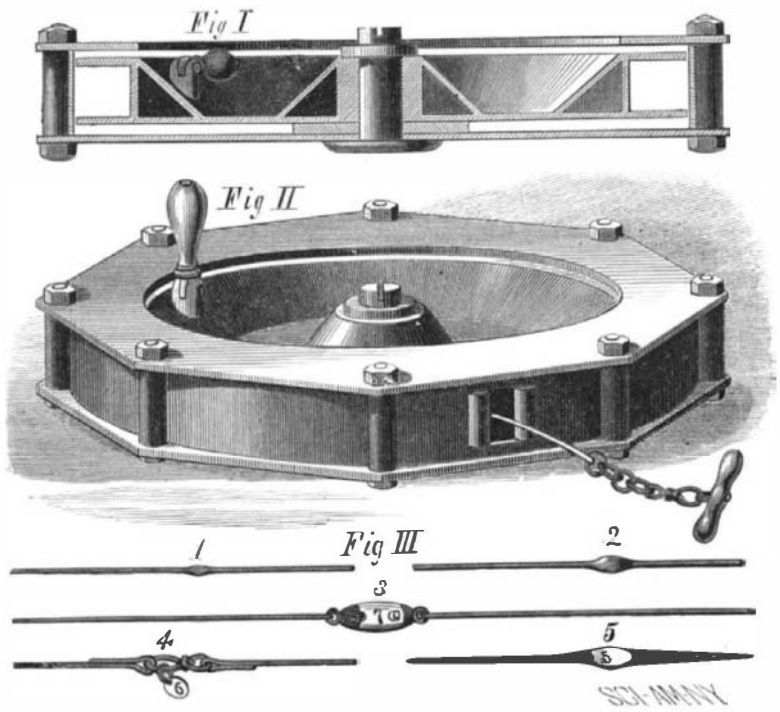
WIRE MEASURING DEVICE.

The engraving shows a wire measuring device for surveying and other purposes, recently patented by Mr. Alfred Atkins, of Wanganui, New Zealand. Figs. I. and II. show very clearly the form and construction of the reel. Between the head of the screw and the spindle is inserted a washer, which rests upon the upper edge of a bearing fixed to the wheel. The spindle is fixed to the back of the frame, which is separated from the wheel by a leather washer. Upon the periphery of the wheel is formed a groove, in which the wire is wound. The reel is provided with a jointed handle, and is placed in a case or frame, in one side of which is a large circular aperture as shown in Fig. II.

The wire is fractionally divided, thereby dispensing with a separate tape or measure for giving the fractional parts, and is composed of several sections, which are united by swivels to prevent kinking. The swivel may be formed as shown at 4, Fig. III., and furnished with a tally to indicate the distance; or it may be made as shown at 3, in which the number is cut upon the flat portion in the center. The smallest divisions —say links—are formed by a very small swelling, shown at 1; those for the next larger divisions—say five links—by a larger swelling of the same form, as at 2; and those for the next larger divisions—say ten links—by a slightly larger but flattened swelling with the number cut upon it, as at 5. When considered necessary, a spring swivel can be attached to the inner end of the wire next to the reel, to be used when any distance is to be measured with extreme accuracy.

By inserting swivel joints in the wire at regular intervals all danger of kinking and breaking is obviated; and as the marks separating the several divisions are easily and quickly perceived, distances—as in surveying—can be measured rapidly and with almost no chance for error.



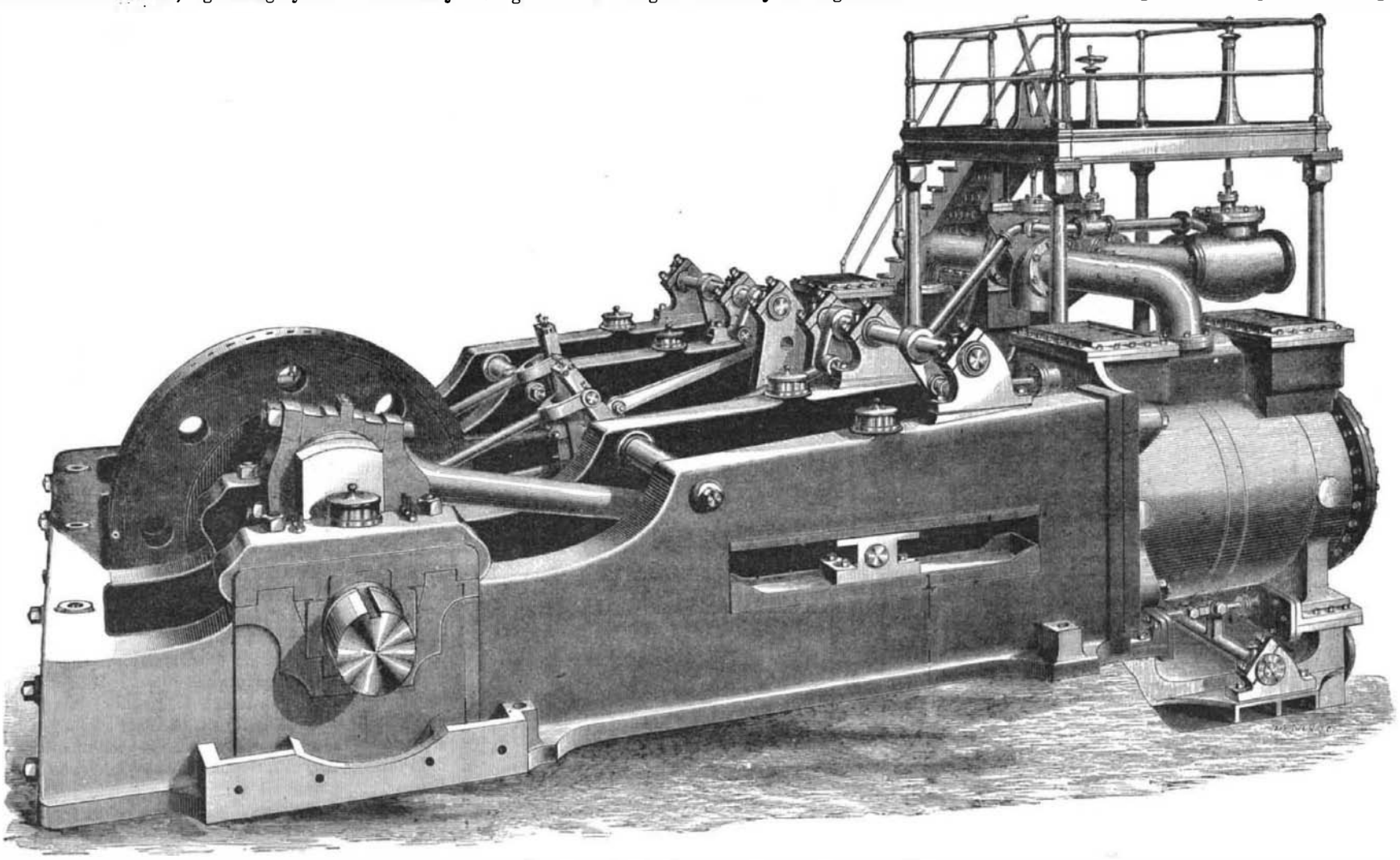
ATKINS' WIRE MEASURING DEVICE.

An Invention Wanted.

A correspondent suggests that a simple and cheap device for registering the distance traversed by a bicycle or other wheeled vehicle would be an invention of which great numbers could be sold. Here is a chance for some ingenious individual to rack his brain.

REVERSING RAIL MILL ENGINES.

The accompanying engraving represents a pair of high pressure rail finishing engines recently erected by W. and J. Galloway & Sons, Manchester, for which we are indebted to the *Engineer*. The pair of engines has cylinders 50 inches bore, and a stroke of 4 feet 6 inches, the pistons being unusually deep, to dispense with back slides. The crank shaft is of the double sweep description, with journals 18 inches diameter, the crank pin being of the same diameter by 15 inches long. As will be seen from the engraving, the framing is of most substantial character, and one of the principal features in connection with these engines is the arrangement of the steam admission and exhaust valves, which consist of simple flat plates, which are found in practice to maintain during wear their original efficiency and tightness. The exhaust valves being placed underneath the cylinders, enable any water that may pass into the cylinders to be discharged freely, without the necessity for special relief valves. The engines are fitted with link motion of the Allen type; the reversing is effected by a steam cylinder, the piston being suitably cushioned, and actuated from the stage where the driver stands.



IMPROVED REVERSING RAIL MILL ENGINE.

Disinfecting the Sputa of Phthisis.

Dr. J. Sormani, Professor of Hygiene at the University of Pavia, gave some interesting details at the Hygienic Congress of the Hague concerning experiments made this year on 150 Guinea pigs with the sputa from phthisis. The object in each case was to ascertain what chemical or other methods would neutralize the bacillus which, it was previously ascertained, existed in large numbers in the sputa. The results of these experiments were summarized in the following manner: 1. The bacilli of tubercolosis were generally very difficult to destroy; dryness, exposure to oxygen, putrefaction, and most disinfectants failed to produce any effect. 2. A temperature of 100° C. only killed the bacilli after at least five minutes of ebullition. 3. The artificial digestion of bacilli showed that they were the last of all living organisms to be destroyed by the gastric juices or chloridic acid. A very active digestion is necessary to kill this microbe. A healthy man may destroy the bacilli in his stomach, but an infant or an adult with his digestive faculties impaired would easily allow the germ to pass the stomach intact, and retain its virulence in the intestinal tube. This determined enteric ulcerations, etc. 4. The bacillus of tuberculosis can be preserved intact for a whole year when mixed with water. It is probable, though not proved, that it has retained its virulence during that time. Thus drinking water may become the means of propagating tuberculosis. It is probable that contaminated linen retains its virulence for five or six months. 5. Alcohol does not destroy the germ, and hard drinkers often suffer from tuberculosis. 6. Cod liver oil, ozone, oxygenated preparations, and other similar remedies have no effect in killing the bacillus, nor are benzoate of soda, salicylate of soda, sulphate of zinc, and carbolic acid, iodide of silver, bromide, camphor, etc., of much greater use. They injure, perhaps, but do not absolutely destroy, the bacillus, at least not in the doses that can be taken without danger. 7. A more decisive action may be attributed to creosote, eucalyptol, pure carbolic acid, the naphthols, and bichloride of mercury. 8. For disinfecting spittoons, carbolic acid solution at 5 per cent is thought sufficient, and Dr. Sormani asserts that the breath never contains any bacillus. He also suggested that essences of turpentine or eucalyptol should be diffused in the houses as an agent for the destruction of this special germ. —*Lancet.*

Change of Plumage in the Wild Duck.

The drake leaves his mate, says a writer in *Familiar Wild Birds*, as she commences to hatch, and then undergoes, in common with many other male birds of the duck family, one of the strangest transformations known to naturalists. The plumage of the drake is, up to this time, exceedingly handsome. The bill is yellowish green; the irides hazel; the head and upper part of the neck a rich glossy green, with a ring of white; the lower part of the neck and the back a grayish chestnut-brown; the rump and upper tail-coverts bluish-black; the middle tail feathers velvet black, and curled upward; front and sides of the neck rich dark chestnut; breast, belly, vent, grayish-white; under tail-coverts velvet black; legs orange yellow. As already mentioned, a wonderful change takes place in the appearance of the drake at the time of breeding. First, the back and breast change color, then the curled feathers are lost, the splendid plumage of the head and neck becomes dull and gray, and about the first week in July all the handsome markings have disappeared, and the bird has assumed the dull brown color of the female.

A Large Gun Tube.

Sir Joseph Whitworth & Co., Manchester, have completed for one of the 110 ton guns now being built for the government a steel tube which is the largest that has ever been made for ordnance purposes. The length of the tube is 42 feet 6 inches, the outside diameter 27 inches, and it is made of fluid pressed steel forged hollow, with a hole through 14¾ inches diameter. The weight of the tube, as delivered by Sir Joseph Whitworth & Co., is 26 tons, but if it had been made in a solid casting it would have exceeded 40 tons.

The Human Blood Worm.

This parasite, the *Filaria Bancrofti* of Cobbold—*Filaria sanguinis hominis* of some authors—is second only to the dreaded *Trichina spiralis* in its interest, producing as it does a long list of diseases in the human system, some of which frequently prove fatal.

The male worm is unknown; the female presents the following characters: Body hair-like, smooth, and of uniform thickness. The head is furnished with a circular mouth without papillæ. The neck is narrow, and the tail blunt. The reproductive outlet is situated close to the head, and the anus just above the extreme tip of the tail. Length, three inches. The embryos attain a length of one two-hundredths inch, and the ova measure about one one-thousandth inch from pole to pole.

The embryo form of the blood filaria was first discovered by Waucherer in Bahia, in 1866, in chylous urine from a female patient in the Misericordia Hospital there; and six years later Lewis found the embryos in human blood, as well as in chylous urine, and in several organs of the body, notably the kidneys. As an instance of the enormous numbers of this parasite which sometimes infest the human body, the latter author calculated in one case that 140,000 filariæ were present in the blood of a single unfortunate patient.

The habitat of the adult parasite above described is the alimentary tract of man. Here fecundation takes place, and, finally, scores of embryos of a worm-like form, and measuring one two-hundredths inch in length, are extruded from the reproductive outlet of the female. These make their way into the blood, and there produce some or all of the following list of symptoms: Chyluria, bloody urine (hæmaturia), wandering muscular pains, elephantiasis—a very common symptom, occurring in more than one-half of all cases—leprosy, and various forms of lymphatic abscess, anæmia, and general ill health, ending frequently in complete destruction of the vital powers and death.

The *Filaria Bancrofti* has been found in Egypt, Australia, China, India, and South America, and doubtfully in several European countries, and in the southern United States; certainly, of the ready possibility of the disease being introduced into any temperate or tropical climate there can be no doubt.

In Bahia and in Brazil generally the blood filaria is especially common, 8⅓ per cent of the entire population of Bahia, it has been calculated, at some period of their lives harboring this parasite.

Nothing could be more interesting than the mode of propagation of this species of filaria. It is well known that the class of the *entozoa* generally must go through at least one stage of their metamorphoses outside the body of their host, frequently within the body of another animal, and at first sight it is difficult to imagine how this can take place in the case of a parasite which inhabits human blood; but the subject has now been entirely cleared up by the laborious investigations of Manson, Lewis, Cobbold, and others. The female mosquito, after gorging itself with blood, repairs to some pool of stagnant water, there to digest its meal, and finally deposit its eggs. Should the victim of the mosquito have been a person whose blood contained filariæ, these parasites are sucked into the digestive tract of the insect, and during the period while its sanguinary meal is being digested the embryos there undergo marked changes, finally developing a four-lipped mouth, and becoming cylindrical in shape, with an abrupt, sharply pointed tail. When they have attained the proper stage of development they abandon their insect host, and take up their abode in the stagnant water. Should a single pair of these microscopic larvæ be introduced into the digestive tract of man through drinking water containing them, or by eating water plants to which they had adhered, they rapidly develop into mature specimens of *Filaria Bancrofti*, and, fecundation having taken place, a new brood of embryos are produced to populate the blood, cause the diseases above mentioned, and form a new center of this hideous disease.

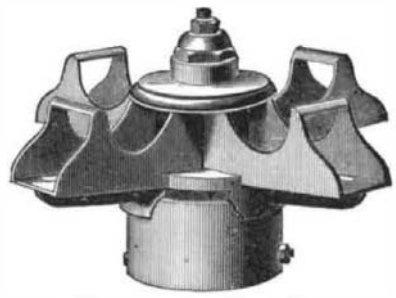
As the parasite under discussion can only be propagated through the agency of the mosquito or nearly allied blood-sucking insects, it is evident that if the race of mosquitoes were exterminated blood filaria disease would very soon cease to exist; but such a proposition needs only to be stated to show its absurdity, and the only practicable method of preventing the disease is to avoid taking the larvæ into the stomach, by the use of only carefully filtered water—except, of course, where a spring of pure water is the immediate source of supply—or of that which has been raised to the boiling point before being used for drinking or culinary purposes; a temperature considerably below 212° being absolutely fatal to this worm in all its stages of development.

The treatment of blood filaria disease is exceedingly unsatisfactory, no known mode of procedure having any great influence over the progress of the disease; a decoction of mangrove bark is a tropical remedy of great repute; gallic acid has been used with asserted benefit by European practitioners. Fortunately, however, the symptoms appear to be to some extent self-limiting. The percentage of deaths in cases of blood filaria disease, calculating from published records, is not high; but this is owing more to the insidious nature of the pathological condition than to its harmlessness to life, death frequently occurring suddenly in the course of the disorder from some acute disease, the latter always running its course rapidly, and often to a fatal termination when the constitution has been broken down by the ravages of filaria. Death may be often traced directly to the presence of this parasite in the blood, and it is certain that all severe attacks of blood filaria disease markedly injure general health and shorten life.

RALPH W. SEISS, M.D.

CLOTHES REEL.

Mounted on an upright is the reel, the track plate of which fits as a cap on top of the post. In the upper surface of this plate is a circular grooved track, fitted loosely within which are anti-friction rollers which run on the bottom of the groove and against the under surface of the head plate, which carries the wooden arms of the reel. This plate is formed with a circular rim on its under side, that receives the upper end of the track plate freely but snugly within it, to protect the rollers and track from rain and dirt. The track plate is formed with a tapering hollow upright projecting up through the eye of the head plate, which rotates around the upright and is centrally guided thereby. The head plate is constructed with radial sockets for holding the ends of the arms. The several working parts are held together by a bolt and nut, as shown in the engraving.



SCHWENDLER'S CLOTHES REEL.

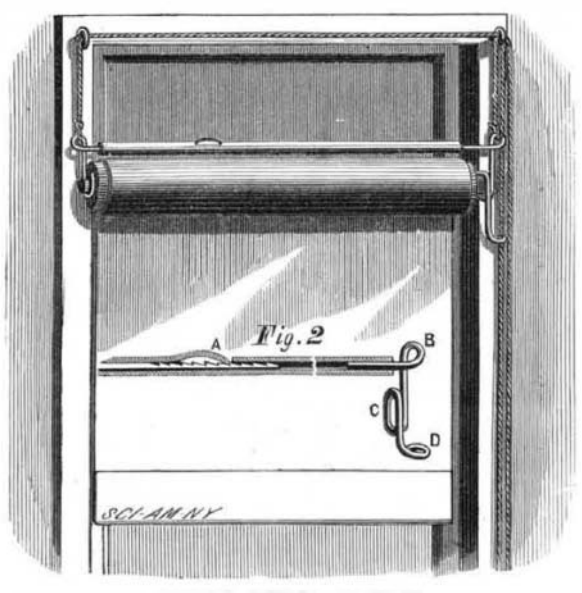
This device, which has been patented by Mr. William Schwendler, of Appleton, Wis., forms a roller carriage clothes reel working with the greatest freedom and steadiness.

The Electro-chemical and the Thermic Colored Rings

If we expose a plate of copper to the flame of a spirit lamp, of a Bunsen burner, or, better, to the fixed and narrow jet of an enameler's lamp, there are produced upon the metal iridescent coronæ around the heated point. If the experiment is well managed there are obtained fixed colored rings, apparently inalterable in the air. These thermic rings are quite similar to the electro-chemical rings of Nobili; like them they follow one upon another, and are propagated in waves. In both cases the colors succeed each other in the same order, which is that of Newton's rings as seen by transmission. Multiple thermic rings may be produced by means of drums surmounted by 2, 3, 4, etc., gas burners. These same pieces serve equally for the production of the electro-chemical rings, by fixing in the fine openings of the tubes needles of steel of equal length for each system. The thermic rings, simple or multiple, approximate the more closely to the corresponding electro-chemical rings as the jets of flame are feebler and less oxidizing.—*O. Decharme.*

SHADE HANGER.

The engraving illustrates a new shade hanger, which can easily and readily be adjusted for shade rollers of different lengths, and for which letters patent have been issued to



FINK'S SHADE HANGER.

Mr. Isaac M. Fink, of Akron, Ohio. The holder is formed of a tube, Fig. 2, in the ends of which wires are held, whose outer ends are bent down to form eyes, B. The extreme end of one wire is bent to form a hook to receive the round pin of the shade roller. On the under part of the other wire is formed an elongated eye, C, which holds the flattened pin of the roller, and below which is the guide eye, D. In the side of one wire are cut ratchet teeth, in which the spring pawl, A, engages, and by this means the hanger can be adjusted for rollers of any desired length by pushing the wire further into the tube or withdrawing it. Cords secured to the eyes, B, are so arranged that by pulling on them or by releasing them the shade roller can be raised or lowered at will uniformly at both ends.

The New Orleans Exhibition.

The exhibition opens at New Orleans December 1, and continues to May 31.

The main building is 1,378 feet long by 905 feet wide, without courts, and has a continuous roof composed largely of glass so arranged as to afford an abundance of light without subjecting the interior to the direct rays of the sun. The machinery department occupies a space of 1,378 feet long by 300 feet wide, within the main building, and has an extension added in iron 350 feet long and 150 feet wide for heavy machinery, described under the heading of factories and mills. Music Hall, with a seating capacity, in commodious chairs, for 11,000 people, a platform capacity for 600 musicians, and a mammoth organ built to order for the exposition, occupies the center of the interior. The main building will contain general exhibits. It is situated about in the center of the grounds.

The United States and State exhibits building is 885 feet long by 565 feet wide. It is one of the largest exposition buildings ever erected. At the time of the adoption of the plans it was supposed that the main building, having the largest capacity of any building heretofore erected, in conjunction with the horticultural hall and such minor outside buildings as were necessary, would afford ample space and accommodation for all exhibits; but the interest in the World's Exposition had become so widespread, and the inquiries and applications for space became so numerous, that the necessity for additional accommodation became imperative, and the management determined upon the erection of this magnificent structure specially for the United States and State exhibits. The government exhibition will be complete—of itself, almost a mammoth exposition. Each department will have its distinctive exhibit. The Department of State showing samples of cotton, wool, and cosmos fibers, and of the fabrics made from them from all parts of the world. This exhibit will be arranged in continental groups representing the geographical divisions of the world's commerce, etc. The Post Office Department will exhibit all the improvements in mail facilities, and establish a branch office in the building for the accommodation of visitors and to show the practical workings of the postal system. The Treasury Department will exhibit coast survey, light housing, life saving service, customs, internal revenue, engraving, printing, etc. The War Department will show arms, ordnance, engineering, medical, surgical, and hospital services, progress in same, etc. The Navy Department will show naval arms, ordnance, projectiles, torpedoes, dynamo-electric machines for firing, models of war vessels, ancient and modern, etc. The Interior Department, everything pertaining to the inventions and improvements in American industries and to the history, customs, and habits of the aboriginal races, etc. The United States Fishery Commission, the Department of Justice, Bureau of Agriculture, the Bureau of Education, and especially the Smithsonian Institution, will be exhaustively represented. The government exhibit will vastly exceed that made at Philadelphia. In addition to the government exhibits, the collective State exhibits and the general educational display will be located in this building. This structure presents a very attractive appearance. The Horticultural Hall is 600 feet in length and 194 feet wide through its center. It is the largest conservatory in the world.

The art gallery is 250 feet long by 100 feet wide. It is a structure built of iron. The building is an elegant and artistic structure, so arranged for mounting, accessibility, and light as to present the best effects, and with ample accommodation for as large a collection as was ever exhibited on this hemisphere.

The grounds embrace the space of 247 acres, bounded on the north side by St. Charles Avenue, on the south by the Mississippi River. The buildings front east toward the main portion of the city. An electric railway incircles the grounds.

The appropriation by the general government of $1,300,000, the contribution by the citizens of New Orleans of $500,000, and the appropriation by the city of New Orleans and the State of Louisiana each of $100,000, afford an ample fund.

Coloring Transparencies and Photographic Cards.

Mr. E. Edwards says: The first thing to be done is to prepare the paints. Get from any wholesale chemist a small quantity of different aniline colors or dyes, and dissolve them separately in spirits of wine, gradually adding the spirit until all is dissolved; dilute by about its own bulk of water, and add ox gall until the colors flow smoothly from a camel-hair brush over glazed paper; when this has been attained the colors are ready for use, and the painting may be commenced. It is advisable for the beginner to commence with a portion of the transparency which has the smallest surface of the same color, as it requires a little practice to lay on an even coat on a large surface, such as the sky or sea. If the color is piled on by degrees with dilute color, it renders the laying on of a smoother coat much easier. It is as well to give the transparency a coat of varnish when the coloring is completed and quite dry. For coloring cards the colors should be laid on very dilute (especially the flesh color), and should be laid on in successive washes until the desired color has been attained. The colors must useful are: Lemon-yellow, green, orange, red, blue, violet.

For flesh color—lemon-yellow and red. For different shades of green—lemon-yellow and blue. For lilac and purple—violet and red. For jewelry and fair hair—orange.

The commonest water color brushes will do.