

At the end of August, 1900, the length of the working galleries was 11,050 feet for the north end of the tunnel, and 8,130 feet for the south end, or a total of 19,180 feet. The maximum force of workmen employed simultaneously on the two sections has been 1,073. The mean progress of the drilling has been 12.2 feet per day; up to the present only three drills have been used in each section. At 6,000 feet distance from the entry, the temperature of the walls has been found to be 20.4 degrees C. for the north section and 28.4 degrees for the south. The ventilation has absorbed daily, since the month of May, 52,844,000 cubic feet of air, of which 27,400,000 were for the north and 25,584,000 for the south end. The ventilators are as yet established only on the southern section; on the north section the air supply is obtained for the present by a ventilating shaft which is heated to increase the draught. The water-sprinkling devices are installed in each of the sections; the temperature of the water coming out of these is 20 degrees and 15 degrees C. for the north and south ends respectively, when it is but 10 degrees at the exterior. The volume of water under pressure which is sent to the extremities of each section amounts to 703 cubic feet for the north end and 592 for the south. For the north section, the mean daily consumption of dynamite is 1,110 pounds, being 596 pounds for the mechanical drilling and 594 pounds for the hand drilling; for the other section this consumption is 893 pounds, with 620 pounds for the mechanical drills.

THREE IMPORTANT PATENT DECISIONS BY THE UNITED STATES COURT OF APPEALS AT NEW YORK.

The United States Court of Appeals for the Second Circuit last week handed down its decision in the suit of the Thomson-Houston Company against The Lorain Steel Company for alleged infringement of Letters Patent to Walter H. Knight, No. 428,160, for electric motor regulators, commonly known as the "Interlock" patent. The complainant in this suit contended that this patent covered broadly the use of a stop or lock, controlled by the regulating switch of a motor controller, for preventing the operation of the reverse switch except when the regulating switch was at its off, or open circuit position; or in other words, that the patent covered all forms of the devices now in use in motor controllers which make it necessary for the motorman to operate his controller handle to shut off the trolley current before he can operate his reversing switch.

In an opinion by Judge Wallace, the Court of Appeals reverses the decision of the lower court, which held the defendants liable under the patent, and declares the patent to be invalid as to all the claims involved in the suit. Judge Wallace decided:

"The patent cannot be broader than the real invention, and that is measured by the novelty of the particular contrivances which constitute the locking mechanism. . . . We are of the opinion that the broad claims of the patent (claims 1, 2, 3 and 4) are not warranted by the scope of the real invention by Knight. As it is not asserted by the complainant that infringement of the fifth claim has been established, it is unnecessary to advert to the differences between the devices employed by the defendant and the patented devices. We conclude that the first four claims of the patent are invalid, and in the absence of any proof of infringement by the defendant of the fifth claim, the Court below should have dismissed complainant's bill with costs."

The same Court has also handed down its decisions in the suit of the Thomson-Houston Electric Company vs. The Nassau R. R. Company and The Lorain Steel Company, and in the suit of the Thomson-Houston Electric Company vs. The Bullock Company, et al. These two suits, which were heard together on appeal from the Circuit Court, and in which The Lorain Steel Company was the real party defendant, involved two Letters Patent to Elihu Thomson, Nos. 283,167, of August 14, 1883, and No. 401,085, of April 9, 1889, commonly known as the "magnetic blow-out" patent, the suits being for alleged infringement by the defendant in the manufacture, use and sale of its motor controllers.

The earlier Thomson patent was framed to cover broadly the application of a magnet to an electric switch for the purpose of extinguishing arcs formed at the switch contacts. In the opinion by Judge Shipman, the Court affirms the decision of Judge Thomas in the Circuit Court, and declares the patent to be devoid of patentable novelty in view of the prior art.

The later Thomson patent involved the use of insulating material in an arc-rupturing device for the purpose of protecting the metal surfaces of the switch contacts or electrodes and of the blow-out magnet from the action of the electric arcs.

The Court of Appeals reverses the decision below which sustained the patent, and declares it invalid. The Court says:

"We cannot perceive that the effect of the insulation in an arc-rupturing device is anything more

than the old effect which had always accompanied insulation."

These decisions of the Court of Appeals dispose of three patents claiming principles which lie at the foundation of the manufacture of the modern electric car controller, and terminate the protracted litigation which has been carried on under the patents against the controllers manufactured by The Lorain Steel Company.

THE GLASGOW EXHIBITION OF 1901.

The buildings to accommodate the exhibits at the great exhibition at Glasgow this year are rapidly approaching completion. Difficulty was experienced a short time ago regarding the delivery of the structural steel, but the trouble was avoided by eliminating a good deal of the steel work from the buildings. The designs for the buildings have been prepared by Mr. James Miller, I.A., of Glasgow. There will be four principal groups of buildings—the fine arts gallery, the machinery hall, the industrial section and the grand hall for entertainments—which will cover in all about 20 acres.

The buildings for the industrial section are in the Spanish Renaissance style. The building is 700 feet in length by 360 feet in width, and is crowned by a huge dome 80 feet in diameter, which is a conspicuous feature. The main avenue, 92 feet in width and 150 feet in height, extends longitudinally through this building, and has a massive circular arched roof. Four white towers spring from the building to a height of 180 feet above ground level. Round the exterior of the dome at a height of 100 feet above the ground is a large balcony which affords an excellent view of the whole of the grounds. Each corner of the building and the north and south fronts toward the center have a pavilion about 35 feet square, and surmounted with minarets, so that from the exterior the erection will present an attractive appearance.

The machinery hall is 500 feet in length by 320 feet broad, and consists of one central bay 100 feet wide, and four other bays each 53 feet in width. The height of the central span is 41 feet and that of the side spans 29 feet. The central bay is flanked on each side by an overhead gallery, 15 feet wide, from which the whole of the exhibits in the building may be witnessed. A railway is to be run into the hall for the conveyance of the goods, while a special footway is to be provided for passengers. The building together with the boiler house and goods yard covers 5½ acres.

The exhibition buildings will cost in all, with the exception of the magnificent new art galleries, \$650,000. The art galleries, in which are to be placed the art treasures of the city, it is estimated will cost \$1,250,000.

The exhibits are to be divided into eight classes, and all the leading countries of the world in addition to the British Colonies will be fully represented. The executive is desirous of making the section devoted to industrial design and manufacture specially exhaustive and adequate, and to attain this object deputations have been dispatched to the leading industrial centers to obtain the support of the most prominent manufacturers. Another important class is that devoted to machinery, electricity, motive power, and labor-saving appliances, which it is intended to make the most salient feature of the exhibition. The exhibits are to be driven by electric motors, and every assistance is to be extended to exhibitors in order that they shall be able to display the characteristics of their specialties to the best advantage. In the marine engineering and shipbuilding section will be exhibited a collection of models, representing the evolution of the modern ship from wood to iron, sail to steam, paddle to screw, and single engines to triple-expansion engines. In the locomotion and transportation section, the latest development of automobilism will be extensively represented, together with the most modern railway engines. Other sections include agricultural and mining machinery, scientific instruments, archaeology, etc., while a special class is to be reserved for women.

During the time the exhibition is open scientific meetings will be held. The British Association will celebrate their annual gathering here, under the presidency of Prof. Rucker, the savant of terrestrial magnetism. The Society of Engineers and Shipbuilders, the Society of Chemical Industries, and several other similar scientific and mechanical institutions will also contribute lectures dealing with their respective ramifications of industry and commerce.

RESIGNATION OF COMMISSIONER DUELL.

We regret to note that the Hon. C. H. Duell, Commissioner of Patents, has resigned the Commissionership to resume patent practice. Mr. Duell has been a most efficient executive officer of the Patent Office, and he will retire to private life with the best wishes of those who have been associated professionally with him.

SCIENCE NOTES.

A bust of Gauss is to be placed in the lecture room for geodesy and mathematics at the University of Berlin.

Dr. Talamon, one of the physicians of the Bichat Hospital, Paris, announces the successful treatment of pneumonia by injecting anti-diphtheritic serum.

A party from the Massachusetts Institute of Technology has perfected plans for going to the island of Sumatra to observe the total solar eclipse of the sun on May 17, 1901. The party will be in the charge of Prof. Alfred E. Burton.

A relief expedition sent by the Duke of Abruzzi left Sandefjord March 5 on board the "Capella." It is commanded by Capt. Stockken, father of the missing machinist of that name. The "Capella" will go to Franz Josef Land. They hope to find alive the Norwegian machinist and the two Italians who were lost in the recent Abruzzi expedition.

Prof. Loeb's experiments in artificial parthenogenesis are most interesting. He has been able to develop eggs of Chaetopterus, an annelid, into free-swimming larvæ by placing them in solutions which cause them to lose water. Potassium chloride solutions and hydrochloric acid when added to the sea water have been found effective in causing the eggs to develop. The artificially developed larvæ did not differ from those produced by natural fertilization, and it was concluded that the processes of segmentation are a function of the constitution of sea-water.

A London journal calls attention to what might be termed the "elevator disease." It says it looks as though people with weak hearts had, after all, better climb ten flights of stairs than effect the ascent by means of the elevator. Lift attendants have died sudden deaths; people with weak hearts have noticed ominous sensations when in the elevator. We are told the sudden transition from the heavier air at the foot to the lighter air at the top is extremely trying to the constitution. Most people have experienced singular sensations of internal collapse when the lift floor sinks beneath the feet, but none suspected that the results might be so serious.

A great congress is to be held in London on July 22 of this year on the subject of tuberculosis, and the discussion of the experiences obtained in various countries for the cure of consumption and the best methods to adopt to bring about its eradication. The congress will last five days, and it will be supported by delegates from all parts of the world, who will advance any information relative to the subject at their command. The King of England, who has always taken a keen interest in the cure of this malady, will open the congress. One of the leading features will be a museum containing a number of pathological and bacteriological instruments, charts, models, etc.

Prof. Pickering makes the following statement relative to the light flash from Mars: "Early in December we received from the Lowell Observatory in Arizona a telegram that a shaft of light had been seen to project from Mars (the Lowell Observatory makes a specialty of Mars) lasting seventy minutes. I wired these facts to Europe and sent out neostyle copies through this country. The observer there is a careful, reliable man and there is no reason to doubt that the light existed. It was given as from a well-known geographical point of Mars. That was all. Now the story has gone the world over. In Europe it is stated that I have been in communication with Mars, and all sorts of exaggerations have sprung up. Whatever the light was, we have no means of knowing. Whether it had intelligence or not, no one can say. It is absolutely inexplicable."

Vacant lots have been successfully cultivated in Philadelphia under the direction of the Philadelphia Vacant Lots Cultivation Association. During the past years gardens were provided for 480 families, consisting of 2,486 persons. The aggregate receipts from the various farms showed a total of \$24,560. This is six times the amount expended by the association on the lands. Five families became so adept at gardening that their savings have enabled them to hire ample farms of their own. Thirteen families were given Belgian hares for experiment last year, and the successful results attained will cause the association to take up this line of industry on the farms this year.

Dr. George G. Hopkins, of Brooklyn, has been using decomposed light in the treatment of consumption with considerable success. Dr. Hopkins' system is to use decomposed light as a substitute for sun rays. The patient is fed with arsenic, cod liver oil, etc., in order to build up the system and strengthen the tissues. Then the light, which restores vitality, is used and the patient is enabled to throw off the germs of consumption. The system originated with Dr. Finsen, of Copenhagen. It has also been used for the treatment of cancer. A 15,000-candle power arc light is used and the light is decomposed by blue glass, thus allowing only certain of the rays to strike the patient.