discontinued, owing to the very low price paid. The cheapness of the sand is one of the causes of the inexpensiveness of the German mantles.

A cylindrical slide rule has been devised by Prof. Robert H. Smith. By means of a spiral on the cylinder a length of over four feet is obtained for the logarithmic scale, which enables great accuracy to be obtained.

A school of practical agriculture has been opened at Briarcliff Manor on the New York and Putnam Division of the New York Central Railroad. The aim will be to raise the standard of agricultural methods, and practical instruction will be given in the orchard, garden, greenhouse, poultry yard and dairy. The idea is to consider first the quality and afterward the quantity of the article produced.

Meager accounts have been received of the trials of Count Zeppelin's airship which took place at Friedrichshafen on the evening of July 2. At a height of 1,260 feet the airship traveled 5¼ miles in seventeen and a half minutes, presumably with the assistance of the wind. There were five in the car. The apparatus for ascending and steering answered admirably until a rope became twisted in the gear which caused an abrupt end to the trip. The airship was fully described in the SCIENTIFIC AMERICAN for May 26, 1900.

The Académie des Sciences has lately received a communication from La Paz, Bolivia, relating to a remarkable meteorite which fell near that city. It was observed on November 20, 1899, at 7 h. 24 m. by a clear and starry night, the moon not being visible. According to the observers which were stationed on the hill of St. Sebastian, a short distance from the town of Coronilla, the meteor passed in a straight line from southwest to southeast during five or six seconds, over one-third of the visible horizon. It had the form of an immense disk of a reddish white color, with a train of bluish light; it exploded near the town of Pazedon and projected a number of meteorites upon theground.

The so-called horse-sickness which is endemic in the Orange River Colony, Transvaal, Natal, Rhodesia, and Bechuanaland, and occasionally in Cape Colony, is getting to be very serious and efforts are being made to render the horses immune. Fortified serum derived from immune horses almost invariably produces fatal results when injected into horses suffering from horse-sickness. The fortified serum is a useful agent if properly used, and is capable of preventing the onset of horse-sickness. Judicious treatment with the serum will assist in bringing about a cure, for if the animal is gradually accustomed to the toxin until it can receive an injection of 100 to 200 cc. of serum, virulent blood can be injected without danger.

In some circumstances a liquid which will not freeze is needed, among others, for certain forms of brakes, especially those used for pieces of artillery. For this purpose glycerine has been used extensively, but is somewhat costly, and alcohol even more so. These liquids may be replaced to advantage by a solution of chloride of calcium of 28 per cent strength, its cost being almost negligible. The solution will support a temperature of —32° C. without apparent change, and does not attack metals. Another solution which has been recommended for this purpose contains, in 100 parts, 1 part of chloride of magnesium, 10 parts chloride of calcium, and 20 of chloride of aluminium.

In Berlin elaborate preparations are making for the exhaustive aeronautical and scientific research that is to be made on July 15. The balloon, which has been contructed by a continental firm, is the largest ever made, being of over 320,000 cubic feet capacity, or twice the size of that in which Andree set out for the North Pole. It is to carry 6¼ tons, with 3½ tons of ballast. It will ascend at the Sport Park, Friednau. The main object of the expedition is to ascertain how long it is possible for a balloon to remain floating in the air. For this purpose the aerial vessel will be well supplied with provisions, while it will also be equipped with sleeping accommodation for the benefit of the aeronauts. The balloon is also to be utilized, during its ascent for the purpose of making several meteorological observations.

A curious case was tried before the Civil Courts in Vienna the other day regarding a claim arising out of a railway accident. The plaintiff stated that he had received internal injuries as the result of the accident. The medical experts maintained that the shock of the smash had caused the heart of the plaintiff to change from its normal position, to one lower down in his body. This theory was received with incredulity by the jury, but their sceptism was satisfied when they applied their hands to the man's ribs and could feel the organ beating in the usual manner. The medical men stated that the sufferer might live for several years notwithstanding the extraordinary displacement of his heart, but that he was more liable to heart failure and would experience great difficulty in doing his work. Under these circumstances the jury awarded the plaintiff heavy compensation.

Engineering Notes.

The city of Lafayette, Indiana, has presented to Purdue University a 2,000,000 gallon water works pumping engine for use in the laboratory of the University. It was built in 1875, and is an excellent example of the duplex walking beam pump. In addition to its historical value, it will furnish an ample supply of water for the hydraulic experiments which will be carried on.

M. Ende has recently compared the figures for the motive power used at the different expositions which have been held at Paris. In 1867 the total horse power was 854, furnished by 52 engines averaging 16 horse power each; in 1878 the total was 2,533 horse power, given by 41 engines of 62 horse power average. The figure for 1889 is 5,320 horse power; only 32 engines were used, with a mean of 166 horse power. In 1900 the total power of the engines and dynamos used to supply the energy is 36,085 horse power, supplied by 37 machines, giving a mean of 975 horse power. The French section has 18 machines, with a total of 14,435 horse power, or 802 per unit, and the foreign section supplies 19 machines, giving 21,650 horse power, or a mean of 1,140 per unit.

In the large sawmills of Joseph Fialla, in Austria, the sawdust is utilized by being made up into briquettes; these form a good combustible for boiler furnaces or household use. The sawdust is impregnated with a mixture of tarry substances and heated to the proper temperature; it is then passed over a plate of iron heated by steam, from which a screw conveyor takes it to the screw-press, where it is compressed into briquettes of the required size. The press turns out 19 per minute, weighing ⅝ of a pound each and measuring 6×2½×1½ inches. The calorific power is about the same as that of lignite, with but 4 per cent of ash. The factory turns out more than 6,000,000 briquettes a year; the cost is about 16 cents per thousand, and the selling price reaches one dollar, leaving a considerable margin of profit.

The development of the carbide of calcium industry in Europe is shown in the account recently published by the French Acetylene Syndicate, by which it appears that in 1896 there were but four carbide factories, of which two were in Switzerland, one in Germany and one in France. At present the total number of carbide works in France, either in operation or in course of construction, represents a nominal capacity of 50,000 horse power, this being furnished by hydraulic plants. In Germany this figure is 12,440; Italy has more than 16,000 horse power; England, on the other hand, has but 1,600; Norway has 15,000, Austria 18,550, Russia 3,500, of which 2,000 represents hydraulic power, and Switzerland 19,000 horse power. The full capacity of these plants is not entirely utilized as yet; thus, France which could produce 27,000 tons annually, gives but 15,000 to 20,000.

A new railroad is to be constructed in Belgium which will unite Brussels with Ghent; it forms the prolongation of the existing Ghent-Ostend line and is to be laid out with the most recent improvements. Its length will be about 30 miles. The new road will permit the distance from Brussels to the coast to be covered in 75 minutes; it will be operated at first by steam, but is constructed so that electric traction may be substituted later if desired. It will run in a nearly straight line from Ghent to the suburbs of Brussels, without grade crossings or intermediate stations. The construction of the road will not cost more than $100,000 per mile, and the 30 miles will thus cost below $3,000,000. A project has been recently under consideration for a direct line on the electric system from Brussels to Antwerp, in which the trains were to have a normal speed of 60 miles per hour without stops between the cities, but after considerable discussion it was decided to abandon the project for the present.

An Austrian journal, the Zeitschrift für Berg und Hutten Weisen, gives a number of figures relating to the mine disasters which have taken place during the last five years in the principal countries of the globe. During this period, Germany is the country which has suffered most from disasters of importance; the whole number of lives lost is more than 700, occasioned by 49 disasters; the list does not take into account single accidents. Of these the most fatal accidents have been caused by explosion of gas and by fire. Russia occupies the second place with 650 victims, including a single disaster which was caused by inundation, in which 300 lives were lost. America and England come next, the former with 395, the latter with 365; in the former case explosions have been the principal causes, and in the latter explosion and inundation. As the Austrian journal does not take into account accidents of less than 10 fatalities, there is no doubt that the list would be greatly increased. The next is Hungary, with 126; Spain, with 108; France, with 70; and Belgium, with 48. In France this number is due to 7 serious accidents, and deducting those of Montceau-les-Mines and Rochebelle, in which 50 lives were lost, there remains but 20; it may be supposed that this number, relatively small, is due to the good working of the mining administration in that country and to the strict inspection which is exercised.