

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, for the U. S., Canada or Mexico, \$3 00

One copy, six months, for the U. S., Canada or Mexico, 1 50

One copy, one year, to any foreign country belonging to Postal Union, 4 00

Remit by postal or express money order, or by bank draft or check.

MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN.

Building Edition of Scientific American.

THE BUILDING EDITION OF THE SCIENTIFIC AMERICAN is a large and splendidly illustrated periodical, issued monthly, containing floor plans and perspective views pertaining to modern architecture.

Single copies 25 cents. By mail, to any part of the United States, Canada or Mexico, \$2.50 a year. To foreign Postal Union countries, \$3.00 a year.

Export Edition of the Scientific American.

with which is incorporated "LA AMERICA CIENTIFICA E INDUSTRIAL," or Spanish edition of the SCIENTIFIC AMERICAN, published monthly, uniform in size and typography with the SCIENTIFIC AMERICAN.

Manufacturers and others who desire to secure foreign trade, may have large and handsomely displayed announcements published in this edition at a very moderate cost.

The safest way to remit is by postal order, express money order, draft or bank check. Make all remittances payable to order of MUNN & CO.

Readers are specially requested to notify the publishers in case of any failure, delay, or irregularity in receipt of papers.

NEW YORK, SATURDAY, FEBRUARY 1, 1896.

CONTENTS.

(Illustrated articles are marked with an asterisk.)

Acetylene explosion and fire..... 73
Belts, glue joints in..... 74
Bicycle, a 25 cent..... 74
Bicycle exhibition, a great..... 66
Bicycle lamp, an electric..... 72
Bilimore, Mr. Vanderbilt's..... 75
Blenheim Palace..... 71
Boats, ferry, electric..... 69
Bradford, Mass., case, of Desau Railroad..... 73
Building materials, fireproof..... 74
California Exposition in N. Y..... 71
Castings, sand blast cleaning of..... 74
Cement, leather belting..... 76
Colors according to latitudes..... 74
Colors of atoms, etc..... 76
Cyprus, excavations in..... 67
Discovery, Prof. Roentgen's..... 67
Dry dock building, N. Y. navy yard*..... 65
Early rising precept, the..... 71

THE ANNUAL BICYCLE EXHIBITION AT THE MADISON SQUARE GARDEN, NEW YORK CITY.

As we go to press, the annual cycle exhibition under the auspices of the National Cycle Board of Trade has, with much eclat, come to a close. It opened January 18 and closed January 25. It would be impossible for us to attempt to describe all that was there, but the task is made easier by the fact that the 1896 bicycle has been built practically upon the lines of the 1895 wheel, and that the novelties shown there have, by force of circumstances, become sifted down to those presenting real points of merit, so that they are more interesting and fewer in number than hitherto, the age of so-called "freaks" in bicycles having, apparently, passed.

Wheels for a number of riders are shown in the Fowler and in the Stearns exhibits, both exhibits showing sextuplet wheels for carrying six riders at once. The Fowler "sextet" is 13 feet long with 125 inches wheel base; weighs 137 1/2 pounds and is geared to 153 inches. There are four front fork sides, two on each side of the front wheel. This and the Stearns sextuplet attracted much attention. The chains of the Stearns sextuplet are graduated in size from front to rear in accordance with the stress that they have to receive, the powers of the six riders being, of course, exerted simultaneously on the last chain.

The frames, in general, are practically of the same construction as those of the past year, being almost universally of the diamond Humber type. Tubes of D-shaped cross section are used in the Singer wheels, which are of English construction, these having for the rear forks tubes of this section. It is not easy to see that much is gained thereby, although, of course, it is conducive to narrowness of tread.

The Wolf "Sociable" is a wheel that attracted considerable attention. It is a tricycle, adapted for two riders, seated side by side. This company and the Columbia Company show wheels adapted for army use. The "Sociable" is shown carrying a Maxim gun, the Columbia is shown with a Colt rapid firing gun. An army tandem is also shown by the Columbia Company, carrying two guns, a signal flag, and a complete outfit for two soldiers. Military men are now realizing that the bicycle will have its place in war, military science pressing into its service everything available.

Another exhibit attracting considerable attention is the so-called "Upright" wheel, a rear-driven safety with small front wheel and with handle bars carried around behind the rider, leaving the front unobstructed. The mounting is done from the front, and the position the rider assumes is perfectly upright, the handles coming on a line with his sides. The frame, approximating to the triangular shape, is very strong, and it is claimed that the bicycle can be made of exceedingly light weight. This is a concession to what might be termed the rational rider, one who desires to sit upright. The Owen bicycle has a somewhat similar frame of triangular outline, the saddle being at the apex. This is mounted in the usual manner. The Hardy spring frame bicycle is an appeal to the constituency of riders who desire comfort. It is provided with a spring frame by which all jar is taken from the rider, and in its construction the following feature is carried out: The three essential distances, those between the handle bars, the saddle and the crank bracket, are absolutely invariable, so that the rider on a rough road may be rising and falling with the spring, but the three critical distances never change.

Another feature in the construction of bicycles is shown by the Diebel center bearing used in the Fairmount cycle. This is a bearing for the crank shaft, which bearing is made to contain only a single row of balls, the necessary strength being given to it by making the diameter of the circle of balls large enough to insure a proper leverage; in this way a wheel is constructed with but three inches width of tread.

Several electric lamps are shown; one is equipped with a storage battery and there is supplied with it a dynamo to be run by water power to be taken from a house faucet. This will enable one to recharge his own battery. Some primary battery lamps are shown. The majority of wheels are fitted with wooden rims, but the Eagle Company show their wheels fitted with aluminum rims of their own manufacture and of improved section, designed to make them stronger and more rigid than hitherto. One of the features of their exhibit was a wheel with unbrazed joints to be taken apart, in order to show the uninitiated the precise construction of the bicycle frame. As another innovation in wood, numerous examples of wooden handle bars appeared, and a bicycle was shown with wooden frame pieces in place of tubes.

Another very interesting exhibit was Jakobson's tandem attachment. By means of this attachment, the front wheel being removed from one bicycle, it can be fastened to another so as to produce a really practical three-wheeled tandem. The repair of bicycle tires was exemplified in a number of ways, including vulcanizing apparatus for the more permanent repairing, apparatus both of the electrical and steam variety being shown, while various kinds of repair kits for the riders' use were exhibited. For those who travel with their wheels a great convenience in the shape of the Streat collapsible bicycle crate was shown. This crate is made of wood, with iron joints, to shut up into very small compass. It can be instantly opened to receive a bicycle. Those who have had the annoyance of crating their own wheels will appreciate the convenience that this presents.

For those who travel with their wheels a great convenience in the shape of the Streat collapsible bicycle crate was shown. This crate is made of wood, with iron joints, to shut up into very small compass. It can be instantly opened to receive a bicycle. Those who have had the annoyance of crating their own wheels will appreciate the convenience that this presents.

Numerous cyclometers were shown, and among others an innovation in the shape of a chronodometer or combined chronometer and cyclometer worked like a stop watch. The rider, without leaving his saddle, can start a special distance hand simultaneously with a time hand and can stop them again, thus enabling him to obtain for himself a record with chronometrical accuracy of his time for a mile or for any desired fraction thereof. This instrument is self-winding and forms one of the important advances to be noticed.

Carrier cycles were shown in considerable variety and were fitted with pneumatic tires, being a distinct advance of the London carrier cycle, so extensively used by tradesmen in that city. One type, termed sometimes a jinriksha, was provided with seats for two passengers. This vehicle may yet obtain fame in Japan as well as here.

Continuously ringing bells for attachment to the hub of a wheel were shown. Perhaps the most striking novelty in bells was the Bridgeport handle bar bell, which has already been shown in our columns. In it the metal cap at the end of the handle forms the bell, so that it is practically invisible, or rather indiscernible by the ordinary observer.

The weights of wheels are but slightly increased in the majority of cases. Some wheels use 1 1/4 inch tubing in place of the 1 1/2 inch used last year. Tires in some cases are made slightly heavier. But to one who has grown fond of the American wheel, it is a real pleasure to find that the menace of heavier construction, which was taken as impending over the season of 1896, has passed harmlessly away, and we still can ride wheels ten to fifteen pounds lighter than those which obtain favor abroad.

THE FEBRUARY SKY.

BY GARRETT P. SERVISS.

Jupiter now reigns supreme in the starry heavens. Rising late in the afternoon at the beginning of February, by 8 or 9 o'clock in the evening the great planet is in an admirable position for observation. He is still in Cancer, forming a neat little triangle with the stars delta and gamma. Just east of him glimmers the "Beehive" cluster. He is moving slowly westward, and in the course of the month will travel about three degrees toward the border of Gemini. At the close of February he will be some three degrees east of north from the remarkable triple star zeta Cancri, whose nearer components, being about one second of arc apart, form a convenient test for telescopes of moderate power. The more distant component is about 5 1/2 seconds from the principal stars.

Those who do not possess telescopes should not fail to try their opera glasses or field glasses upon Jupiter. With a strong glass of this description all of his four principal satellites can be distinguished when they are well situated for observation. On February 3, for instance, about twenty minutes before midnight, Eastern standard time, three of the satellites will appear strung out on the west of the planet, while the fourth will be seen on the east. A similar, but even more favorable, arrangement of the satellites will occur at the same hour on the 17th. On the 24th, same hour, they will be quite symmetrically arranged, two on the west and two on the east. I have several times derived much satisfaction from the pleased surprise expressed by persons who, having no expectation of visiting an observatory, had not dreamed that they should ever see the moons of Jupiter with as slight an aid as that of an opera glass.

Venus and Mars are together in Sagittarius at the beginning of the month, rising some two hours ahead of the sun. Both are moving eastward, but Venus much more rapidly than the other, so that on the 9th she will pass Mars at a distance not much exceeding a degree and a half, Venus being on the north. By the end of the month she will have entered Capricorn, Mars remaining in Sagittarius. Those who take the trouble to rise early enough to see these planets in the morning sky will also behold the glorious spectacle of the Milky Way, which is nowhere more brilliant than in the region where Venus and Mars are now crossing it. Photographs and telescopic views show that the galaxy in this neighborhood is composed of a wonderfully intricate intermixture of star clusters, star fields, star clouds and nebulae.

Saturn is in Libra, rising on the 1st of February soon after 1 A. M. and on the 29th about two hours earlier. The north pole of the planet now leans toward the earth, and the rings are widely opened. Splendid discoveries concerning this planet should mark the closing years of the nineteenth century, for Saturn has just begun to receive the attention it deserves in some of the great observatories.

Uranus is also in Libra, about five degrees east of

TABLE OF CONTENTS OF SCIENTIFIC AMERICAN SUPPLEMENT No. 1048.

For the Week Ending February 1, 1896.

Price 10 cents. For sale by all newsdealers.

I. CHEMISTRY.—The Nature of Chemical Change and the Conditions which Determine It.—Dr. Armstrong's address before the Chemical Society of England, treating of the last refinements of the theory of chemistry..... 16757
II. CIVIL ENGINEERING.—The New Bridge Across the Danube at Chernavoda.—A new railroad bridge, opened last September, with full ceremonies.—2 illustrations..... 16752
The Catastrophe at Bouzey.—Findings of the commission appointed to inquire into the causes of this accident..... 16753
III. EDUCATIONAL.—Technical Education.—By H. H. SIMMONS.—A very timely article on technical training at the present day..... 16756
IV. ELECTRICITY.—The Arc Light.—By Prof. S. P. THOMPSON.—A continuation of these very practical and interesting lectures on an all-important subject in electricity, and one on which comparatively little has been written.—6 illustrations..... 16748
V. GEOLOGY.—Floating Sand.—An Unusual Mode of River Transportation.—An examination of a well known phenomenon of possible importance in geology, with experiments.—A very interesting and valuable paper..... 16745
VI. MECHANICAL ENGINEERING.—Flexible Shaft with Ball Joints.—Use of a ball and socket joint in flexible shafting.—3 illustrations..... 16750
Triple Expansion Engine.—Frikart's System.—An English engine recently exhibited at the Antwerp Exhibition, with a full description and illustration.—4 illustrations..... 16751
Electrically Driven Twin Punching Machines.—A cam lever punching machine of great power driven by an electric motor.—1 illustration..... 16750
VII. METALLURGY.—Sodium in Aluminum.—A hitherto unsuspected impurity in aluminum and the evil results due to it..... 16755
VIII. METEOROLOGY.—Some Effects of Frost.—By W. E. PARTRIDGE.—An interesting and practical article on the freezing of water, and its effects in nature..... 16747
IX. MISCELLANEOUS.—Tarpon Fishing in Florida.—Illustration of the capture of the great Florida fish.—3 illustrations..... 16756
Spanish Troops in Cuba.—Note on the landing of the Spanish troops in Cuba.—1 illustration..... 16757
British Feeling on the American Crisis..... 16744
X. NATURAL HISTORY.—The African Atherura.—A curious rodent found in Asia and Africa, from the zoological collection in the Jardin d'Acclimatation of the Bois de Boulogne at Paris.—1 illustration..... 16746
A Curious Case of Commensalism.—Instances of different animals living together, as illustrated by the hermit crab and others.—2 illustrations..... 16746
XI. NAVAL ENGINEERING.—H. M. S. Jupiter.—Recent accession to the battleships of the Majestic type of the British navy.—1 illustration..... 16753
XII. PALEONTOLOGY.—A New Fossil Plant in the Coal Measures of New South Wales.—A fossil recently described in the reports on the geology of the antipodean continent..... 16745
XIII. PHYSICS.—A Portable Phonograph.—A phonograph of compact dimensions described and illustrated.—1 illustration..... 16758
XIV. RAILROAD ENGINEERING.—Snow Shed Fire Protection.—A valuable contribution to railroad engineering.—Description of methods in use on the Southern Pacific Railroad for protecting snow sheds..... 16752
XV. TECHNOLOGY.—Megaas and Refuse Furnaces.—A very valuable article on the combustion of megaas and organic refuse of that nature.—5 illustrations..... 16754
An Electric Refrigerating Machine.—An ammonia refrigerating machine operated by electric energy.—4 illustrations..... 16755
Camphor Making in Formosa.—Description of an ancient method of making and producing the gum..... 16758
XVI. TRAVEL AND EXPLORATION.—Venezuela.—The Venezuelan question.—The features of the country and of life therein.—Its natural scenery, rivers and rapids.—2 illustrations..... 16744

Saturn, and Neptune is in Taurus, but, of course, invisible to the naked eye.

Mercury, having been in good position for observation as an evening star in the latter part of January, passes between the sun and the earth on February 8, and at the end of the month may be seen an hour before sunrise in the morning sky.

February opens, as January did, with a waning moon. She passes last quarter on February 5 and becomes new moon on the 13th. First quarter is reached on the 21st in Taurus and the full phase on the 28th in Leo.

The lunar conjunctions with the planets occur in the following order:

Saturn, February 6; Uranus, February 6; Mars, February 10; Venus, February 10; Mercury, February 12; Neptune, February 22; Jupiter, February 25.

On February 18, the South Pole, which is now enjoying its long summer day, will be shadowed by an annular eclipse of the sun, but the eclipse will not be visible anywhere in the northern hemisphere. A partial eclipse of the moon on February 28 will be seen in Europe, but not in this country.

The starry heavens are never more splendid than in the month of February. At 9 o'clock in the evening, at the middle of the month, the unrivaled Sirius, the Nile star of ancient Egypt, will be seen blazing high on the meridian, with Orion glittering toward the west and Gemini in midheaven. The jeweled arch of the Zodiac, springing from the western horizon, will brighten as it rises from Pisces, touching the hills with its stars, through Aries and Taurus, to the Twins shining near the zenith, while its downward sweep to the east will include Cancer, Leo and a part of Virgo. Crossing the middle of this magnificent belt of constellations, nearly at right angles, and touching the horizon north and south, will appear the starry laces of the Milky Way, encircling the sky with a band of celestial light. It is when wonder-opened eyes are lifted to such scenes as this that astronomers are born.

Obituary Notices.

John Allston Wilson, a well known civil engineer, died January 19, in West Philadelphia, at the age of 59 years. In the years 1857 and 1858 he served as topographer on the surveys made in Central America for the Honduras Inter-oceanic Railway. He entered the service of the Pennsylvania Railroad Company in 1861 and for a number of years was the chief engineer of that company. He was also connected since this time with many railroads.

Matthew B. Brady, the celebrated photographer, died in New York City, January 15. He was born in Warren County, N. Y., in 1823, and when a young man came to New York and opened a studio. In 1851 he entered his work in the exhibition in London and took first prize. His reputation grew until his photographs were known all over Europe. During the civil war, Mr. Brady placed a corps of artists in the field and obtained a famous collection of war studies, at an expense of more than \$100,000. In the work of collecting more than 30,000 of these photographic plates Mr. Brady spent the greater part of his fortune, with the expectation that his collection would be purchased by the government; they did not, however, take all of them. For years after the war he maintained a studio in Washington and photographed the most celebrated men of the country. Mr. Brady lost most of his property and became nearly blind a few years ago.

Charles William Hewison died January 20. He was born in 1830 and early showed great inventive and constructive powers. In 1849 he acted as chief engineer on one of the Pacific Mail Line steamers. Shortly before the war broke out he met John Ericsson, the inventor of the Monitor. He made the principal engines of the Monitor and was chief engineer of one of the armored ships which went south at the beginning of the war. He had a large foundry and shop on the west side of New York, and it was there that he made the first phonograph for Thomas A. Edison. He was intimately associated with Captain Ericsson and constructed many models for him.

SOLDERS FOR GLASS—Mr. Charles Margot finds that an alloy composed of ninety-five parts of tin and five of zinc melts at 200 degrees, and becomes firmly adherent to glass, and, moreover, is unalterable, and possesses a beautiful metallic luster; and, further, that an alloy composed of ninety parts of tin and ten of aluminum melts at 390 degrees, became strongly soldered to glass, and is possessed of a very stable brilliancy. With these two alloys it is possible, says the Pottery Gazette, to solder glass as easy as it is to solder two pieces of metal. It is possible to operate in two different manners. The two pieces of glass to be soldered can either be heated in a furnace and their surfaces be rubbed with a rod of the solder, when the alloy as it flows can be evenly distributed with a tampon of paper or a strip of aluminum, or an ordinary soldering iron can be used for melting the solder. In either case it only remains to unite the two pieces of glass and press them strongly against each other, and allow them to cool slowly.

Excavations in Cyprus.

The trustees of the British Museum, following up their excavations at Amathus in 1894, chose for their field of operation in 1895 the site of Curium, which General Cesnola's discoveries made famous a number of years ago. It was known that he had left certain spots untouched. These have now been explored under the direction of a Museum official, Mr. H. B. Walters. The results are exhibited temporarily in the European Saloon of the British Museum.

The ancient town of Curium was built on the summit of a rocky elevation some 300 feet above the sea, and was almost inaccessible on three sides. The rock is of calcareous sandstone, and has been cut on the east and south sides into a perpendicular face. The whole extent of this elevation is covered with the debris of buildings.

The tomb area is very extensive. Beginning with the rock-cut tombs, many hundreds of which are seen in the south wall of the Acropolis, long ago explored and emptied, tombs of all periods are found over the low-lying ground extending about half a mile south of the Acropolis, and in less numbers on the adjoining hill slopes.

But the special feature of the recent excavations was the discovery of a necropolis dating from what is called the Mycenaean period, and thus apparently confirming the statement of Strabo that Curium had originally been founded by a colony from Argos. It would seem that this cemetery, which lies on the side of a low hill to the east of the village of Episcopi, represents the site of the original Argive or Mycenaean foundation, and that the city had been transferred to the site now known as the Acropolis toward the end of the sixth century B. C., that being the date of the earliest tombs there.

In the Mycenaean tombs, along with pottery of the kind usually known by that name, was found a considerable quantity of rude and primitive pottery of local make, such as is found in Cypriote tombs of the pre-Phoenician period. These vases are hand-made, and decorated either with patterns in white or in relief on a dark ground, or with simple black patterns on a creamy ground. The Mycenaean vases are mostly of a character familiar from Dr. Schliemann's discoveries; but among them are also some specimens of remarkable rarity, in particular two large vases which belong to a class previously known only by four examples, found on pre-Phoenician sites in Cyprus and a fragment at Nauplia, in Greece. The method of decoration is purely Mycenaean, and the clay is probably of an imported kind; but the style of the figures is decidedly rude and betrays local influence. On both vases we have human figures in two-horse chariots, painted in black on a bright buff ground, and on one is a series of female figures in panels divided by borders—a style of decoration hitherto unknown. The field of each vase is covered with ornaments characteristic of this period.

Of vases of the Ialysos type we have a tall, elegant, two-handled cup, painted with cuttle fish, and a funnel-shaped vase decorated with murexshells. Another very remarkable and almost unique vase is of a shape known as pseudamphora, the mouth being covered up and a spout in the side used instead; this vase is decorated with an octopus on either side. In one tomb was found, along with two or three Mycenaean vases of the ordinary type, a sard scarab with Egyptian hieroglyphics, which has been pronounced by competent authorities to bear the name of Khonsu, a deity that was not introduced into Egypt until the twenty-sixth dynasty (666-527 B. C.); moreover, neither the shape nor the material of the gem is such as we are accustomed to associate with an earlier date than the seventh century B. C.

In another tomb a Phoenician cylinder was found with a design of a late conventionalized character, which cannot be dated earlier than 600 B. C., and with it were some gold ornaments of a common Mycenaean type. But incomparably the most important object in these finds is a small steatite scaraboid, on which is an intaglio design of a bull lying down. The work is very admirable, the drawing most masterly, recalling the famous Vaphio gold cups in the museum at Athens. From the shape of the stone and the technical skill employed it is evident that this gem must belong to a very advanced period of Mycenaean art, possibly as late as 700 B. C. Other gems which may be mentioned are a scarab of Thothmes III, found in a tomb of recent date; a scaraboid with an ibex, and an archaic scaraboid gem set in a silver ring, representing Heracles running. In the later or sixth century Curium, one particular site proved to be rich in gold ornaments. It seems very probable that Cesnola's treasure was originally gathered for the most part on this site, and this opinion has been shared by other explorers subsequent to his time. Besides sundry finger rings, earrings, and similar ornaments, a fine pair of bronze bracelets plated with gold, ending in rams' heads, should be mentioned; also a gold chain necklace of very delicate workmanship. The only bronze object that calls for special mention was an archaic Greek statuette of a female figure, dating from the sixth cen-

ture; it had formed part of an elaborate lamp stand. Among the vases found in the later tombs is a large hydria (pitcher) of black glazed ware, on which figures are painted in thick white, with details marked in yellow. Many vases with similar decoration, but of inferior execution, have been found in Southern Italy, and are supposed to have been made at Tarentum, but probably this vase may be claimed as of genuine Greek manufacture.

On the site of what appears to have been a temple to Demeter and Core was found a Greek inscription which has the peculiar interest of being written first in the ordinary Greek letters and next in the Cypriote syllabary or local alphabet, in which each sign represents not a single letter, but a syllable, e. g., the first word *Δημητρι* is written da-ma-ti-ri, each two letters being represented by one character.

For the coming season it has been decided by the authorities of the Museum to try a new site, where it is hoped that further evidence may be obtained bearing on the early history of Cyprus.—The Architect and Contract Reporter.

Prof. Roentgen's Discovery.

Full reports of Prof. Roentgen's discovery have not yet reached us, and the accounts so far received do not greatly clarify the atmosphere surrounding his discovery. The effects are said to have been produced by Crookes tubes as the source of light or of ethereal disturbance. The active cause, whatever it is, it is said, was incapable of refraction, at least by an ordinary photographic lens. The discovery is described as having been made by accident. Prof. Roentgen was experimenting with a Crookes tube covered with cloth. Some sensitized paper lay near it, and the paper showed next day some streaks of coloration. This appearing mysterious, Prof. Roentgen repeated what he had done and traced the cause to the tube, and so went on to prove that he could get actinic effects from an active Crookes tube through a screen, generally made of organic matter, and one quite opaque to light, although one account says that the effect can be produced through a plate of aluminum over half an inch thick. Another statement is to the effect that the rays are not undulatory, but move forward in straight lines.

This statement suggests an attempt to draw an analogy between what goes on inside a Crookes tube with the molecules of extremely rarefied air therein and what is supposed to go on in the space between the tube and the sensitized surface. Nine examples of the photographs are said to be in Vienna, sent there from Wurzburg. The Crookes tube, it appears, is placed behind the object to be experimented with, and the photography thus appears as shadow photography, or a species of printing similar to contact printing. It appears probable that the discovery is one of theoretical importance in physics, but probably of no practical value as yet in photography.

It is also to be remarked that there may be less of novelty in the experiments than is generally supposed. It is not going too far to say that even the old time breath images produced by a coin lying on a mirror are recalled to the mind by the descriptions received. Then the electric images produced by an electric discharge through a coin and impinging upon a photographic plate, Sanford's experiment, have been cited. It has even been suggested that some analogy with Hertz's experiments may exist. He passed radiant energy due to long ether waves through pitch and other bodies quite opaque to short ether waves, such as produce light. There is no novelty in passing ether waves through an opaque organic screen; the difficulty is in getting any actinic effect out of such waves. It is conceivable that their period might be shortened, and this has been suggested as a possible explanation of the achievement.

Cross-eyed Headlights.

The New York, New Haven and Hartford Railway has just introduced what might be called a "cross-eyed" headlight on their Air Line Flier. This is the invention of Col. N. H. Heft. The single headlight, ordinarily used, shines directly ahead when the locomotive is turning a curve. The field or whatever is alongside of the track is illuminated, but the rails ahead are for the moment in perfect darkness. In the new system two headlights are used. They are set precisely as the eyes are set in a cross-eyed person. They are so arranged that each will throw light across the other's rays. With the two lights so set it makes no difference which way the curve turns, as one or the other of the headlights illuminates the pathway. These new headlights have been such a success that they will be supplied as soon as possible to all through fast night trains.

Fisheries Exhibition at Kiel.

An estimate will be submitted to Congress for \$20,000 to enable the War Department to make a river and harbor exhibit, and also the Fish Commission to make an exhibit, at the International Fisheries Exhibition, to be held at Kiel, Germany, next February.