SCIENTIFIC AMERICAN

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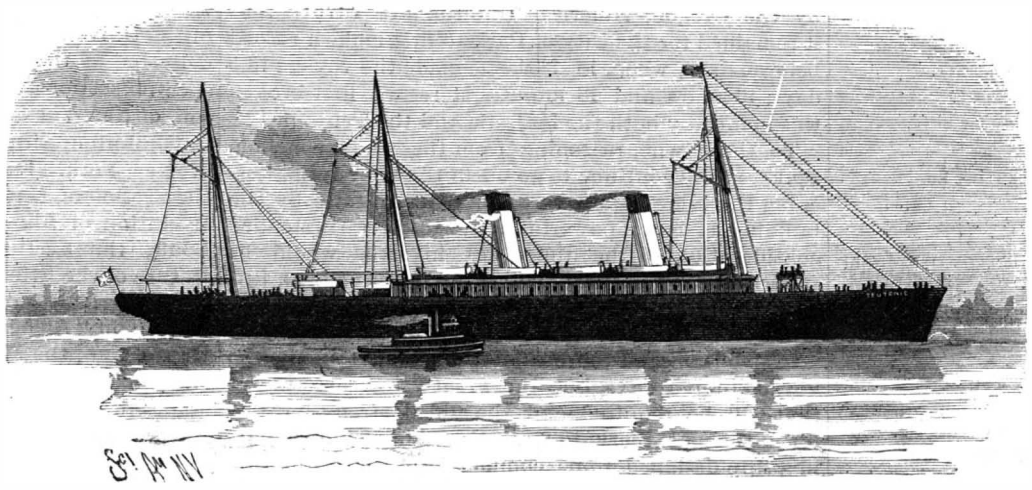
WHITE STAR STEAMER TEUTONIC.

Two weeks ago we recorded the fact that the steamer Majestic, in a voyage ending August 5, had broken all previous records of quick voyages across the Atlantic, making the run in 5 days 18 hours and 8 minutes. Now the Majestic herself has been beaten by a sister ship of the same line, the Teutonic, which completed the voyage on August 19 in 5 days 16 hours and 31 minutes, thus beating the time of the Majestic by 1 hour and 37 minutes. The time in each case is taken from Daunt's Rock light, outside of Queenstown Harbor, to the Sandy Hook lightship, at the entrance to New York Harbor. The Teutonic also made in this voyage the longest single day's run ever recorded, 517 knots. Her average speed for the voyage was 20·357 knots per hour. The engines developed, during the best runs, about 19,900 horse power, her screws making almost 81 turns a minute, while the average for the voyage was a little under 80 turns a minute, on a coal consumption said to be about 310 tons per day.



THE WHITE STAR LINER TEUTONIC.

The records of the daily runs for the three fastest voyages thus far made are as follows:

	Teutonic.	Majestic.	City of Paris.
First day.....	460	470	462
Second day...	496	501	493
Third day....	505	497	502
Fourth day...	510	501	506
Fifth day....	517	491	509
Sixth day....	290	317	316
Total...	2,778	2,777	2,788

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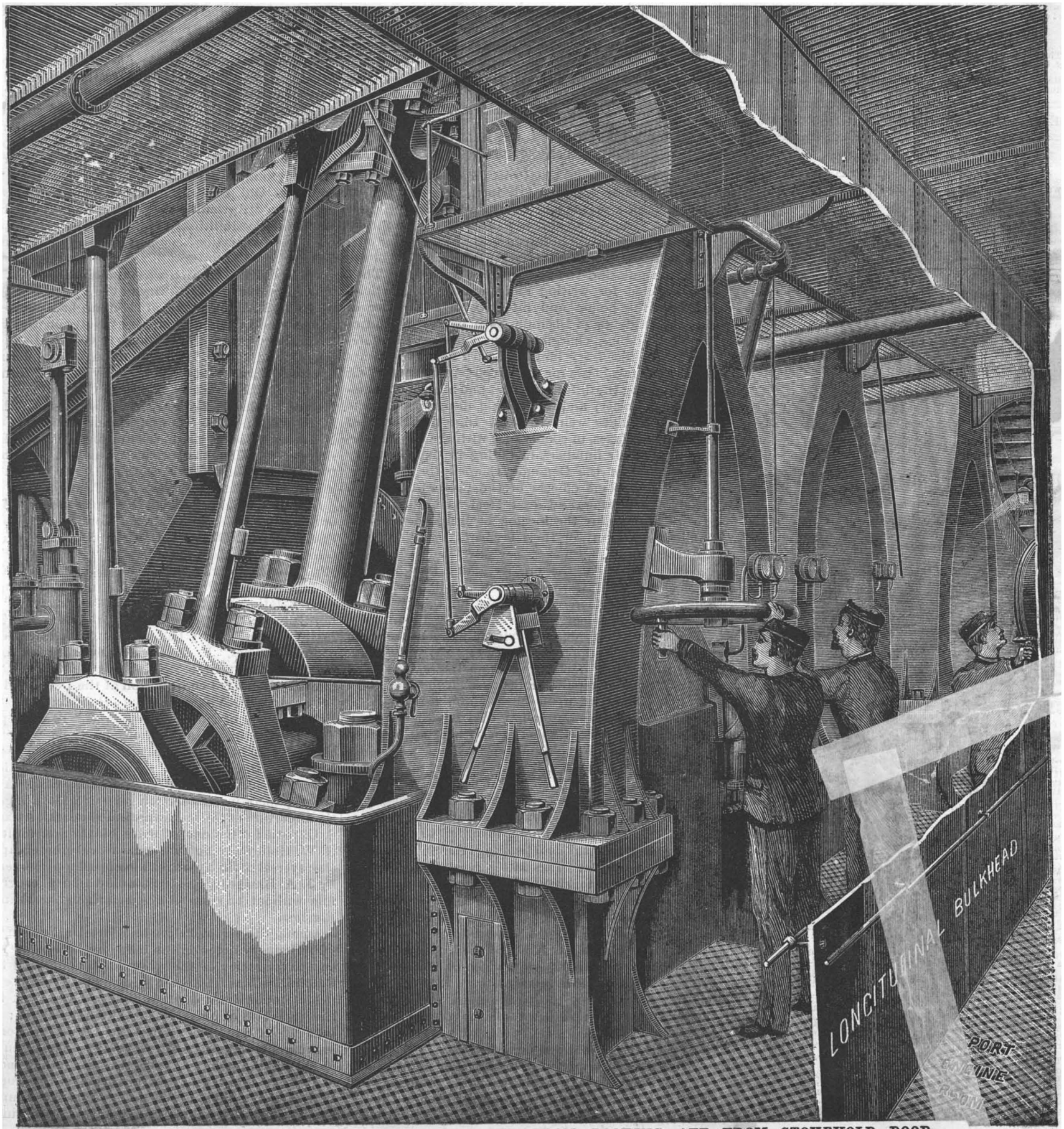

STEAMSHIP TEUTONIC—STARBOARD ENGINE ROOM, LOOKING AFT FROM STOKEHOLD DOOR.

Scientific American.

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NEW YORK, SATURDAY, AUGUST 29, 1891.

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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 817.

For the Week Ending August 29, 1891.

Price 10 cents. For sale by all newsdealers.

THE FAST TRIP OF THE TEUTONIC.

Although it is by about an hour and a half only in a voyage of more than five days and a half that the Teutonic has beaten all previous passages across the Atlantic, the record is more impressive when we note in comparison the progress made in the past twenty-five years in increasing the speed of ocean steamships. In 1866 the Scotia was a record breaker when she made the trip in 8 days, 2 hours, and 48 minutes. From 1873 to 1880 the best records were between 7 and 8 days, but in 1882 the Alaska was styled the Atlantic greyhound on first making the trip in less than 7 days, her time being 6 days, 18 hours, and 37 minutes. This time was further successively reduced by the Oregon, America, Umbria, and Etruria, but it remained for the City of Paris to first make a record below 6 days, when, in 1889, she made the voyage in 5 days, 19 hours, and 18 minutes, a record first broken this month by both the Majestic and the Teutonic.

To those who, reasoning from these data, conclude that we shall continue to go on in the same ratio, lessening the time required to cross the Atlantic by the building of more powerful steamships, an extended consideration of the difficulties involved would be superfluous. Something will probably be gained, it is true, and it is semi-officially announced that the Cunard Company has prepared plans for the building of a twelve thousand ton steamer, designed to make the voyage in five days, but the greatly increased power that will be required, and the added strength called for in the machinery, to make this gain of a few hours in a ship designed to be commercially successful, present problems to be solved only by the highest engineering skill. The beautiful workmanship and the tremendous power of such great engines as those of the Teutonic and Majestic seem indeed to represent about the acme of present attainment, and the utilization of steam has reached a point hitherto unknown, but he would be a bold man who would, for these reasons, attempt to set a limit to the possibilities of the future.

"ALLEGED DECEPTIONS IN GERMAN STEEL WORKS" CORRECTED.

The proceedings in the Prussian courts of Essen, quoted in these columns, 8th inst., from a statement published on an erroneous report in the London *Iron and Steel Trades Journal*, were an action brought by the state to prosecute both the author and editor of a local partisan paper on charges of violation of the statutes regulating the privileges of the press. They were indicted for writing and promulgating articles assailing the honor and integrity of a number of citizens, residents of Bochum, both of private and of official standing, charging them with malice aforethought in incensory language with fictitious crimes against the fiscal laws for the purpose of disseminating hatred among the different classes and religious denominations of society and for inciting insurrection. One of the calumnies went to show that the Board of Assessors of Taxes, in connivance with the city authorities in all their numbers, including in their capacity as members of the Common Council the Director-General and some officers of the Bochum Verein, a society for mining and cast steel manufacture, to grossly undervalue the income of every one of their number, and many of their favorites, especially Protestants, some as high as 90 per cent, and to overestimate the people of the middle and lower grades of income, especially Catholics. All the libeled parties appeared on summons as witnesses for the state with straightforward, clear and overwhelming testimony.

The author in his defense evinced great antagonism in violent attacks upon one person especially, the director-general of the steel works, Louis Baare, who stood ready to support separate and aggravating charges of outrages committed upon himself and the great industrial institute he represents. To impair his testimony the defendant charged him with using counterfeit stamps upon inferior and rejected rails and other railroad material, thus making it pass for good. The state's attorney finding that a denunciation to that effect had been made before a magistrate the day previous, temporarily withdrew the separate charges concerning offenses against Baare, in order to avoid delay by postponing the case pending the investigation of the new matter. The latter resulted in the dismissal of the deponent's charge, which during the further course of proceedings was declared unfounded. The defendants were convicted of all the charges preferred, found guilty, and sentenced to a term of imprisonment. Baare, in behalf of the Bochum Verein, had in the meantime deposited in court documentary evidence proving that stamps were regularly and legitimately made at the works upon order and for the proper use and convenience of contracting parties and their representatives, who stamped with them their tested material on acceptation.

The Prussian ministerial department of railroads has published since a table, showing from railroad statistics the accidents which occurred each of the last six years, numbering in all 2,672 cases, of which there was only one wherein a broken rail was a cause, and that only from being struck by a broken wheel.

Contradiction of the felonious charge has followed from railroads named in the same. The stenographic reports of the court proceedings, and state documents published in German official papers, are the sources of the aforegoing narration of this much abused affair.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The first session of the fortieth meeting of this body was held in Washington, August 19. Prof. Goodale, of Harvard, relinquished the presidency to Prof. Prescott, of the University of Michigan. Eight addresses were delivered by the several vice-presidents before their respective sections, the subject of Vice-President Stevenson, of New York, being a study of the Chemung and Catskill groups in relation to the geology of the State of New York. E. W. Hyde, of Cincinnati, addressed the Section of Mathematics and Astronomy on "The Evolution of Algebra;" Prof. J. A. E. Nipher, of St. Louis, the Section of Physics on "Functions and Nature of the Ether of Space;" Prof. R. C. McKenzie, of the Agricultural College of Michigan, the Chemical Section on "Alchemy;" Prof. Thomas Gray, of Terre Haute, Ind., the Mechanical Section on "Problems in Mathematical Science;" Prof. Joseph Jastrow, of Madison, Wis., the Anthropological Section on "The Natural History of Analogy;" and Prof. John M. Coulter, President of the Indiana University, the Biological Section on "The Future of Systematic Botany."

The evening was devoted in part to the annual address of the retiring president, Prof. George L. Goodale, of Harvard, on "Some of the Possibilities of Economic Botany."

The programme of the second day included papers in all except the mechanical section. A technical paper on "A Measure of the Reliability of Census Enumeration" was read by Alexander S. Christie, of Washington. "A National University, Its Character and Purposes," and "The Science and Art of Government" were titles of papers by Lester F. Ward, of Washington. W. J. McGee read a paper on "The Southern Old Fields," followed by one by Colonel Hinton on "Agriculture by Irrigation; Some Social Economic Possibilities." C. R. Dodge read a paper on "The Needs of the American Flax-Fiber Industry," and exhibited samples of flax.

The Biological Section was much interested in "Another Chapter in the History of the Venus Fly Trap," by Dr. J. M. MacFarlane, of Edinburgh. Among other papers read in this section were "Notes on the Physiological and Structural Changes in Cayuga Lake Lampreys" and "The Transformation of the Vermilion Spotted Newt," Simon H. Gage; "On the Kinds of Motion of the Ultimate Units of Contractile Living Matter," John A. Ryder; "A New Nectria," Byron D. Halstead; "The Flora of Carmen Island," Joseph N. Rose; "Uses of the Fermentation Tube in Bacteriology, with Demonstrations," Theobald Smith; and "The Foraminifera, with a New Device for the Exhibition of Specimens," James M. Flint.

In the Geological Section the topics were: "Source of Supply to Lateral and Medial Moraines," by John T. Campbell; "New Meteoric Iron from Arizona containing Diamonds," A. E. Foote; "Post-Glacial Anticlinal Ridges near Ripley and Caledonia, New York," G. K. Gilbert; "Purposes of Mountain Building and their Relationship to the Earth's Construction," Warren Upham; "Notes on an Extinct Volcano at Montreal, Canada," Henry Lampard; "On a New Horizon of Fossil Fishes," E. D. Cope; "On the Age of the Mount Pleasant, Ohio, Beds," Joseph F. James; "Preliminary Report of Observation at the Deep Well near Wheeling, W. Va.," William Hallock; and "The Eureka Shale of Northern Arkansas," T. C. Hopkins.

In the Astronomical Section the topic was "Latitude of the Sayre Observatory," the title of a paper by C. L. Doolittle, and "The secular variation of terrestrial latitudes," by George C. Comstock. Among other papers in this section were: "On a digest of the literature of the mathematical sciences," Alexander S. Christie; "Groups of stars, binary and multiple," G. W. Holley; "Note on some recent photographs of the reversal of the hydrogen lines of solar prominences," by J. A. Brashear; and "Standardizing photographic film without the use of a standard light," Frank H. Bigelow.

Among the papers before the Chemical Section were: "Preliminary notes on the influence of swamp waters on the formation of the phosphate nodules of South Carolina," Chas. T. Reese; "Land and river phosphate pebbles or nodules of Florida," E. T. Cox; "A latent characteristic of aluminum," Alfred Springer; "The influence of negative atoms and groups of atoms on organic compounds," Paul G. Freer; "The calculation of the boiling points of isometrics from their moment of inertia," and "The determination of the true position of the carbon atoms in organic compounds by means of analytical mechanics," Gustavus Hinrichs;

"Distribution of titanic oxide on the earth's surface," F. P. Dunnington.

Among the papers in the Anthropological Section were: "The essentials of a good education, with a new classification of knowledge," M. H. Seaman; "The custom of kava drinking as practiced by the Papuans and Polynesians," Walter Hough; "A linguistic map of North America," J. W. Powell; "Jade implements from Mexico and Central America," Thomas Wilson; "On a collection of stone pipes from Vermont," G. H. Perkins; and "The importance and methods of the science of comparative religion," Merwin Marie Snell. Professor Powell's ingenious map attracted much attention.

Diamonds in Meteors.

BY H. C. HOVEY.

A remarkable paper was read at the Washington meeting of the A. A. A. S., by Prof. A. E. Foote, of Philadelphia, describing a new locality for meteoric iron near Canon Diablo, Arizona, fragments of which contained diamonds. The report at first was that a vein of pure iron, two miles long and forty feet wide, had been found, containing also gold, silver, and lead; and that surface iron could be gathered by the carload. That was in March of the present year. Prof. Foote explored the region thoroughly in June, without finding any such vein; but what he did find was of great geological and mineralogical interest.

Crater Mountain, 185 miles north of Tucson, is a peculiar circular elevation, strikingly like an old crater. It rises 432 feet above the surrounding plain, and its cavity is three-fourths of a mile in diameter. Its interior walls are so steep that animals once entrapped within them never escape, but leave their bleached bones at the bottom. The rim, of sandstones and limestones, is uniformly uplifted on all sides at an angle of 40°, while the bottom lies at a depth of from 50 to 100 feet below the general level of the plain. Although the cavity is thus crateriform, no lava, nor obsidian, or any other volcanic product was found. Small meteoric fragments were scattered over an area about a third of a mile in length and 120 feet wide, and extending northwest and southeast. Exactly in line with it, but about two miles from the base of the crater, were found two large masses, one weighing 154 pounds and the other 201 pounds, which were on exhibition, both of them deeply pitted, and the larger one perforated in three places. The latter is now the property of the Ecole des Mines, Paris. Smaller masses were also found, numbering 131 in all, ranging in weight from one-sixteenth of an ounce to 6 pounds 10 ounces. Several of them were coated with arragonite. About 200 pounds of angular sulphureted fragments, also of meteoric origin, were found near the base of the crater, a few of which showed a greenish stain from oxidized nickel.

A fragment of a mass weighing 40 pounds was examined by Prof. G. A. Koering, who found it to be extremely hard, a day and a half being taken in making a section and several chisels being broken in the operation. An emery wheel was ruined in trying to polish the section. This led to closer inspection of certain exposed cavities, where small black diamonds were found that cut polished corundum as easily as a knife might cut gypsum. These diamonds are mineralogically of great interest; the presence of such in meteoric having been unknown till 1887, when two Russian mineralogists found traces of diamonds in a meteorite mixture of olivine and bronzite. By treating with acid the amorphous carbon in the cavities, a small white diamond, one-fiftieth of an inch in diameter, was found, as well as troilite and daubreelite. The general mass was three per cent nickel. The Widmanstattian figures were not regular. The indications are that a large meteorite, weighing about 600 pounds, had become oxidized in passing through the air, and burst before reaching the earth. It is hardly credible that the crater could be accounted for by meteoric impact, and its origin is a problem unsolved. The fact of special interest may be accepted as proved, that diamonds have been found in meteoric fragments. The specimens were carefully examined by the geologists present at the reading of Prof. Foote's paper, and while there were many opinions expressed as to the so-called "crater," and as to its relation to the meteor, none doubted the genuineness of the diamonds.

POSITION OF THE PLANETS IN SEPTEMBER.

JUPITER

is morning star until the 5th, and then evening star. He is in opposition with the sun on the 5th, at 5 h. 12 m. P. M., when he appears on the eastern side of the sun, rises at sunset, is on the meridian at midnight, and is visible the entire night. It is the culmination of his career for the present year, and glorious is none too strong a word to give expression to the majestic grace with which the prince of the solar family treads his starry path during September nights.

Planets have two periods. The sidereal period is the time of a planet's revolution around the sun, from a star to the same star again, as seen from the sun. The synodic period is the time between two successive conjunctions of the planet with the sun, as seen from the earth.

Jupiter's sidereal period is 11.86 years, so that it takes him nearly 12 years to complete a revolution through the constellations of the zodiac, and he, therefore, requires a year to make his way through a zodiacal constellation. He will be found in Aquarius during the present year, in Pisces during the next year, and so on.

Jupiter's synodic period is 399 days, a little more than a year and a month, a number easily remembered, and one which makes it easy to calculate his successive oppositions. Jupiter's opposition occurs this year on September 5. It will occur 34 days later in 1892, or about October 9. It will thus be seen that the careful observer may readily keep the run of Jupiter's position in the zodiac, and the date of his opposition from year to year.

The moon is in conjunction with Jupiter on the 17th, the day before the full, at 0 h. 47 m. A. M., being 3° 45′ south.

The right ascension of Jupiter on the 1st is 23 h. 2 m., his declination is 7° 50′ south, his diameter is 47″.4, and he is in the constellation Aquarius.

Jupiter rises on the 1st at 6 h. 40 m. P. M. On the 30th he sets at 3 h. 33 m. A. M.

SATURN

is evening star until the 13th, and then morning star. He is in conjunction with the sun on the 13th, at 8 h. 38 m. A. M., when he passes to the sun's western side, and will soon be seen playing his part as morning star. Saturn is too near the sun to be visible, but an interesting epoch occurs in his September course. The rings will disappear on the 22d, when the plane of the ring passes through the earth, and is seen edgewise. It will not reappear until October 30, when the plane of the ring passes through the sun. The southern surface of the ring that has been illumined by the sun for fifteen years will now be in shadow for the same time, and the northern surface will be illumined in its turn for the same time, when the ring will again disappear. Saturn's sidereal period is 29.5 years. He is now found in the same position in the zodiac that he passed in 1862.

The three-hours-old moon is in conjunction with Saturn on the 3d, at 6 h. 26 m., being 3° 6′ north.

The right ascension of Saturn on the 1st is 11 h. 22 m., his declination is 6° 7′ north, his diameter is 15″, and he is in the constellation Leo.

Saturn sets on the 1st at 6 h. 58 m. P. M. On the 30th he rises at 4 h. 37 m. A. M.

MERCURY

is evening star until the 13th and then morning star. He is in inferior conjunction with the sun on the 13th at 0 h. 11 m. A. M., passing then between the earth and the sun, as the moon does at new moon. He reaches his greatest western elongation on the 28th, at 4 h. P. M., when he is 17° 53′ west of the sun. This is the last opportunity during the year for seeing Mercury as morning star with the naked eye. He must be looked for an hour before sunrise, and 8° north of the sunrise point, and is visible at elongation and for a few days before and after.

The right ascension of Mercury on the 1st is 11 h. 47 m., his declination is 3° 14′ south, his diameter is 9″.6, and he is in the constellation Virgo.

Mercury sets on the 1st at 6 h. 50 m. P. M. On the 30th he rises at 4 h. 26 m. A. M.

VENUS

is morning star until the 18th, and then evening star. She is in superior conjunction with the sun on the 18th at 10 h. 8 m. A. M., when she takes her first steps on the path which will make her during the winter months the radiant evening star. She is at present too near the sun to be visible.

Venus, four days before her superior conjunction, meets Saturn, the day after his conjunction. The event occurs on the 14th at 6 h. 32 m. P. M., Venus being 32′ south. The actors in the scene are of course too near the sun for terrestrial vision.

The right ascension of Venus on the 1st is 10 h. 32 m., her declination is 10° 44′ north, her diameter is 10″, and she is in the constellation Leo.

Venus rises on the 1st at 5 h. 3 m. A. M. On the 30th she sets at 5 h. 49 m. P. M.

MARS

is morning star. He rises about an hour and three-quarters before the sun, but it is hard to find him, for he is only a ruddy point in the sky.

The waning moon is in conjunction with Mars on the 2d at 0 h. 9 m. A. M., being 4° 5′ north.

The right ascension of Mars on the 1st is 10 h. 2 m., his declination is 13° 16′ north, his diameter is 3″.8, and he is in the constellation Leo.

Mars rises on the 1st at 4 h. 28 m. A. M. On the 30th he rises at 4 h. 7 m.

NEPTUNE

is morning star. He is in quadrature with the sun on the 1st at 3 h. P. M., when he is 90° west of the sun. His right ascension on the 1st is 4 h. 20 m., his declination is 20° 15′ north, his diameter is 2″.6, and he is in the constellation Taurus.

Neptune rises on the 1st at 10 h. 26 m. P. M. On the 30th he rises at 8 h. 31 m. P. M.

URANUS

is evening star. His right ascension on the 1st is 13 h. 47 m., his declination is 10° 32′ south, his diameter is 3″.5, and he is in the constellation Virgo.

Uranus sets on the 1st at 8 h. 25 m. P. M. On the 30th he sets at 6 h. 34 m. P. M.

Mercury, Mars, Saturn and Neptune are morning stars at the close of the month. Venus, Jupiter and Uranus are evening stars.

Edward Burgess.

The death of Mr. Edward Burgess, of Boston, on July 12, at the age of 43, removed one of the few persons in America who have made important contributions to insect anatomy.

His work was not voluminous, but it was very careful and exact. He was the author of, in 1880, an excellent review of the then recent literature in insect anatomy and physiology. His own most important and extensive paper was on the anatomy of the milkweed butterfly, but he worked out in more or less detail the anatomy of the perfect stage in Anabrus and Aletia, and studied minutely the male abdominal appendages of butterflies, the structure of the head of Psocidae, the mouth parts of the larva of Dytiscus, and the varied course of the aorta in Lepidoptera. He was also the first to show the precise structure and working of the apparatus for feeding in the imago of Lepidoptera.

A large part of his work was in aid of the researches of others, in which he was generous almost to a fault, and his unselfish devotion to his duties for sixteen years as secretary of the Boston Society of Natural History, in whose publications most of his papers were issued, brought the office to a high state of efficiency—a devotion further signalized in his will, in which he made the society his contingent residuary legatee. Besides, although he published but a single short paper on Diptera, his knowledge of this group, in which he rendered large service to others, was unsurpassed among our countrymen.

To entomology, which he had cultivated with such signal success, Mr. Burgess, it is true, died several years ago when he parted from his collection and library and turned his attention exclusively to naval architecture, in which he had been interested from boyhood, and which offered far more promise of financial returns, then first absolutely necessary for him to consider. His world-known success in his new field (for he fairly leaped into fame) it is not the place here to consider, but, clearly the greatest genius our country has ever produced in this branch of science, his naturalist friends without exception will agree that in losing him from their immediate ranks science at large has been the gainer. They were indeed eager to applaud his success, his old scientific friends being, we believe, the very first to give him a tangible proof of their pride in his fellowship—a pride all the greater for the almost painful modesty with which he received every mark of his growing fame. Selfishness could not live in his sight. When the city of Boston gave him a public reception, his shrinking boyish figure as he rose to return his thanks, in which he tried to turn public attention rather to the one whose means, whose confidence, and whose sympathy had rendered the realization of his scientific genius practically possible, will not soon be forgotten by those who witnessed it. But the gentleness and sincerity of his character, the refinement of his life and manners, his truthfulness and loyalty, and all those other delicate traits which revealed his heart and rendered him so dear to his intimate friends, will remain to them a source of perennial inspiration.—*Psyche.*

The Battle of Bennington Monument.

On August 19 there was dedicated with appropriate ceremonies, marked by the attendance of the President and many distinguished visitors, a monument in commemoration of the battle of Bennington, Vt., in our revolutionary war. The monument has been in progress of building for several years, and has cost $100,000. It was paid for by appropriations. It was paid for by the States of Massachusetts, New Hampshire, and Vermont, and by private subscriptions. It is 301 feet 10½ inches high from base to the top of the capstone, and stands on a site 283 feet high. Its base is 37 feet 4 inches, and it is built of native stone faced with Sandy Hill dolomite. It has a lookout room, 188 feet above the foundation, reached by an interior iron staircase.

THE coffer dams of cruisers 9 and 10, building at the Columbian Iron Works, Baltimore, Md., will be filled with cellulose, which has been adopted by the navy department. The living apartments and store rooms of the cruisers are being painted with cork paint, which consists of a heavy coat of white lead and varnish, over which is sprinkled cork. It forms a non-conducting material which keeps the ship dry in warm climates and moist atmospheres.

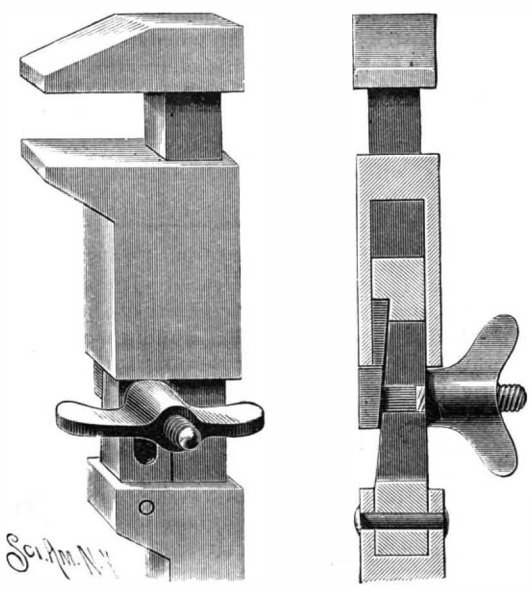
A Steel Chimney.

Steel is being used in the construction of the immense chimney of the Fair building at State, Adams and Dearborn Streets, instead of brick. The chimneys of the Leiter building, at State and Van Buren Streets, will also be constructed of the same material. This new feature of construction has been introduced by Architects W. L. B. Jenney and W. B. Mundle. The chimney when completed will be 250 ft. high, being considerably higher than any other in the city. The outside diameter is 9 ft. 5 in., while the steel varies in thickness from five thirty-seconds at the top to three-eighths of an inch at the bottom. The lower 75 ft. of the chimney is lined with fire brick eight inches deep, formed to fit the shell compactly all around. Above this it is lined with hollow tile. This lining is supported at intervals of 25 ft. by angle iron riveted to the steel shell; in other words, the chimney is lined in a manner similar to blast furnaces and foundry cupolas, and no expansion by heat can lessen its strength. The joints are all hot riveted. The steel shell is carefully protected from corrosion and from any attacks by the weather by painting inside and out. The weight of the chimneys is spread to the foundations in the same general way as that of the columns of the building, the base or foundation on which it rests being constructed in the same manner. The ground first is covered with a layer of cement, then two layers of steel rails in cement and one layer of I-beams, on which the cast iron shoe which takes the shell of the stack rests. The capacity of the chimney is twelve 60 in. boilers 20 ft. in length. The chimney is now up to a height of 150 ft. The cost will be about $7,000. In the one to be constructed in the Leiter building the diameter will be a trifle larger, being 10 ft. 3 in., while the height will not be so great, being calculated at 200 ft. This will afford an escape for the smoke from the fire boxes of nine 72 in. boilers, each 20 ft. long.

This is the first time this material has been used in the construction of the chimneys of mercantile buildings. The magnitude of the building and the necessity of economizing in space, the foundations for the columns occupying about all the ground, led the architects to adopt steel as the material for this purpose. Brick has been used almost entirely heretofore, but upon investigation it was found that the weight of a brick chimney of this size would be almost 700 tons, while of steel construction it would weigh, including the linings, a little less than 250. The outside diameter of the present chimney is 9 ft. 5 in., while were it constructed of brick it would be 16 ft. 6 in., thus making a great saving in space.—*Chicago Journal of Commerce.*

A SIMPLE AND DURABLE WRENCH.

In the wrench shown in the illustration, one of the jaws may be moved toward or from the fixed jaw, and held in the desired position, without threading the shank of the fixed jaw or the guide bar of the movable jaw. The improvement has been patented by Mr. Samuel Stock, of Pontiac, N. Y. The movable jaw has a large rectangular opening in front of the shank, as shown in the sectional view, in which enters a guide bar, which also serves as a lock bar, and is longitudinally slotted. The outer end of this bar is seated in a socket formed in a side projection from the ferrule, where it is held by a pin, and one side face of

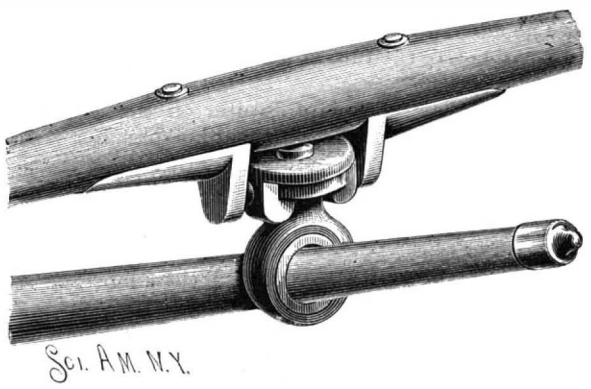


STOCK'S IMPROVED WRENCH.

the bar is beveled the length of the slot. A bolt used with the device has an outer end portion beveled to correspond to the inclined face of the lock bar, the portion of the bolt passing through the slot being square, to prevent the turning of a winged lock nut, the bolt and nut forming supports for the movable jaw. When the jaws are adjusted to clamp the object, the bolt head and nut are brought to bear against the outer portion of the movable jaw, and the nut is screwed in upon the bolt. With this construction the shank is not weakened by having a thread cut on it, and the wrench has a neat appearance and is inexpensive to make.

AN IMPROVED NECK YOKE.

A durable, safe and inexpensive yoke center, for connecting the neck yoke with the poles of a vehicle, one which moves freely in relation to the pole and will not permit the yoke to pound thereon, is shown in the accompanying illustration. It has been patented by Messrs. David H. Gotshall and Herbert Petit, of No. 507 Second Street, Astoria, Oregon. The yoke is of the usual construction, and in elbow lugs attached by bolts to its under side are journaled the trunnions of a circular plate having a depending flange, which extends around all but the front side of the plate, and which is doubled under at right angles to receive the flat head of a pole ring. The head may be readily



GOTSHALL & PETIT'S NECK YOKE.

slipped into the recess of the plate, and a neck between the body of the ring and the head comes opposite the bent portion of the flange, so that the ring may have all necessary movement. The ring is prevented from accidental removal by a pin extending downwardly through the plate and into the head of the ring, but there will be little strain on the pin, the lateral strain from the flat head coming on the flange of the plate. The ring is lined with leather or other suitable material to prevent wear and rattling.

Squandering a Nation's Patrimony.

At the recent celebration of the Fourth of July at Woodstock, Conn., Mr. Murat Halstead delivered a striking address, to which he gave the title of the "Preservation of the People's Inheritance." It could be more accurately described as an account of the reckless way in which mankind in general, and Americans in particular, had squandered, and were continuing to squander, their inheritance. In speaking of the decline of certain nations, Mr. Halstead said:

The lands have been wasted, the forests are no more, the soil that once made fruitful hills and blooming valleys is at the bottom of the seas, and the streams that watered the peopled plains are lost in the sands that are the tombs of the profligates who have perished. The elements of possibility, the foundations of prosperity, are gone, never to be restored, and those cancers of the earth, the deserts, are eating away more and more that which should sustain the generations to come.

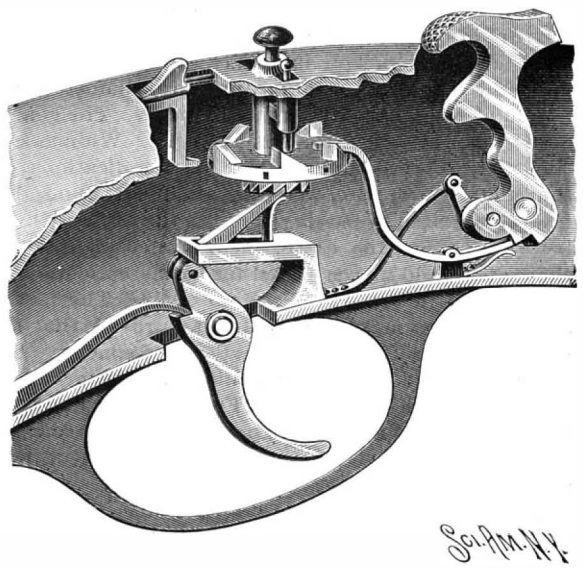
Coming down to our own country, the speaker referred to the exhausted fertility of tobacco lands and wheat fields; to the extermination of food fish and noble game and water fowl; particularly to our vanishing forests.

The woods have been torn from the mountains, and brooks have departed because the springs have ceased to flow; and, when not dwindled almost to dust beds, the ancient mill streams are roaring floods, for the slopes of the ridges are bared and the rainfalls rush from them as over roofs of slate; the hillsides are plowed up and down, preparing gutters to feed the freshets with the soil that is far more precious, in the eyes of those who have been taught the art of seeing, than the precious metals. It is the passion and pride of the average American to smite the trees and shoot the birds and slaughter the last of our running game—and if there are laws for the protection of trees in parks, or game laws to save the quail and squirrel, or to prevent scouring the rivers with seines out of season, and to provide fish ladders and abolish fish traps, they are regarded as tyrannical, a style of oppression identified only with effete monarchies and the tottering despotism of worn-out worlds. The buffalo have been exterminated, a noble race murdered, so that they are hardly enough to supply museums; and if there is a moose left in Maine he has been accidentally spared, and must be pursued by the hunter with remorseless fury to shed his blood to the final massacre. It is a crime to cut down the woods on a mountain, a crime to heedlessly kindle fires to burn forests; but our people have no realizing sense of the sort, and sneer at the Swiss and Germans, who require three permits to fell one tree. In New York there is a struggle that seems hopeless to preserve the remnants of the once majestic and always romantic Adirondack wilderness. In our new States the statesmen dare not stand against the timber thieves.

In some parts of the address Mr. Halstead's rhetoric was rather too intense for scientific accuracy; but, after all, the real sting of the indictment is in its truth. To the speaker's hopeful spirit the establishment of fish hatcheries by the government, the effort to protect the seals of Behring Sea, and the reservation of the Sequoia groves were acts which gave promise of a time coming when more serious thought would be given by our nation to the preservation of its heritage. He noted, too, as hopeful indications, that arbor days were celebrated in many States; that tree planting by children had become fashionable, and that the discussion over the Adirondack woods, although it might not save the wilderness, would ultimately, perhaps, save many other forests. We feel inclined to consider it another cheering sign that an orator of national repute has felt impelled, on that anniversary when Americans are in their most exultant mood, to raise his voice in earnest protest against the reckless destruction of our forests. No higher public service can be rendered by the country's leading men than the reiteration of warnings like this, until it comes to be universally understood what the ruin of our forests means.—*Garden and Forest.*

A TRIGGER MECHANISM FOR GUNS.

A mechanism by which guns having more than one barrel may be fired by a single trigger, with a safety catch, so that the gun cannot be accidentally fired, and a device to indicate the barrel to be exploded, is shown in the accompanying illustration. It has been patented by Mr. Frank D. Granger, of Ellsworth, Kansas, an assistant in the United States Coast and Geodetic Survey. Extending down from the top of the breech is a hollow casing in which is vertically mounted a pin normally pressed upward by a spring, and on the lower end of the pin is loosely mounted a firing disk having on its upper surface a series of cam teeth adapted to alternately raise the sears and release the hammers. Only one sear and a simple style of hammer are shown to illustrate the mechanism, but the improvement may be connected with any of the common forms, especially those generally found in double barreled guns. The hammers have tumblers at their lower ends engaged by the forward ends of the sears, and the hammers are normally pressed forward by springs secured in the lock case, the hammers being thus held in cocked position until the sears are raised at their rear ends by the cam teeth of the firing disk. The under side of the disk has twice as many cam teeth as there are on its upper surface, to engage a pivoted spring-pressed trigger arm which extends upward through a slotted guide, so that when the trigger is pulled the disk will be turned, one of its cam teeth engaging a sear to raise it and fire the gun. When it is desired to fire a barrel which would not normally be fired by a sear, the pin in the top of the breech is pressed downward, carrying the disk down, so that its teeth will not engage the sears, while the disk will be pushed around one notch by the trigger arm, and may be brought into the right position for firing either barrel. A slide block carrying a safety catch is held in the breech behind the vertical pin, by which the disk may be locked so that it cannot be turned, the catch being released by pushing the block rearward. To show which barrel is about to be fired, spring-pressed pins are arranged in arms extending one from each side of the central pin, these pins extending downward into



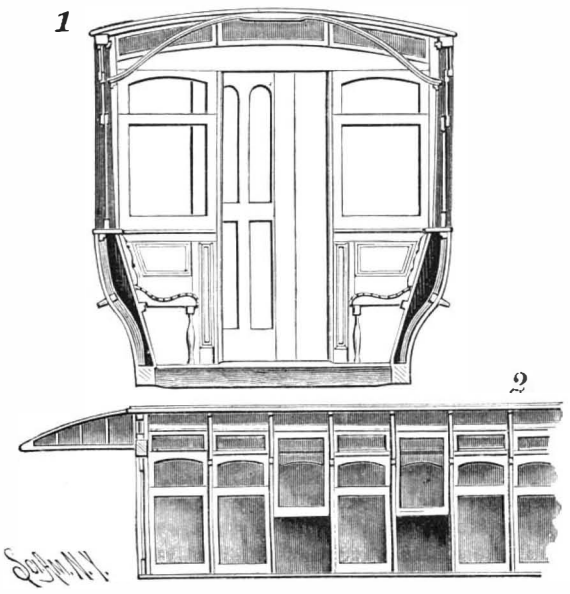
GRANGER'S LOCK FOR FIRE ARMS.

the path of the cam teeth on the firing disk, so that as the latter is revolved one pin or the other will be made to project above the top surface of the breech, indicating the barrel to be fired.

DISSOLVING CAOUTCHOUC.—Caoutchouc can be dissolved more readily by adding from 5 to 15 per cent of oil eucalyptus to the benzol or carbon bisulphide used; in the latter proportions, the mixture of carbon bisulphide will dissolve nearly 20 per cent of caoutchouc.

AN IMPROVEMENT IN CAR CONSTRUCTION.

The illustration represents a style of building a car body patented by Mr. John Turner, and especially adapted for horse, cable, and electric cars. Fig. 1 is a transverse section and Fig. 2 a partial side elevation showing the construction. The side pillars of the body are longer than those usually employed, and they are attached at their lower ends to side sill beams, and at their upper ends to plates on which the roof is supported, at very near the height of the car body at its center. The pillars have straight sash grooves,



TURNER'S CAR BODY.

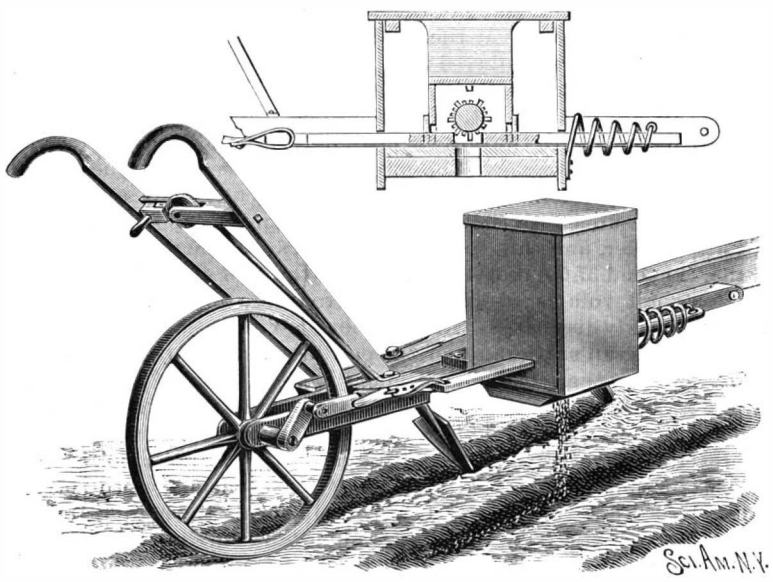
and the sashes are carried upward instead of downward in opening the car windows. A series of permanent upper sashes is provided, behind which the movable ones slide. The car at its central portion is of the standard height, and by thus elevating the roof at the sides more head room than usual is made over the seats, giving ample air space. The roof is also centrally supported by a series of trusses, the ends of which are curved downward and secured to the side pillars. The space between the back of the seats and the sides of the car body is covered by caps, which constitute window sills, effectually preventing any refuse or foreign matter from getting into the pockets which ordinarily exist behind the seats. Beneath the bonnets, in the upper framing at each end of the car, are pivoted sashes forming ventilators. By this manner of construction it is designed that the car body shall be much stronger and capable of being built at materially less cost than has heretofore been the practice.

Further information relative to this invention may be obtained of Mr. John Wimmer, No. 2187 Third Avenue, New York City.

AN IMPROVED PLANTER.

The illustration represents a simple and inexpensive form of planting apparatus, designed to be readily attached to the beam of a double or single plow, and by which any kind of seed may be dropped without portions of the seed adhering to the drop slide. Pivoted to one side of the plow beam is a bar or beam in which is journaled a supporting wheel, and upon one side of the bar is secured a laterally adjustable seed box, having a detachable cover and a central drop opening in its bottom, in which may be placed a drop tube if desired. On the upper face of the bottom of the box a drop slide is held to move beneath a housing within the box around the drop opening, as shown in the sectional view. The slide has near its center an aperture adapted to register with the drop opening on both its forward and rearward movements, thus permitting the seed to drop. By properly arranging holes in the slide relatively to the diameter of the wheel, the planting may thus be done in hills that are 18, 36, or 72 inches apart, or by another arrangement of the slide continuous drill planting may be effected, such change of slide being readily made in two or three minutes. The housing within the seed box consists of a box-like receptacle with guarded side openings through which the slide passes, and a roller is journaled in the housing transversely over the slide, there being arranged around the roller pins adapted to enter recesses in the upper face of the slide, forming a guide therefor which compels the opening of the slide to register properly at all times with the drop opening. The roller also has one or more studs, adapted, as the roller revolves, to enter the drop opening in the drop slide, and force down any seed clinging to the walls of the opening. The housing may be adjusted up or down to cause the roller to contact more or less tightly with the drop slide. The axle of the supporting wheel has a crank arm, to which is pivoted a pitman adjustably connected with the rear end of the drop slide, around the forward end of which is a coiled spring adapted to retain the slide in open position when the implement is at rest and the wheel elevated. To the cross beam between the plow handles is pivoted a lever connected by a strap with the body beam of the planter, whereby, on pressing down a knob of the lever, the rear end of the attachment is sufficiently raised to remove the drive wheel from the ground.

This improved planter has been patented by Mr. William W. Jones, of Granada, Col.



JONES' PLANTER.

The Banana a Developed Lily.

Goldthwait's Geographical Magazine says that the banana belongs to the lily family, and is a developed tropical lily, from which, by ages of cultivation, the seeds have been eliminated and the fruit, for which it was cultivated, greatly expanded. In relation to the bearing qualities of this fruit, Humboldt, who early saw the wonders of the plant, said that the ground that would grow 90 pounds of potatoes would also grow 33 pounds of wheat, but that the same ground would grow 4,000 pounds of bananas, the proportions thus being, to wheat 133 to 1, and to potatoes 44 to 1. The banana possesses all of the essentials to the sustenance of life. The savage of the sea isles and the jungle owes what he has of physical strength to this food.

Wheat alone, potatoes alone, will not do this. When taken as a steady diet it is cooked—baked dry in the green state, pulped, and boiled in water as soup, or cut in slices and fried. I do not know whose beauty I admire the most—the majestic cocoa palm, with its heavy crown of great fringed leaves, or the graceful banana, with its great leaves, which are six feet long and two feet wide.

The leaves of the banana are tender, and the strong winds of the tropics—the hurricanes—soon tear the leaves in strips, thereby adding to their grace and beauty. The banana is a fruit that beast and bird, as well as man, are fond of, and the owner, when he lives in a sparsely settled country, must needs protect his plantation by a fence of some thorn plant.

Motion by Electric Current.

BY M. D. HURMUZESCU.

A fine metal wire stretched between two supports, one of which is provided with a strainer or spring for regulating the tension, on being traversed by a *continuous* current begins to vibrate.

The amplitude of the vibrations, which is at first very small, increases as the time goes on, and quickly arrives at a maximum, which it maintains as long as the current is passing through, provided that the surrounding atmosphere remains in the same condition, or at any rate does not undergo any sudden change. The vibrations may thus continue inefinitely; they stop in a few seconds when the current is interrupted.

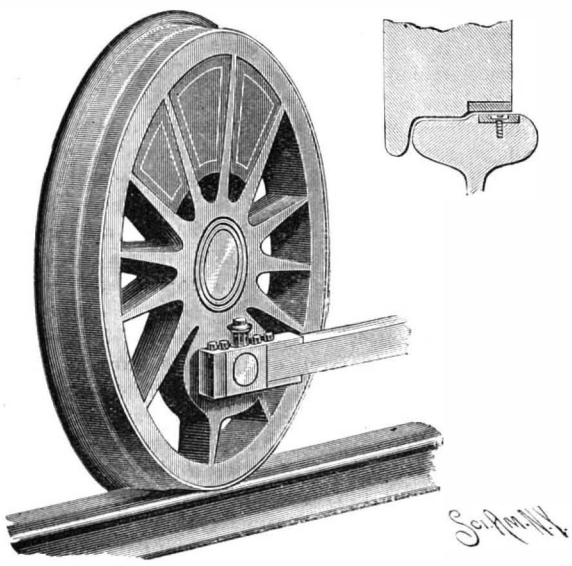
For a given tension, the amplitude of the vibrations seems to depend (according to the experiments which I have made up to the present) on the difference in the temperature of the wire and of the surrounding atmosphere. Now, as it is the intensity of the current which produces this difference of temperature in a given wire, the amplitude should vary according to the intensity.

The explanation of this fact seems to me to lie in the interchange of heat between the wire and the surrounding atmosphere; this constitutes really a *thermic motor*, in which the energy expended is supplied by the current, and the principle of the conservation of energy can be applied to it.

Any cause producing a change, in any manner whatever, in the mode in which this interchange of heat takes place will modify the phenomenon in some way or other. We can foresee that the finer the wire, the more rapid will the vibrations be; this is confirmed by experiment. I repeated the experiment with wires of different natures, and found that the phenomenon always preserves the same character. If we put the wire in a large glass tube the movement is regular, because the wire is sheltered from the movements of the air. On closing the two ends of the tube, I observed no change in the rapidity of the vibrations.

A CAR WHEEL AND RAIL TO INCREASE TRACTION.

According to the invention forming the subject of the accompanying illustration, it is designed that where a railroad track is built at a grade or is curved, or at switches, the rail shall be provided with a strip of soft, tough metal, held to the rail by countersunk



CHOATE'S CAR WHEEL AND RAIL.

screws, as shown in the sectional view, the outer edge of the rail being raised and a channel made therein for the purpose. The outer edge of the driving wheels is also smaller than it is near the flange, so that when running on the ordinary rail only the inner portion of the tread will come in contact with the rail, but the outer portion of the wheel is provided with a band of hard metal, roughened on its outer surface, adapted to come in contact with the strip of the rail at places where increased tractive power is required. When the wheels thus made reach the rails provided with the strips, the roughened band on the wheel is designed to take a firm hold on the softer metal of the strip, so that the motor will be able to haul a very large load. The bands and strips are intended to be renewed at small cost when they become worn.

This invention has been patented by Mr. Franklin W. Choate, of San Diego, Cal.

A Gigantic Relief Map of the United States.

A geographical novelty has been produced by Prof. Edwin E. Howell, of Washington, D. C., namely, a large relief map of the United States and Gulf of Mexico, with portions of the Atlantic and Pacific oceans, between the 67th and 127th meridians, modeled on the section of a globe 133 feet in diameter. This great work is prepared from data furnished by the United States geological survey, the United States coast and geodetic survey, and the United States Hydrographic Office. The horizontal scale is 1 inch equal to 50 miles; and vertically 1 inch equals 5 miles. The dimensions of the map are 6 feet 6 inches by 4 feet, and it is about 15 inches in its greatest thickness. The first copy of this important and artistic work has been secured by Mr. David Pell Secor, for the Bridgeport Scientific Society.

In this connection it may be added that Mr. Secor's previous gifts to the Society include more than 18,000 specimens, worth at least $10,000, and extremely rich in aboriginal relics, especially spear and arrow tips, fully 2,000 of the latter being made from various precious stones.

Mr. Secor has likewise purchased for the Leland Stanford, Jr., University, California, the large and celebrated herbarium of the late distinguished botanist, Prof. William Henry Hervey, of Trinity College, Dublin, which has been received and acknowledged by the University with thanks. This immense collection is in six cases, containing 360 bundles of standard sized botanical paper, with 16,977 species from all parts of the world. As there are usually as many as four or five specimens of each species, the grand total amounts to fully 70,000 specimens. The naming of these specimens has been carefully revised according to the most approved classification, and it may safely be affirmed that there are less than half a dozen herbaria in America that rival the Hervey herbarium in size, or in authentic accuracy. The enterprise and liberality of the donor are worthy of especial commendation. Mr. Secor's residence is in Bridgeport, Conn., where he devotes most of his time to gratuitous scientific pursuits.

To make cloth that is used in lining shoes waterproof, use oiled silk or heat the linings in melted paraffin.

Culex Pipiens.

We all know the creature, but may not perhaps recognize him as readily under this name as under the more familiar, but not thereby despised, one of mosquito. We said "him," but we were wrong, for, unlike what is found in some of the higher orders of creation, it is the females that make all the trouble and do all the biting and stinging, the male being a very inoffensive and harmless insect, shunning man and getting his sustenance from the juices of plants, a few drops of which suffice for the needs of his short career. We might know that nothing good could ever come from the Culicidæ, for they start out in life in a way that no self-respecting larva could abide, swimming around, as if ashamed of themselves or of their progenitors, with their heads hanging down in the water and breathing through their tails.

A single mosquito, buzzing about on a warm summer night, can do more to keep away slumber than the uneasiest conscience that ever pricked the soul of man for his sins; yet in this part of the world, even in New Jersey, we do not think of the creature as one that can destroy life. Its limit of evil doing is as a pruritifactive and profanity-causing pest. When present in large numbers, however, they may become as dangerous to man as the rattlesnake, or as the man-eater in the Indian jungle. In an article on poisonous insects, in the "Reference Handbook of the Medical Sciences," Mr. Riley, the government entomologist, says that the pestiferous little insects "have caused the rout of armies and the desertion of cities, and the hum of an insignificant gnat may inspire more terror than the roar of the lion. The bravest man on the fleetest horse dare not cross some of the more rank and dank prairies of Northern Minnesota in June. It is well known that Father De Smet once nearly died from mosquito bites, his flesh being so swollen around the arms and legs that it literally burst.

"Those who have traveled in summer on the lower Mississippi or in the Northwest have experienced the torment which these frail flies can inflict; at times they drive every one from the boat, and trains can sometimes only run with comfort on the Northern Pacific by keeping a smudge in the baggage car and the doors of all the coaches open to the fumes."

There are said to be more mosquitoes to the cubic inch on the Magdalena River in South America than anywhere else in the known world, and it is madness to attempt a voyage up the river without a mosquito netting and some ammonia or other preparation to relieve the itching of the bites received in spite of constant care. A story is told of an Englishman who was not afraid of a mosquito or two, and scorned to take any precaution before starting up this river for Bogota. He soon had cause to repent of his foolish obstinacy, and after offering vainly all the money he had for the loan of a mosquito netting for the remainder of the voyage, he was driven mad by his tortures on the third day of the sail, threw himself into the river, and was drowned. This may be true and it may not, but any one who has ever faced one of these dense swarms without the protection of a thick net will have no trouble in recognizing the probability of its being an actual occurrence.

But one must give the devil his due, and even the mosquito has his good points, or rather let us say *her* good points, for, as we hinted before, the male has all the gentle unobtrusiveness and innocuous artlessness of his sex in other walks of life. The larvæ, wriggletails as they are usually called, swim about in stagnant pools and perform a useful service in purifying the water and freeing it from many swarms of microbes that are possibly inimical to man. But it is only in her tender youth that Culex pipiens is good, and as soon as she gets her wings and becomes capable of working mischief, her period of usefulness to the community is at an end.

In addition to the irritation which she excites by her bites, she has been accused of carrying about the germs of disease on her proboscis, and thus spreading contagion and defying quarantine. Dr. Finlay, of Havana, has been trying to turn this to good account by making the mosquito the instrument of preventive inoculations against yellow fever. He recently published the statistics of his experiments in this direction, from which it would seem that this method may really possess some efficacy. The insects that have been seen to bite patients with yellow fever are carried away carefully and made to sting newly arrived and unprotected individuals. Dr. Finlay reports the results of over fifty cases of mosquito inoculation, and of these but four individuals contracted the disease in a severe form within three years after the inoculation, one only dying therefrom. Of the remainder, some presented symptoms of yellow fever between the fourth and twenty-fifth day after inoculation, while others had no symptoms at this time, but suffered later from a mild attack of the disease. Some significant comparative statistics were obtained from the observation of sixty-five monks who, from time to time, arrived in Havana, where they all lived under similar conditions. Thirty-three of these were inoculated and thirty-two were not. Only two of the inoculated suffered from well marked attacks of yellow fever, which, however, did not prove fatal; whereas eleven of those that had not been inoculated were severely attacked, no less than five dying.

There are numerous patent preparations recommended as efficacious in relieving the irritation caused by the sting of the mosquito, some of which are possibly very serviceable, but probably not more so than oil of cloves, ammonia, bicarbonate of soda, chloroform, or thymol. When none of these remedies can be obtained, it may be well to remember that the alkali of ordinary soap is often as efficacious as anything. As soon as a bite is felt, the part should be moistened and rubbed with a piece of soap, the lather so formed being allowed to dry on the skin, and in a very short time, unless the individual be unusually susceptible to the poison of the insect, all irritation will have disappeared.

But prevention is, of course, better than cure, and most people who, for their sins, must live in a mosquito country keep off the greater number of their enemies by sleeping under a mosquito bar, although there is always one culex that manages to get in despite the utmost precaution. These bars are a great comfort, nevertheless, and even an absolute necessity in certain regions, but they are very inflammable, and serious accidents have resulted from their being set on fire by the flame of a candle or gas jet in the neighborhood of the bed. We may, therefore, fittingly bring these konopological remarks to a close by presenting the following recipe, published by the *National Druggist*, for rendering mosquito netting uninflammable:

"Make a solution of one part of ammonium sulphate to five parts of water and immerse the netting in the same. One pound of netting will require from twenty to twenty-four ounces of the solution to thoroughly saturate it. The material is entirely inoffensive, and the ease with which it is employed is not its least recommendation. After saturating the bar (or other material) with the liquid, it is necessary to pass a hot iron over the fabric to dry it and make it ready for use."—*Medical Record.*

Smokeless Powder—The New 12 Inch Gun—Firing of High Explosive Shells.

The first experience of our army officers with smokeless powder in high power cannon indicates that the day of the brown prismatic powder is now past. The results of three shots lately fired from the 8 inch gun at Sandy Hook were of the highest importance in showing to what extent the American guns can be relied upon when a proper brand of powder is secured. The powder used was smokeless powder, manufactured in Germany, and understood to be a modification of the Nobel powder. Its principal ingredients are said to be nitro-glycerine, nitro-cellulose, camphor, and benzole. The powder comes in block cubes, three-eighths of an inch on each edge. It has the appearance of black rubber when in the cube, but when pared in three pieces is translucent. The trial consisted of three shots fired from the gun, mounted on a free recoil carriage, in order to determine the velocity and pressure along the bore. In the first round a charge of 30 lb. of powder, and shell weighing 300 lb., were used, giving a velocity of 1,497 ft. and pressure of 18,000 lb. In the second shot the charge was increased to 45 lb., the velocity recorded being 1,990 ft., and the pressure 31,160 lb. In the third round, with 50 lb. of powder, the remarkably high velocity of 2,162 ft. per second was given, the pressure being about 38,000 lb. The velocities were taken 165 feet from the muzzle. The energy of the shot at the muzzle was 9,720 foot tons. The good results of the last round can be appreciated when it is remembered that with a charge of 130 lb. of brown powder, with the same weight of projectile as used in the above three rounds, the highest velocity attained with the normal pressure of about 37,000 lb. was 1,935; with a 250 lb. projectile, such as used in the navy gun, it is estimated that a velocity of 3,345 ft. can be secured with 50 lb. of the same brand of smokeless powder, and this, too, without increasing the pressure beyond 37,000 or 38,000 lb. When the gun was fired, a small volume of smoke shot from the muzzle, but quickly dissipated. Another notable circumstance was the clean appearance of the powder chamber after the firings, there being no residue whatever.

Preliminary tests of the army 12 inch steel breech-loading rifle, the first gun of that caliber completed in this country, were recently had at the Sandy Hook proving grounds, for the purpose of establishing a proper grade of powder before commencing the regular service test. The results are important only in showing that the gun is well able to stand the pressure figured upon. The unsatisfactory quality of the powder used made it impossible to determine anything else about the full ballistic qualities of the gun. Five rounds in all were fired, commencing with a charge of 250 lb. of powder and increasing to 375 lb. With the latter charge and a projectile weighing 1,000 lb., a velocity of 1,862 feet per second was obtained, with the pressure recorded at 36,500 lb. per square inch. The highest velocity obtained was in the fifth round, when the weight of the projectile was reduced to 850 lb. With a charge of 370 lb. of powder, this projectile was given a velocity of 1,952 feet, the pressure reaching 38,567 lb. per square inch. These latter figures approach very nearly to the results calculated for the full charge of 440 lb. of powder and a 1,000 lb. shot, therefore showing that a radically different powder must be adopted to secure the ballistics expected from the regulation charge and weight of projectile. The official test of the gun will be postponed until a satisfactory powder can be obtained. The breech mechanism of the gun worked perfectly.

A successful test was made at the Sandy Hook proving ground lately of the new explosive, emmensite, as an exploding charge for shells fired from powder guns, and there is every prospect that in a short time emmensite will obtain an official recognition as a leading explosive for military purposes. A shell filled with the explosive was placed in a 7 inch breech-loading rifle and fired into the water. The shell was fired from the gun intact and the experiment developed the fact that, though this substance is a high explosive of an intensity nearly, if not quite, equal to dynamite, it can safely be subjected to the shock of being fired by the expansion of powder gas and utilized as an explosive for projectiles. The next step taken will be to discover a fuse for these shells.—*Army and Navy Journal.*

PHOTOGRAPHIC NOTES.

Paramidophenol Developer.—This new developer, introduced by Messrs. Lumiere, has now been tried also by our German authorities, and their judgments are, on the whole, favorable to this reducing agent. Professor Vogel finds that the pure paramidophenol is very insoluble, so that it was impossible to prepare with it the solution recommended by Messrs. Lumiere. Dr. Schuchardt, of Gorlitz, has, however, succeeded in producing a hydrochloric preparation of this substance, which, in the hands of Prof. Vogel, proved to be more soluble than the first one, though it is said to dissolve much less readily in cold water than hydroquinone. It is, therefore, necessary to heat the water previously. The developer thus obtained is very energetic, giving, however, somewhat thin negatives, and the mixed solution soon becomes brown. If the paramidophenol solution and the sodium sulphite solution are kept separately, they will keep clear. Also Prof. Eder and E. Valenta state that the paramidophenol forms an excellent developer, giving, according to its composition, every degree of softness or intensity. The color of the negatives is grayish black, the film being free of every bluish or greenish color, even if a neutral fixing bath is used. The authors recommend the use of a dilute solution for the reason that then the paramidophenol does not crystallize out of its solution and the developer becomes less expensive. Moreover, the diluted solutions form equally excellent developers as the concentrated ones. The formulæ recommended by the authors are the following:

PARAMIDOPHENOL SODA DEVELOPER.

Water	1,000 cc.
Sodium sulphite	80 grammes.
Carbonate of soda	40 "
Paramidophenol	4 "

PARAMIDOPHENOL POTASH DEVELOPER.

Water	1,000 cc.
Sodium sulphite	120 grammes.
Carbonate of potash	40 "
Paramidophenol	4 "

The latter is specially well suited for plates which tend to give thin negatives, while the soda developer yields more delicate images. With the latter, also, transparencies on gelatino-bromide emulsion may be developed very successfully.—*H. E. Gunther, in Photo. News.*

A Bone Shedder.

Dr. Bell, of Parrottsville, Tenn., reported the case of a woman who sheds her bones, and showed some of the specimens before the East Tennessee Medical Society (*Medical Standard*). He said: "The patient is seventy-one years of age, seemingly in perfect health, a well preserved woman of medium height, average weight, and normal in every other respect. Twenty-one years ago the exfoliation of bone began in her fingers, and has during the succeeding years continued until she has twice shed ulna and radius, humerus, scapula, and part of inferior maxillary. This shedding takes place spontaneously without pain, hemorrhage, suppuration, inflammation, or inconvenience. On one occasion when churning she shed the radius. There is no deformity, sapination, pronation, extension, flexion, and circumflexion being perfect. The bones shed (about six hundred pieces) were, on careful inspection by the society, found to be entirely natural. She has given about one hundred pieces of bone away as souvenirs. The woman is conscious of the pending expulsion of a bone about ten minutes before it takes place, and a perfect bone is always left in its stead. The bone makes its way out, always on the posterior side, and the wound heals by first intention, though at the 'exit of the bones' were numerous small scars. She has always been in comfortable circumstances and is cheerful, a very interesting fact, as showing the power of the mind to adapt itself to extraordinary circumstances."

Correspondence.

The August Meteoric Shower.

To the Editor of the Scientific American:

The August meteors were observed here on the night of the 10th. The display was not very brilliant, averaging about 125 per hour, for one-third of the heavens, about Perseus as a center. By far the greater part of the meteors passed northward from the radiant; 90 per cent of them left a distinct train. Their average brightness was a little less than that of a second magnitude star. Night of the 11th cloudy. So no further observations have been obtained.

LAURENCE LA FORGE.

Alfred University Observatory,
Alfred Center, N. Y., Aug. 12, 1891.

Jet Propulsion.

To the Editor of the Scientific American:

In your issue of August 8 I notice that Mr. John W. Hahn thinks my intermittent jet suggestion a "step backward;" dwells upon waste of power, and medium, and winds up with a statement as to intermittent screw propellers, which seems to me rather indorses than detracts from my suggestion.

Admitting, as he states, that the aim of the friends of hydraulic propulsion includes a constant jet, as their aim has seemingly fallen short of the mark, should it be considered a "step backward" to aim differently—possibly a little higher?

Regarding "waste of power" and "medium," I may only say that the end attained might or might not justify the power used; and the "medium" also is a matter not now germane to the mere principle presented.

But, regarding the intermittent screw, Mr. Hahn seems to overlook that the blades secure the intermittent thrust desired against the recovered resisting element; while his statement leads to the inference that the Archimedean screw would serve equally as well in this respect as the intermittent blade. If so, he quite naturally would befriend the constant rather than the intermittent thrust—and herein lies the difference; while cost of power, and mechanical mediums, I omit.

First let us secure the principle, then its utility will regulate the extent and value of the power, and competition the size and cost of the medium.

W. H. WETHERILL.

Philadelphia, August 15, 1891.

Jet Propulsion.

To the Editor of the Scientific American:

Being a reader and lover of your valuable paper, and as boats and their means of propulsion are my pet hobbies, I have been greatly interested in what has been said of late on the subject of jet propulsion.

I have been experimenting on the subject of propulsion for a few years, as much as my limited time and means would permit, and although I am far from being scientific, and could not perhaps give good reasons why, I am not a believer in the practicability of jet propulsion, as against either the wheel or screw, now in use. I do think, however, that there is a better way.

I would like to say to the friends of the jet theory that my way to use it (the jet) would be to equip my boat with wheels, the same as they now are—except that the wheels need be only about one-fourth their present weight and strength—then direct the nozzles to the paddles below the water line, using the engines to pump the water, instead of working on the crank shaft as they now do. This would, I am quite sure, be an improvement on the wheel, and give the jets what, in my opinion, they stand most in need of—backing.

I believe that the jets *do* "bore holes in the water," as they say. We all know that, if we let a stream of water fall from an elevation in an unbroken state into a body of water at rest, the momentum acquired in falling carries it down to a greater or less degree according to the fall, to rise again to the surface, perhaps a long distance from its point of entering. My opinions need not discourage any one, as they may not be well founded. I think, as a general thing, we look too far from nature for our ways and means of doing things. Electricity is a natural light and traveler, water and steam are natural powers. We have only *learned to use them.*

There are no screw, wheel, or jet propellers in nature, though the screw, which is the best, is the nearest to nature's way.

FRANK D. WHIPP.

Cleveland, O., August 10, 1891.

A Trip up Columbia River in the Salmon Season.

To the Editor of the Scientific American:

About the middle of April, 1889, I took a steamer at San Francisco out through the Golden Gate, and two days on the Pacific among whales and sharks brought us to the mouth of the Columbia River at about noon. The day was beautiful and atmosphere clear, and seated on the upper deck we had a magnificent view of grandeur along each shore. On the left or north shore, as we ascended, there stood Mt. Hood, covered to her lofty peak with snow, in appearance eight or ten miles distant, but were told that it was about forty. Then a little on there, Mount St. Helen, not as beautiful in appearance as her sister Hood; the latter a more ragged appearance.

It being in the height of salmon catching, with beautiful river strung on both sides of our narrow channel with nets and fishermen all along with their row-boats, drawing up their nets and dislodging their beautiful shining game, some weighing fifty or more pounds, with the smaller, and flopping them into their boats; and others unloading on to the wharves for the canneries.

I have sailed up and down our Mississippi to the jetties, where it empties into the ocean, and up and down the Clyde, in Scotland, where the navy of the world is built, and up the Rhine from Mordyke to Dusseldorf, and amid the wonders and curiosities along the shores of these majestic rivers to me none compare in grand beauty to our Columbia slope.

At evening we arrive safely at the city of Portland, Oregon, where we find comfortable lodgings for the night. Next morning we take the train for Seattle, stopping at Tacoma on the way. Here is one of the most flourishing and prosperous cities in America, surrounded with vast forests, sawed lumber of good quality for ordinary building purposes $7 per thousand, inexhaustible coal fields right at her door, bordering on a beautiful bay containing abundance of fish, and near the Columbia River, which yields her hundreds of tons yearly of salmon, probably giving out more actual wealth than any other river on the globe. About three weeks after I left, Seattle was nearly all destroyed by a terrible fire, which destroyed all of the business portion and the hotel we stopped at. Were I twenty years younger there is where I would locate, it being a beautiful climate, never excessively hot nor of freezing cold.

J. E. EMERSON.

Damage from Patent Alkali Works.

Boosey vs. Cheshire Alkali Co.—An action was brought by Mr. William Boosey, nurseryman, to recover compensation from the Cheshire Alkali Company, Limited, for damage caused to his nurseries at Middlewich by noxious vapors given off from the defendants' works, and to restrain the defendants from continuing the works in the same way. It appeared that the plaintiff had been carrying on business as a nurseryman for thirty years at Middlewich. In 1880 he took a piece of land, about twelve acres, which at the time was in a rough and uncultivated state, and laid it out as a nursery. Upon this and an adjoining plot of land he had expended about £400 a year. The damage done to plant life by the escape of a white, limelike powder from the alkali works, particularly as it happened at the time when the produce of the nurseries was going into the market, was, the plaintiff alleged, a very serious matter. The defendants formed their company in 1887 for the purpose of the production chiefly of carbonate of soda, and their works are separated from the plaintiff's nurseries by only a line of railway. Before the erection of the works commenced the plaintiff was apprehensive as to the injurious results which might follow to his shrubs, and he instructed a solicitor to write to the company a letter giving them notice that he would take all legal steps for the protection of his property. The reply was that there was no occasion for alarm at the contemplated works, the process used by the company being absolutely innocuous. The works were then commenced, and were completed about September or October, 1889.

In the early part of March following the damage to the nurseries became apparent, and had gone on to such an extent that almost the whole of the plaintiff's stock was unfit for sale. The presence of ammonia was then very noticeable, and showers of white powder were thrown off from the works, covering and blighting the trees and shrubs. Evidence was given at great length in support of plaintiff's case. Mr. Alfred Smetham, F.C.S., consulting chemist to the Manchester, Liverpool, and North Lancashire Agricultural Society, said he believed most of the damage to the nurseries was due to ammonia. Mr. Bernard Dyar, F.L.S., F.C.S., gave similar evidence, stating that he could smell ammonia in the nursery. The proportion of ammonia that was floating about would be between 1 in 1,000 and 1 in 2,000. He had made several tests with ammonia on vegetable matter. He treated vegetable matter with a solution of 1 in 7,000, and there was a distinct shrinking.

Mr. Clement Higgins, Q.C., for the defense, said that the process of manufacture carried on at the works was innocuous. There were no noxious fumes which did damage.

He was free to admit that a certain portion of the powder did go into the air from the grinding process, and some would go through the cracks of the shed. They had done all in their power to prevent it. They had not only built what was called a gangway, but they had filled up all the cracks with felt, and the fact was that practically no dust had escaped since that was done in October, 1890. When the skilled witnesses went to inspect the works they found there, no doubt, a certain amount of soda ash in the air which they would feel, but the jury could not put their finger upon any body of evidence in the case which was conclusive and satisfactory to show that the white powder had done any damage. The damage to the nursery existed before the date of the erection of the alkali works, and was caused by the adjoining saltworks in the district, and also by frost. The ammonia that came from the works before it reached the nursery would be so diluted as to be absolutely harmless. The works were conducted upon a patent principle, the main object of which was to save ammonia, because to lose ammonia was to lose money. Not only had they this patent process in use, but they had made subsequent improvements in the process, so that they might now say the system was almost perfect, and ammonia could not escape from the works so as to do any harm. With regard to the carbonate of soda, there might be traces of it, but it must be proved that damage had resulted from it. No doubt strong enough doses of carbonate of soda would injure plant life, but it must be proved that it was in strong enough doses to do the injury in the present case.

Mr. Norman Tate, analytical chemist, said he visited the plaintiff's nursery on the 20th January. There was some damage done to the plants, but it was chiefly due to frost and coal smoke. There was no smell of ammonia. The ammonia which escaped from the works could not have done the damage. The powder which was thrown off would not injure the plants. Similar powder was used on plants to kill green fly. In proof of his statement he instanced experiments lasting three weeks which he had made, and produced bunches of green leaves of rhododendrons and cypress treated in the way he had described. He believed that possibly the other chemists had used what was often described as pure carbonate of soda, but which occasionally was found to contain some caustic soda. He did not smell ammonia in the nursery, but he had seen thick smoke from the neighboring salt works coming across an orchard and in the direction of the nursery. He could detect a smell of hydrochloric acid in the air.

James Carter, a neighboring farmer, was called for the defendants to prove that his premises near the nurseries had not suffered from the proximity of the alkali works. In cross-examination he admitted, however, that several poplars exposed to the white powder that was deposited from the works were in a dying state. Thomas Jackson stated that his garden, which was situated about 150 yards from the alkali works, gained the first prize at the last Davenham flower show, but in reply to Mr. Marshall, for the plaintiff, he stated that he had frequently seen the white powder in the nurseries. Henry Heather, chemical engineer, and John Oakes, manager of the defendants' works, having also been examined, Mr. Edward Davies, consulting chemist, of Liverpool, said ammonia was very volatile, and whatever escaped in the process of manufacture would expand in a radius of 100 yards to a strength of only 1 in 120,000. The damage was not such as he had been accustomed to see caused by alkali works. He had never known that ammonia was injurious to vegetation, but had understood it to be beneficial to some varieties. There was some, but he would not say the main damage, due to hydrochloric acid. Mr. John Fraser, of Essex, gave it as his opinion that the destruction of plants was mainly owing to frost.

Counsel having addressed the court, the commissioner, in summing up, pointed out that there was no doubt when the alkali manufactory was opened in 1889 the plaintiff's nursery was in a perfectly good and flourishing condition, and it was logically certain that damage was done at the end of the year, twelve months before the frost of last winter. He suggested that the wholesale price would be a fair value to allow for whatever goods, if any, were destroyed or damaged by the chemical works. The jury, after half an hour's consultation in private, returned a verdict for the plaintiff, awarding damages of £500.—*Chemical Trade Journal.*

Electric Motors.

As an interesting contribution to the history of electric power transmission and electric traction, the *Moniteur Industriel* cites the fact that on January 16, 1855, Henry Gilbee was granted a patent "for the employment of two magneto-electric machines united by wires, one of the machines being put in motion by any convenient power, and generating a current which causes rotation of the second machine." The inventor, it would appear, foresaw also the establishment of a number of motors along the line of a conducting wire taking power from it. The inventor was M. Bessolo, a business arrangement having been entered into by him with Mr. Gilbee for the purpose of commercially developing the patent. Possible applications of the latter were, at the time, pointed out to be the operation of machine tools, and electric traction with underground or overhead conductors or with the rails serving as conductors. It would appear from this that all systems of electric traction have thus been antedated by Bessolo's early patent of 1855.

WHITE STAR STEAMER TEUTONIC.

(*Continued from first page.*)

The White Star steamers Teutonic and Majestic are similar throughout. They have a gross tonnage of 10,000 tons each, and their displacement, when fully loaded, is about 16,000 tons each, the indicated horse power of each being 17,000, which can be run up, as has been seen, to nearly 20,000. They were both built by Messrs. Harland & Wolff, of Belfast. The Teutonic was launched in January, 1889, her keel having been laid in March, 1887, and the Majestic was launched in June, 1889. Both vessels are specially constructed for service as mercantile armed cruisers, according to arrangements made with the British Admiralty, so that the British government could at any time add them to its naval force in case of war with another country. They are built of Siemens-Martin steel, and propelled by two independent sets of triple expansion engines driving twin propellers with manganese bronze blades. In addition to being minutely subdivided by athwartship bulkheads, they are constructed with a longitudinal bulkhead running fore and aft throughout the greater portion of their length, which gives additional rigidity to their structure and greatly increases their security in the event of accident. They can each carry 855 fore cabin passengers, 175 second class, and 300 in the saloon. When fully loaded, each will have on board about 3,000 tons of coal and nearly 4,000 tons of cargo.

In the engine and boiler rooms each carries twenty-five engineers. Mr. T. Sewell, in the Majestic, and Mr. Currie, in the Teutonic, hold the extremely responsible positions of engineers-in-chief. There are sixty firemen and forty-eight coal trimmers; electricians, ice machine men, etc., bring up the engine room staff of each to one hundred and sixty-eight. They carry crews of about forty sailors, twenty-five cooks, and sixty stewards.

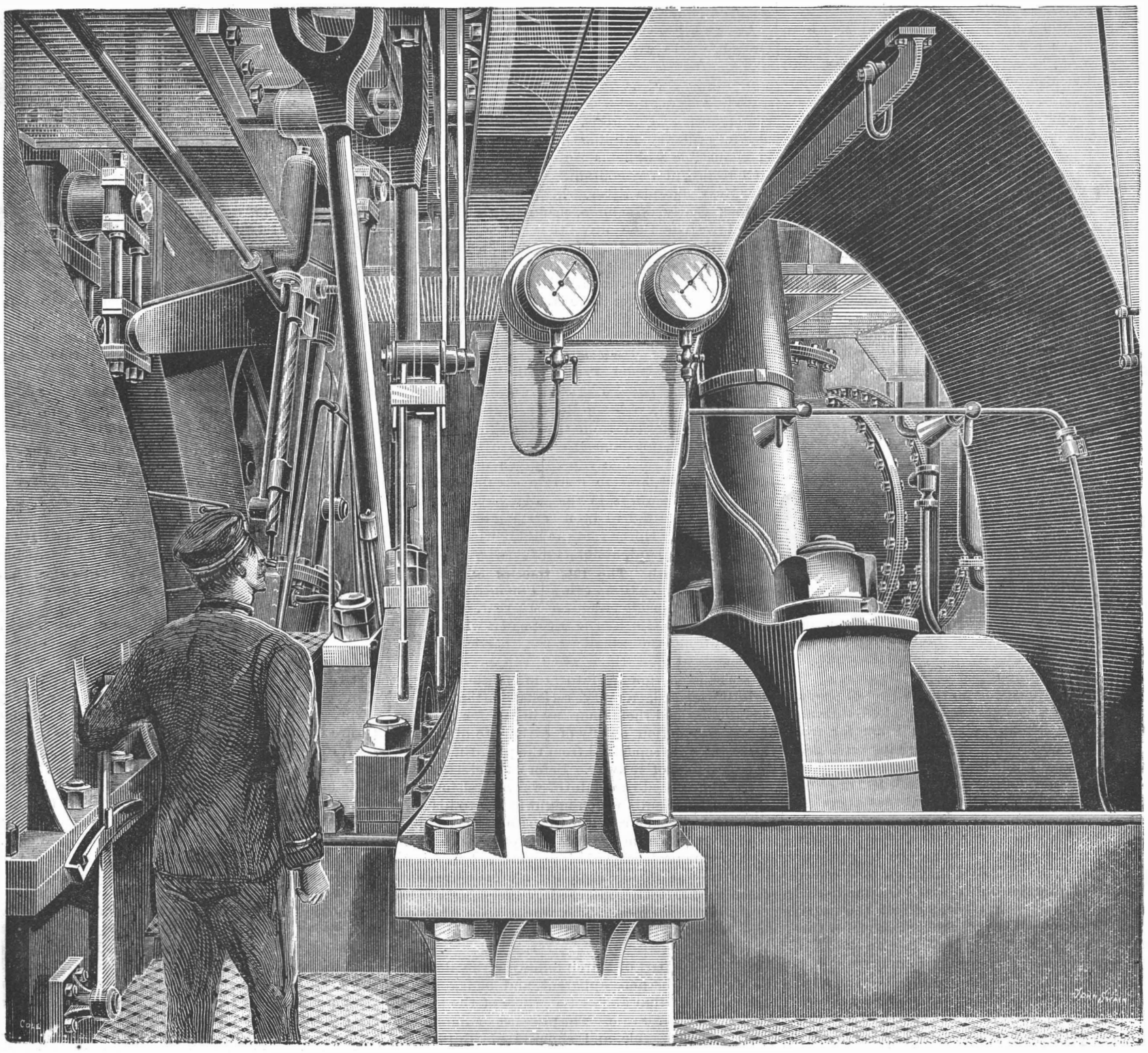
The cylinders of the triple expansion engines are 43 inches, 68 inches, and 110 inches in diameter, respectively, the stroke, common, being 60 inches, and, according to the London *Engineer*, from which we copy the illustrations and condense this description, each cylinder is carried on cast steel frames. In front is an A frame, and at the back a single frame, so that the cylinders are carried each on three points of support, and the "three-legged stool" principle is called in to give stability, which it does in the fullest degree. The high pressure cylinders stand next the boiler rooms. The engine rooms are over 50 feet long. All the cylinders have piston valves, two each to the intermediate and low pressure cylinders, and one to the high pressure cylinder. The cylinders are not steam jacketed, but all are fitted with liners and are air jacketed. The intermediate and low pressure pistons have tail rods, but the high pressure pistons have not. All the pistons are coned to impart stiffness, and have been made as light as is consistent with strength.

The condenser is quite separate from the engine. It is cylindrical, of brass, some 20 ft. long, and 7 ft. in diameter. The tubes are of brass, ⅞ in. diameter. The aggregate length of all the condenser tubes is about twenty miles. The water passes through the tubes three times. The boilers are fed by Weir's vertical pumps, but Worthington pumps are also provided. The engines are separated by the longitudinal bulkhead, which rises a few feet above the water line to a point about level with the cylinder covers. The whole of the upper part of the engine room is common to both engines. As the propellers overlap, the engines can be placed much closer together than is possible when the usual system is adopted.

The valve gear is of the ordinary Stephenson shifting link type. The rods of the two sets of piston valves on the intermediate and low pressure cylinders are keyed into a crosshead working in guides, and to the center of the crosshead. The link die is coupled so that one link serves for both valves. We give a view taken on the middle platform. The cylinder bottoms are seen overhead. The construction of the valve gear will be readily understood. The hand wheel and screw on the weigh shaft is for fine adjustment for expansion.

We also give two views showing the enormous dimensions of the crank shaft and connecting rods. The crank shafts, each weighing 41 tons, are of Whitworth steel, the crank pins being 22 in. by 22 in.

The screw shafts are placed so close together that the screws overlap 5 ft. 6 in., and the starboard propeller is astern of the other by 6 ft. The propellers revolve "outboard." A large opening is made in the dead wood to allow of this system of construction. There are no stern brackets, the hull being worked out round the screw shaft, and fitted with a strong spectacle casting in steel, which carries the stern bearings. There is no screw alley in the ordinary sense of the word. Each screw shaft—one 199 ft. and the other 205 ft. long, weighing 76 tons—runs along a species of chamber which, well aft, is really outside the hull. One of our engravings shows a view taken in this chamber. At the other side is the longitudinal bulkhead, and in the space between this and the shaft are placed ice-making machines—ammonia—and the cold air storage holds are supplied with cold air by fans from this department. Everything is duplicated, so that the machinery at both sides of the bulkhead is the same.



STEAMSHIP TEUTONIC—STARBOARD ENGINES, STARTING PLATFORM.

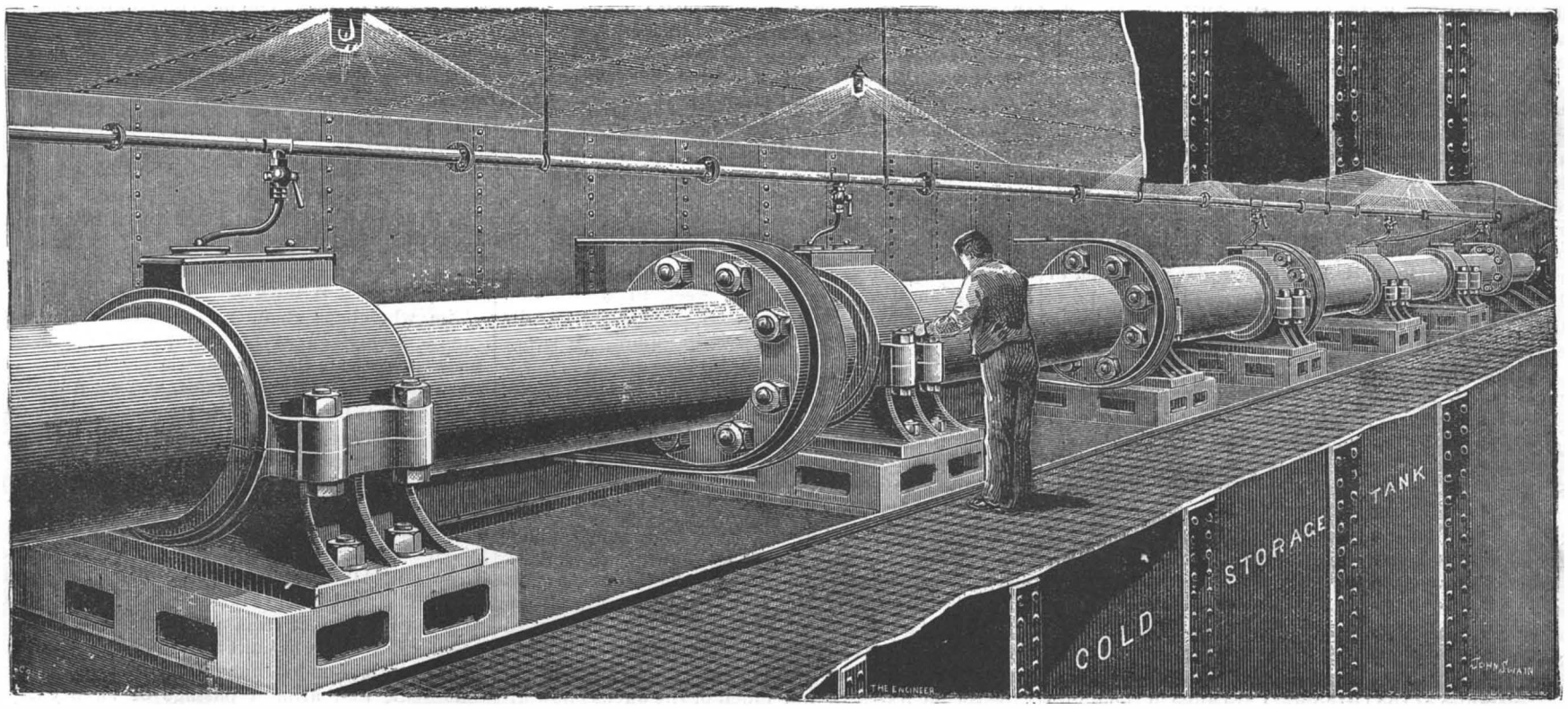
The screw propellers are 19 ft. 6 in. diameter and 28 ft. 6 in. pitch, four bladed, modified Griffiths true screws, with a surface of 108 square feet each. The propeller blades were cast of Parsons manganese bronze from ingots supplied by the Manganese Bronze and Brass Co., Deptford, by Messrs. Harland & Wolff, Belfast, who have for some time past adopted this metal for the propellers of all their fast passenger steamships.

Steam is supplied by twelve double-ended and four single-ended boilers, containing eighty-four furnaces. The pressure is 180 lb. They are worked with forced, or rather assisted, draught, on a modification of Howden's system. On the bridge decks, at each side of the funnels, there are four double fans driven by compound engines, to drive air into the stokeholds, supplementing the supply drawn through the fiddley

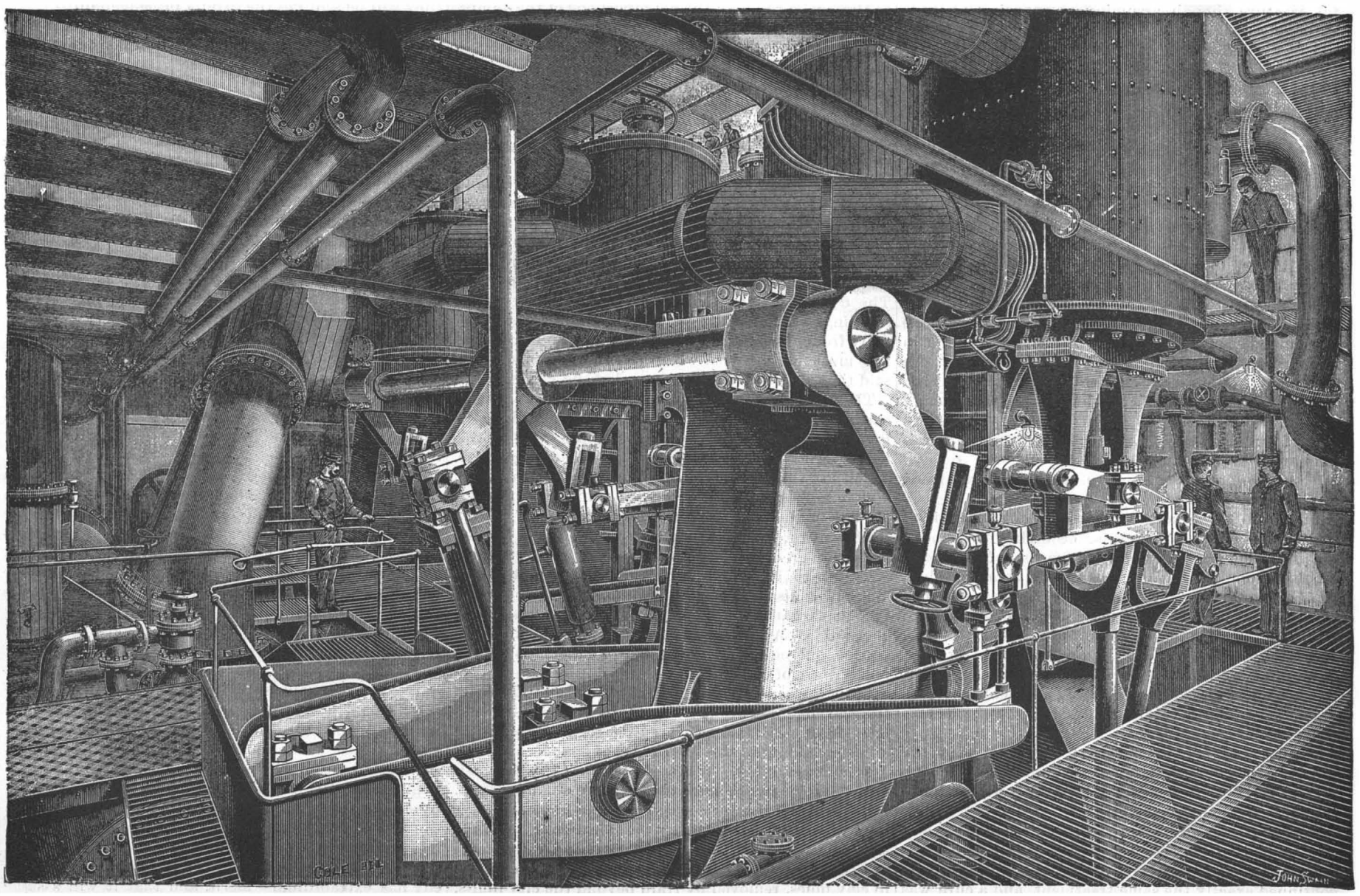
gratings. Below these are fourteen fans, driven by Chandler engines, to draw the air from the hottest places in the stokeholds and force it into chambers in the uptakes at the bases of the chimneys. There are fifty vertical tubes in each chamber, and through these tubes the products of combustion pass, while the air from the fans circulates round them, and passing down the sides of the smoke boxes is finally delivered into the closed ash pits at a comparatively high temperature. About one-fourth of the whole air supply is admitted over the fires. The combustion is very perfect, and it is only under exceptional circumstances before the fires are fairly away that much smoke is given off. The chimneys, two in number, are oval, each 14 ft. on the major axis by 11 ft. 6 in. wide. In addition to the eighteen fans, there are three others, two for keeping the dynamo rooms cool and one for ventilating the firemen's quarters.

In running the engines of the Teutonic at their indicated 17,000 horse power, it is computed that the boilers will have to produce about 120 tons of steam per hour, with an absolute pressure of 195 lb., the safety valve load being 180 lb. on the square inch. Of course the feed pumps have to deliver 120 tons of water into the boilers against this pressure every hour. The feed water required for one hour would fill a cubical tank nearly 16½ ft. long, broad, and deep; for at 36 ft. to the ton, 120 tons means 4,320 cubic feet. The energy expended in putting this great body of water into the boilers is over 57 horse power, allowing nothing for friction in pipes or losses of any kind. The feed pumps really absorb about 120 indicated horse power. The total feed water for one day of twenty-four hours amounts to 103,680 cubic feet, or an ample daily supply for a town of 26,000 inhabitants, giving every person twenty-five gallons per day. To convert this water into steam about 13·5 tons of coal are burned every hour, or in round numbers 320 tons a day. These figures are not official, but they are not far from the truth. The 13½ tons of coal need for their combustion not less than 270 tons of air. Assuming that this air before it enters the fans has a temperature of about 80°, it will weigh, omitting fractions, 7 lb. per 100 cubic feet. The 270 tons represent, then, 8,640,000 cubic feet. To raise this air from 80° to 180° as is done represents about 5,800 theoretical horse power, and a large portion of this may be regarded as clear gain, being obtained for nothing. In other words, if the air were delivered cold to the furnaces instead of hot, some 20 tons of coal extra would be required per day.

The centrifugal circulating engines must run constantly when the main engines are moving; they must be started before the main engines, and must be kept running during all temporary stoppages, in order that the great condensers may be kept cool and ready to deal with the immense volumes of steam which are discharged from the low pressure cylinders of the main engines. The weight of steam to be condensed is taken roughly at 120 tons per hour, a quantity which gives some idea of the important part which surface condensation has played in the progress of steam navigation. About 26,000 gallons of water are made into steam at a pressure of 180 lb. per square inch, and reconverted into water every hour. To effect this condensation about 4,000 tons of sea water are passed



STEAMSHIP TEUTONIC—STARBOARD TUNNEL.



STEAMSHIP TEUTONIC—STARBOARD ENGINES, MIDDLE PLATFORM, FROM FORWARD STARBOARD CORNER.

through the tubes of the surface condensers every hour. This duty is effected by circulating pumps, and it may be interesting to state that the amount of water dealt with on the round trip between New York and Liverpool is over 1,000,000 tons—enough to fill a reservoir about a mile long, a quarter of a mile wide, and six feet deep.

The London Insectary.

The insect house in the Zoological Society's gardens is now in excellent order, and well deserves a visit. In addition to the silk moths that are usually present during the warm weather, the Papilioninae, or swallow-tail butterflies, afford at the present time the chief display. The perfect insects of several species of the genus Papilio have appeared—*P. cresphontes*, *ajax*, and *asterias* from North America, *P. alexanor* from the Mediterranean shores, and the handsome *P. maackii* from Japan. The last named has been seen for the first time in the house this year, and offers a striking contrast to the other species of the genus that have previously been exhibited in the gardens, it being of black and golden-green colors instead of the yellows and blacks that we are accustomed to in our European swallow-tails.

P. cresphontes has appeared in large numbers in the house, but no varieties have been obtained. This, also, is the first season for two other beautiful Papilioninae, viz., *Doritis apollina* from Asia Minor and the Japanese *Sericina telamon*. The latter shows considerable difference in the markings of the sexes. The North American *Limenitis disippus* can be at present seen in all its stages, and is well worthy of attention, the caterpillar moving along the leafstalks with a peculiar interrupted gait. Of the sphinx moths, the south European *Deilephila alecto* has already appeared, and *D. nicae* is expected. These insects are, however, not seen to advantage in confinement, as their superb powers of flight cannot be displayed in a small compartment. Two examples of the Orthoptera are alive in the house —*Diapheromera femorata*, one of the stick or twig insects from North America, and *Empusa egena* from southern Europe. The former has been reared from eggs laid in the insect house, but these progeny are not so healthy as those obtained from freshly imported eggs. The Empusa is of a most bizarre form, and belongs to the family Mantidae, the species of which feed only on living creatures. The public is indebted to Mr. S. H. Carver for the opportunity of seeing living scorpions. He has sent examples of two species of this group from Egypt, both of which, unfortunately, are unidentified, there being obvious difficulties in the way of carrying about live scorpions and comparing them with dried specimens. There is a third scorpion, from south Europe, living with its Egyptian congeners. It has a small delicate tail, and is altogether a less frightful creature, though assuming a menacing attitude with equal readiness.

A spider, *Lycosa portosantana*, from Madeira, is healthy, and is a fine creature, though insignificant by the side of its neighbor, a huge Mygale from South America. The latter, as well as the scorpions, is fed with mice, which are given to it dead, though in its native haunts a Mygale has been known to prey on living individuals of these small mammals.—*Nature.*

A New Treatment for Baldness.

The form of alopecia for which M. Moty suggests a new plan of treatment is that which proves at times so obstinate, in spite of all applications, commonly known as alopecia areata. At a recent meeting of the French society of Dermatologie et Syphilographie, he presented a number of patients who had been subjected to intradermic injections of corrosive sublimate in strength of two to five hundred, and claimed that the treatment had proved very satisfactory, in that the growth of hair over the bald spots had been more rapid than after other modes of treatment. A variety of vehicles had been experimented with, until it was found that an aqueous solution was the best. Several injections of not more than five or six drops are made around each patch.

Modern investigations tend to show that there is at least one variety of alopecia, occurring in rounded plaques, which is due to the invasion of a microorganism, and the observations of Von Scholen, Thin, Robinson, and others in this field have rendered it scarcely justifiable for an author at the present day to attribute the affection to neurotic causes in all cases. If, as Robinson maintains, the organisms are situated deeply in the tissues of the scalp or other hairy portions of the skin, then the plan of treatment here suggested is eminently rational, and ought to be as successful as it is claimed.

It must always be remembered, however, that the disease is of a most erratic nature, and while at times it resists all our efforts, at others it shows a tendency to rapid and spontaneous recovery.

Besnier relates an instance in point, where a patient was treated in his service continually for two years without success. He was then sent to a colleague who continued exactly the same treatment, and a cure was promptly effected.—*Med. Record.*

Disposal of Refuse in American Cities.

The disposal of the refuse in cities, while it has been a problem in the sanitation of our larger towns, is yet to be solved. There is probably not a city of any size in the United States where the disposal of wastes is satisfactory or conducted in such a manner as to meet the demands of cleanliness and hygiene. If there is a perfect plan adopted, there are to be found defects in its execution which render ineffective the methods used. The report of Mr. Walter V. Hayt, General Sanitary Officer of the Chicago Board of Health, recently published, gives a summary of different cities as to their methods of "collection and disposal of garbage and refuse." From this we learn that in New York the garbage is collected by the city teams, loaded upon flat boats, removed to sea and dumped. The garbage is removed from Philadelphia by small contractors in a very unsatisfactory manner; some feed to hogs, others sell to farmers, and at times it is buried or accumulated on the ground awaiting slow decomposition. Cremation is recommended. In Brooklyn refuse is moved to the sea. Collections are made daily from hotels, from dwellings twice a week in winter and three times a week in summer. St. Louis collects its garbage and discharges it at certain dumps. It is not satisfactory, and cremation is also here recommended. The following is said regarding the disposal of garbage in Boston:

"There are now about three hundred and fifty thousand loads of garbage, ashes, street sweepings, and other miscellaneous *debris* gathered up by the city teams annually, and carted away to different places and for different uses. The annual cost to the city in hauling this large amount of material is about $500,000, about $100,000 of which is spent in collecting garbage. With the growth of the city and the gradually increased distance to which such matter must be carried for disposal comes a corresponding increase in the expense. The question occurs to us, cannot this growing expense be lessened, and much of the offense now attending the necessary storing of garbage in the houses and yards, and the hauling and carting of it in the streets, be avoided? It is found that with trifling cost in arranging the kitchen stove, each family can easily burn all its refuse as it is made, and before it becomes offensive, and thus save all subsequent expenses and nuisance incidental to its being kept on the premises for several days and then carried through the streets by the city teams."

Baltimore says that "the mode of disposing of the garbage, night soil, and street dirt of the city, as at present carried on, though far from perfect, is, with our present facilities, the best our circumstances will allow. The offal and filth of cities *must* be deposited *somewhere* when gathered from every house and locality, and is from the very nature of things a nuisance to those who reside in the neighborhood of the dumps. Much, however, could be done in mitigation of this evil by more stringent regulations in the manner of removing both garbage, ashes, and night soil. The garbage carts are very poorly adapted, in their present construction, for the transportation of garbage and ashes through the streets of the city, and are a source of constant complaint by citizens whose olfactories are greeted throughout the summer months by the odor of decaying vegetable and animal matter, and at all seasons saluted by a shower of dust from uncovered ash carts."

In 1883 Cincinnati contracted with a private company for two years to remove, for the sum of $2,500 annually, all "vegetable garbage, dead animals, and slaughter house offal within the limits of the city." The company must remove all animal matters from dwellings and hotels at least three times a week, and daily from all slaughter houses. Ashes and other refuse must not be mixed with vegetable garbage. It is said that the city has the best end of the contract.

The Cleveland method is as follows, as taken from the report: "*Something Necessary?*" "A long delayed sanitary necessity remains unprovided in this city, to wit: A satisfactory gathering of house garbage. No city of this size can be considered well taken care of which makes no public provision for this purpose. Private methods are entirely inadequate and mainly inefficient for the prompt and cleanly removal of such material. It is an old topic in these reports, but must continue to be urged until some relief is obtained. Whatever disposition is finally made of garbage, a systematic gathering should be inaugurated as speedily as possible. At present we are without funds for such service, but could money be better employed for the real welfare of our citizens?"

From the report it is gathered that the total cost of the scavenger service in Chicago for the year 1889 was $253,140.72. The area covered aggregated 174 square miles, including in this 2,047 miles of streets and about 3,000 miles of alleys. It is admitted that this service is only "fair." In one ward only is there a daily service. Outside of this it was tri-weekly. About 225 teams have been regularly employed by the contractor to whom this collecting is let, and by the city, and an average of 2,000 cubic yards per day is removed and deposited in clay holes, removed by train beyond the city limits, or from February 19 to October 15, 1890, burned by the Chicago Garbage Reduction Company. This company burned 7,208 tons of garbage in this period. For the year 1890 a total of 325 teams was demanded, and Mr. Hayt recommends radical improvements in the contract system of collecting, "if that is to be continued." These recommendations cover the employment of a minimum number of teams, a wagon box of standard size, with a proper canvas cover, wagons to be plainly marked with ward and number.

In all the cities cited the methods of disposal are not satisfactory in one. The method adopted or the service rendered is at fault. The lack of funds is responsible in some instances for the deficient work in the disposal of garbage. In the first place there is too much garbage produced, and in the next that which must necessarily be produced is not properly cared for, and the problem how best to dispose of the refuse of cities is still unsolved. The fact is some garbage must be produced, and we do not believe that any method which does not look to the destruction of this garbage will be a success.—*Sanitary News.*

Whaleback Steamers.

The whaleback steamer Charles H. Wetmore, Capt. Saunders, arrived at Liverpool on July 21, having made the passage from Montreal in about sixteen days. She arrived in New York from Liverpool Aug. 14, making the trip in fifteen days. She is the first lake steamer that ever crossed the Atlantic, and her safe voyages mark a new departure in the steam tonnage of these waters. Several Clyde-built steamers have been sent across, and after being cut in two sections they were locked through the St. Lawrence system of canals and joined together again at Buffalo. The Campana, Athabasca, and Alberta, built to the order of the Canadian Pacific Railroad Co., are instances of importations, and they have ever since remained in the lake trade. The steamer Rosedale was built at Sunderland, England, in 1888; she left London bound to Chicago on May 25 of that year, and after a passage of twenty days she reached the lakes and proceeded on to Chicago, where she arrived all well. Last year she was lengthened at the shipyard in Owen Sound, and she has since been a fortunate and profitable steamer on the lakes. Quite a number of lake schooners have crossed the Atlantic, and at one time it was thought that a lucrative trade might be built up between Cleveland, Ohio, and the old country. Steam, however, had so superseded sail that canal schooners were found to be too small to compete in the Atlantic carrying trade, and the large lake tonnage was prohibited on account of the limited size of the St. Lawrence system of canals. The Wetmore shot the rapids where the canals would not admit of her locking through, so that unless she is cut in two she can never reach the lakes again. After demonstrating the seagoing qualities of this type of vessel, they will be sent *via* the Straits of Magellan to Puget Sound, to enter upon the coal trade between Sound ports and San Francisco. It is now considered that the ultimate success of these vessels is assured.—*Marine Record.*

Quick Eyes and a Clear Head Needed.

When a railroad company, says the *Philadelphia Record*, handles as many million tons of coal annually as the Reading does, the question of weighing it becomes a matter of some importance. Skill and long experience have solved the problem, however, and the bulk of the vast coal tonnage of the leading coal-carrying road in the country is weighed on four scales, and then they are not crowded.

The weight of the empty car is marked in chalk on the outside. As the car approaches, a clerk takes the number of the car and its weight, the weigher calls out the gross weight, and the difference is the weight of the coal. The cars run as fast as ten miles an hour across the scale, and it is very seldom that one has to be stopped and brought back for reweighing, although that is done when the weigher is at all uncertain about his figures.

The men at the scales can generally tell within a hundred pounds or so what a car contains. As soon as they see the class of car coming, they know the number of tons it contains, and have the scale so prepared that only the hundredweights need be adjusted while the car is moving over it. Expert officials of the company can tell at a glance what each class of cars should contain, and if, in looking over the weight sheet, any car appears either too heavy or too light, it is brought back and reweighed.

Phenocoll Hydrochlorate.

Phenocoll hydrochlorate, the new antipyretic which is distinguished because of its ready solubility in water, is now at last commercially obtainable, and is receiving the attention which, from its expected therapeutical superiority, it merits. It claims for itself an antipyretic, anti-rheumatic, and anti-nervine action. From the evident interest of qualified observers and leading therapeutists in Germany, France, England, and America, it is reasonable to deduct that the new remedy has extraordinary merit, and that it will assume prominent rank in a very little while.

BOA CONSTRICTORS.

In the SCIENTIFIC AMERICAN of August 8 and August 22 appeared a number of illustrations representing various snakes in characteristic positions, with a description of their habits, by Mr. G. R. O'Reilly, who has traveled much in search of snakes and reptiles, and who finds no difficulty in making captive, in a live state, the most generally dreaded serpents. Our illustration shows his easy manner of handling a boa constrictor at the Central Park Museum. Of course, it is not to be inferred that the snake thus easily mastered is of a size and power equal to that represented in the famous Laocoon marble, if such monstrous serpents ever existed, but it is none the less a true boa of very respectable size, such as are widely distributed in tropical America.

The name *boa* has been generally applied to several varieties of large serpents which kill their prey by constriction, and do not have poison fangs, the European variety being known as pythons. The true boas are abundant in Guiana and Brazil, where they are found in dry, sandy localities, amid forests, and on the banks of rivers and lakes, some species frequenting the water. They feed chiefly on the smaller quadrupeds, in search of which they often ascend trees. The size of their prey often seems enormously beyond their capacity for swallowing, but the creature's jaws are merely connected by ligaments which can be distended at pleasure. Its mouth can be made to open transversely as well as vertically, the two jaws not being connected directly but by the intervention of a distinct bone, which adds greatly to the extent of its gape. It has also the power of moving one-half of the jaw independently of the other, and can thus keep a firm hold of its victim while gradually swallowing it. The upper jaw has a double row of solid, sharp teeth, and there is a single row in the lower jaw, all pointing inward, so that, the prey once caught, the boa itself could not easily release it. Their immense muscular power enables them to crush within their folds quite large animals, which they first lubricate with saliva and then swallow whole by their immense dilatable jaws and gullet. After feeding they become inactive, as is the case with most other reptiles, and remain so while the process of digestion is going on, which, for a full meal, may extend over several weeks, during which period they may be readily killed or captured.

HANDLING A BOA CONSTRICTOR IN A SAFE AND EASY WAY.

The eggs of the boa are about the size of hens' eggs. About fifteen years ago a boa at the Central Park menagerie laid twenty-one eggs, making the deposit in sight of her keeper, and it was especially noted that each third egg laid was sterile. The fertile eggs had each a young boa within; one came out of its shell immediately after being laid, but soon died, and all the others died in their shells.

The boas of tropical America, where the specimen shown was captured, never reach the size attained by the great pythons, of the same family, of Hindostan, Ceylon, and Borneo, some of which are said to grow to thirty feet in length, and to be able to manage a full-grown buffalo. A specimen which was brought from Borneo to England was sixteen feet long and eighteen inches in circumference. A goat was placed in the cage of this boa every three weeks, and during the process of swallowing, which occupied over two hours, the skin of the snake became distended almost to bursting, the points of the horns apparently threatening to pierce the coat of the destroyer. The whole animal was so completely digested that nothing was passed but a small quantity of calcareous matter, not equal to a tenth part of the bones, and a few hairs. The skin of the boa was the object of serpent worship among the Mexicans, and a specimen of a skin which was so used is preserved in the British Museum.

Steinheil's Lens Manufactory in Munich.

The new workshop erected by the firm is situated about twenty minutes' walk from the town, in the neighborhood of the Bavaria restaurant. Work was commenced in the building on March 1 of the present year, and about fifty workmen are now employed. The whole is two stories in height, and consists of a central building with wings, in which the workrooms are situated. Of these there are some fifteen of various dimensions, but all are lightsome and airy, the smallest of them having a surface of thirty square meters. In these rooms the grinders, polishers, mechanicians, carpenters, etc., carry on their operations. The first floor contains the dwelling apartments of the manager, while the second floor contains a commodious testing room, sixteen meters by seven meters, in which all the lenses, apparatus, etc., turned out by the firm are tested, except the larger sizes of telescopes, which are subjected to the same ordeal in a passage (forty meters long) on the ground floor.

The glass used has, since that firm has been in existence, been supplied by Schott & Co., of Jena, either in the form of slabs or of pressed lenses, which latter, however, have to be carefully annealed before being dispatched from the Jena manufactory. The lenses are, first of all, roughed out in cast iron moulds by hand, and then ground fine by means of emery powder and water in glass moulds. Each workman is provided with a glass model of the surface to be imparted to the lens. It goes without saying that all the surfaces to which the lenses are ground are spherical, *i. e.*, no hyperbolic or other forms are employed. Each surface is tested to see if it has received its proper curvature by means of a so-called spherometer. The different operations of grinding, finishing, polishing, centering, etc., are all performed by separate workmen, who are practiced in one of these particular branches only. The grinding and polishing rooms are carefully separated from one another, as also the machinery employed, by which means the presence of emery powder where it is not wanted is prevented, and the scratches and injury to the lens which result therefrom are avoided.

The lenses are polished by means of rouge, in moulds made of pitch, instead of on cloth, as in many other manufactories, which enables a more perfectly spherical surface to be obtained. All the lenses are polished separately, and not *en bloc*. A two horse gas engine, working in the cellar, drives the polishing machinery, lathes, etc. Sometimes three or four polishing machines are coupled together and driven by the engine, and are then managed by one workman. The perfect sphericity of the surfaces is tested by applying the glass model, of which mention has been made above. After both the glasses have been carefully freed from dust, etc., the one is superposed upon the other. Thereupon Newton's rings make their appearance, which should be the case if the surfaces fit properly, while, with a surface of which the radius of curvature is different from that of the model, they show no color.

Very special attention is bestowed upon the centering both of the single and combination lenses. Centering in the optical sense means grinding the edge of the lens in a lathe in such a manner that it is equidistant at every point from the optic axis. To effect this the lens to be centered is cemented on to a lathe with horizontal spindle, centered by a poppet and an adjusting lever, and then turned. This, next to the attainment of a perfectly spherical surface, is the most important requisite of a good system of lenses.

Another operation of great delicacy is the manufacture of prisms, both for optical and photographic purposes. It should be remembered that the angles of the prism, which must be highly accurate if the desired effect is to be produced, must be obtained by grinding and correction. For example, the angle of a right-angled prism is only then exactly 90° when parallel rays of light falling on the two surfaces inclosing that angle are reflected parallel to one another, when the position is such that a line joining the source of light and the angle of the prism should, if produced, bisect that angle. The correction of the two 45° angles is also ascertained by construction, and likewise the so-called pyramidal error.

The firm was founded in 1855, and, besides its well-known photographic objectives, produces also telescopes of sizes up to 33 cm. object glass diameter. An instrument of this size is now in process of manufacture for the Upsala observatory, and others have been supplied for the observatories of Potsdam and Catania.—*Deutsche Photographen Zeitung; Br. Jour.*

Large Tree.

The Arlington *Times* says that the largest tree in Snohomish County, Cal., probably is a cedar which stands a little way from the Kent's prairie and Stanwood road, about six miles from Arlington. A party of nine went down from that place lately to satisfy themselves of the truth of what by them were regarded as exaggerated reports of its size. The measurement taken shows it to be 68 feet, being nearly 23 feet in diameter. If measured around the roots and knotty protuberances the tree would likely measure 99 feet. The measurement was as close to the body of the tree as line could be drawn. About 75 feet from the ground the tree forks into four immense branches. Just below the forks is a big knothole, and five of the party—Jack Howard, J. F. Shannon, A. Engberg, Ralph Morris, and Harry Patterson—climbed up and made an exploration of the inside of the tree, which is a mere shell, though still green. They went down some 45 feet in the tree, and claim that there is standing room for at least 40 men there. A peculiar feature which they noticed was that the tree is barked on the inside the same as on the outside.

The Insolubility of Pure Metals in Acids.

The results of an investigation concerning the cause of the insolubility of pure metals in acids are contributed by Dr. Weeren to the current number of the *Berichte*. De la Rive, so long ago as the year 1830, pointed out that chemically pure zinc is almost perfectly insoluble in dilute sulphuric acid. Dr. Weeren's theory of the phenomenon is as follows: "Chemically pure zinc and also many other metals in a state of purity are insoluble or only very slightly soluble in acids, because, at the moment of their introduction into the acid, they become surrounded by an atmosphere of condensed hydrogen, which under normal circumstances effectually protects the metal from further attack on the part of the acid." The experiments from which this theory has been derived were briefly as follows: The amount of chemically pure zinc dissolved by the acid was first determined. It was next sought to determine what difference would be effected by performing the experiment *in vacuo*, when of course the escape of the hydrogen would be greatly facilitated. The solubility was found under these circumstances to be increased sevenfold. Next the experiment was performed at the boiling temperature of the dilute acid, first when ebullition was prevented by increasing the pressure, and secondly when ebullition was unhindered. In the first case, when ebullition was prevented, the solubility was practically the same as in the cold; while in the second case, with uninterrupted ebullition, the solubility was increased 24 times. Finally, experiments were made to ascertain the effect of introducing into the acid a small quantity of an oxidizing agent capable of converting the hydrogen film to water. When a little chromic acid was thus introduced the solubility was increased 175 times, and when hydrogen peroxide was employed the solubility was increased three hundredfold. The explanation of the ease with which the metal becomes attacked when the ordinary impurities are present is that the hydrogen is not then liberated upon the surface of the zinc, but rather upon the more electro-negative impurities, leaving the pure zinc itself open to the continued attack of the acid.

Speed of Bicycles.

The *Kolnische Zeitung* gives an account of some interesting experiments which were tried by Major Brix, the commander of the Militar-Turnanstalt in Berlin, in order to test the speed of bicycles as compared with that of horses, for the purpose of conveying dispatches to Berlin and Weissensee. The distances attempted were, from Straussberg to Weissensee, a distance of just under 24 miles, and from Eberswalbe to Weissensee, 32 miles. In the latter journey two cavalry officers rode against two infantry officers mounted on bicycles. The latter accomplished the journey in 215 minutes and 210 minutes respectively, while the two lieutenants on horseback arrived at their destination seven minutes before the first bicycle rider. In the shorter distance the same result was obtained, the riders arriving a few minutes in advance of the bicyclists. In both cases the cavalry officers only rode at a gallop for the first fifteen minutes of the journey, while the bicyclists went at full speed all the way.

Progress of Cotton.

The development of the American cotton crop from 900,000 bales in 1830 to nearly 11,000,000 bales in 1890 represents a vast increase in the world's consumption of this material. Fifty years ago it would have been considered impossible that a demand for such a large supply could have come into existence; and even now, some persons are puzzled to determine how it happens that the consuming power of mankind always adjusts itself to every enlargement of the product. In a recent report, Mr. Carroll D. Wright shows that the increased consumption is due, not so much to the fact that there are more people, as to the further fact that each person uses more material. The per capita consumption in this country in 1830 was only 5·9 pounds. In 1890 it was 19 pounds, an increase of nearly 300 per cent. In the meantime the western part of the world has become more densely populated, while Europe has for many years been almost free from the desolating and destructive wars which impoverished the people and forbade them to supply their wants. Thus while the consumers all over the world have had large means with which to buy, the wonderful improvements in machinery have reduced the cost of manufacture so that prices here have steadily fallen. The cotton mill of 1890 produces, at a given cost, a quantity of material far in excess of that produced by the cotton mill of 1830, and increasing competition continues to compel the introduction of economies which tend to force prices even to lower figures. It is safe to assert that the product will never exceed the demand.—*Textile Record.*

Patent—Combination—Reissue—Validity.

The United States Circuit Court for the Northern District of Illinois held, in the recent case of the Alaska Refrigerator Company *vs.* the Wisconsin Refrigerator Company *et al.*, reported in the *Legal News*, of Chicago, that in order to defeat a patent for a combination it is not enough to show that all the elements of the combination, separately considered, were old at the date of the invention, that a reissue cannot be held invalid because of enlargement of claims when the original patent is not in the case, and no evidence is offered to show expansion in the reissue beyond what is justified by the original specification and drawings, and that the presumption is in favor of the validity of a reissue applied for and obtained in less than two years after issue of the original patent.

RECENTLY PATENTED INVENTIONS.

Railway Appliances.

BRAKE VALVE MECHANISM. — Alfred P. Riggs, Colorado City, Col. This is an auxiliary regulating valve mechanism, the invention relating to a triple valve of fluid pressure brakes, and providing improvements whereby, after the brakes are set, the pressure in the brake cylinder may be reduced to any desired amount, and the auxiliary reservoir receive at the same time an amount equal to that released from the brake cylinder. A novel spring mechanism is also provided for returning the piston to its normal position, and the drip cup has a readily removable strainer.

HANGER FOR CAR DOORS. — Peter Allain, Rutland, Vt. This invention provides a novel and simple means for the support of a freight car door from a hanger bar near the top of the car, permitting the door to have a laterally sliding movement. The construction is such that the door may be swung outwardly by lateral pressure, and slide in the space between the outside of the car and the inner surface of the hanger bar, or be moved opposite the door opening in the car side and be swung inwardly to align therewith, thus sealing the opening and aligning the outer face of the door with the exterior surface of the car.

LONGITUDINAL RAILWAY SLEEPERS. —Johann P. E. C. Stromeyer, Twickenham, London, England. This is a metal sleeper transversely corrugated, and the rail rests on the crests of the corrugations, to which it is attached by lugs formed by punching and stamping the metal. Wedges are driven into the hollows of the corrugations separating the crests, these wedges also supporting the base of the rail, and pressing its flanges against the under sides of the lugs.

Electrical.

SAFETY DEVICE FOR ELECTRIC WIRES. —John H. Sedlmeyer, Johnstown, Pa. This invention is designed more particularly for application to the trolley wires of electric railways, for giving an alarm at the power station when the line wire is broken or is crossed by another wire. Combined with the main line is a normally dead parallel conductor, a spring retracted switch lever connected with the line wire, and held in engagement with its contact point by a clock mechanism, of which a detent lever forms a part, adapted for engagement with an armature lever, while an electromagnet is provided for operating the armature, and is electrically connected with the normally dead wire. The invention is also equally applicable to electric light wires.

Mechanical Appliances.

BENCH VISE. — Joseph F. Emmert, Waynesborough, Pa. Combined with the bench and a hinged sleeve adapted to be swung up from a vertical to a horizontal position, is an inner jaw held to rotate on the sleeve and an outer jaw having a bearing in the sleeve, the bearing being adapted to rotate and longitudinally adjustable in the sleeve. The improvement is more especially designed for carpenter's bench vises, providing therefor a vise which can be arranged for substantially universal adjustments, and presenting many advantages over the ordinary vises.

PLUMBERS' PORTABLE HEATER. — William A. Nicholas and Henry Birnbaum, Rapid City, South Dakota. This is a soldering iron and pot heater, and has a base on which is arranged an oil reservoir, with burners on the opposite end of the base, and a detachable hood having a hole and cover and a door. A casing surrounds the burners, there being a transverse partition in the casing and a drip pan on each side of the partition. This heater can be used indoors or out in all kinds of weather, and one or more irons and a pot may be heated at the same time.

ANTI-FRICTION COMPOSITIONS.—Jonathan Harris and George Wass, Painesville, Ohio. This invention covers a process of producing a compound suitable for bearings or wearing surfaces of different kinds, the compound being composed of a metallic base, as any quality of Babbitt metal, antimony, lead, tin, zinc, copper, or brass, with which is mechanically mixed a certain proportion of plumbago, the mixture being effected in such way that the lubricating properties of the plumbago will remain intact.

LACE HOLE CUTTER FOR BELTS.—Theodore O. Earle, Binghamton, N. Y. This is a neat, light and durable tool, especially adapted for use upon rubber belts, in which it is designed to cut a clean, clear hole, in the thickest belt, without subjecting the layers to undue strain, or disturbing their relation to each other. The body of the device is of the general shape of a C-clamp, one member of which is provided with a revolving cutter, while the other has a table portion to receive the belt, the proper position of which is readily regulated by an adjustable gauge.

VALVE FOR AUTOMATIC FIRE EXTINGUISHERS.—Edwin W. Storer, Philadelphia, Pa. This improvement is adapted for use in connection with a dry pipe automatic system, when the pipes are filled with compressed air instead of water, and connected with the water supply by a valve, the rise in temperature opening the sprinklers and actuating the valve. The valve case has a centrally movable tube with a valve at each end, and a duct having an auxiliary valve leading through the inner valve, while a lever mechanism connects the auxiliary valve with a flexible diaphragm on the outer side of the outer valve. The device is of simple and inexpensive construction and positive in operation, and the valve is held in place by a very small air pressure.

PAD PRESS. — Martin V. B. Bean, Lanesborough, Minn. This invention relates to presses used in making harness saddles, and provides a pad press designed to be easily and perfectly adjusted to the saddle back, while holding the pad in such a manner that it might be conveniently stuffed, and will have a smooth, flat, even bearing face. The base of the press has vertically slotted parallel flanges on its upper side, caps having shoulders on their under sides being mounted on the flanges, while forming plates on the base have bolts extending through slots in the base, and thumb screws extending through the flanges impinge on the forming plates, a glass plate being held between the latter and the cap shoulders. The glass is heavy enough not to be easily broken, while permitting the work to be seen. When the pad is stuffed it is held against the forming plates adjusted against the back of the saddle, and when filled exactly corresponds to the shape of the saddle. The same inventor has obtained an additional patent for clinching plates for use in connection with these pad presses, the plates being quickly adjusted and held in place within the saddle pad, so that the rivets used to fasten the pad linings together may be clinched. The plates are of thin flexible material and shaped to correspond to the pad.

Miscellaneous.

STEAM COOKER AND DISH WASHER. —Huldah A. Shepard, Nelsonville, Ohio. This is an apparatus designed to conveniently cook large quantities of food, and to be easily changed from a cooker into a dish washer. A series of perforated shelves is mounted in the body of the device, which has a removable perforated cover, and a vertically movable dasher secured to a rod is mounted beneath the shelves, the rod being operated by lever, the raising and lowering of which moves the dasher to throw soap and water over the dishes previously placed in position to be washed. For cooking, the articles are placed on the shelves, with sufficient water in the bottom of the device, which is placed over a fire, and the cooking is effected by the steam generated.

FIRE ESCAPE. — Metrah Makely, New Berne, N. C. This device consists of a clamp adapted to grip a rope, and having handle portions by which the grip of the clamp on the rope may be regulated, in connection with a pair of presses arranged to sustain the weight of a person, whose weight will operate to tighten the clamp on the rope. The rope is passed down to the ground from a secure fastening in the upper portion of a building, and the clamp sections are made to press with a readily regulated pressure upon the rope to control the speed of descent while one is lowering himself to the ground thereby.

FEED BAG RAISER.—George B. Schmidt, New York City. This is a tension device capable of attachment to any feed bag, and so made that the bag will be lifted in proportion to the amount of feed taken from it, so that the animal feeding can at all times readily reach the food. One of the devices is connected with each side of the bag, and the two devices are united by a rope or strap attached to eyes of the yoke, and sustaining the bag from the animal's neck. The improvement not only prevents tossing of the head to get at the feed, but prevents waste of oats, wear and tear of the bag, and the necessity of tying the rope when putting on the bag. The breathing of the horse cannot be interfered with, and he cannot slide the bag on the ground.

BOW FACING OAR.—George R. Merrell, Boston, Ill. Combined with a pivoted bracket and an oar capable of a rocking movement therein is a handle having a link connection with the bracket, while a gravity arm is rigidly attached to the inner end of the oar, and a projection on the upper face of the link connection is adapted for engagement with the gravity arm. The ore is automatically feathered upon its return stroke, and the bracket has two apertures, through either of which it may be pivoted upon the face plate, which is a rocking plate, the outboard aperture giving double inboard leverage over that obtained when the fulcrum is at the inboard aperture.

FRUIT CLIPPER.--Ripley A. Stewart, Leesburg, Fla. This is a device to be held on the hand by loops over the thumb and forefinger, and by a wrist strap, the shear blades being connected by a rivet or screw, which also holds a guard plate. The shear blades have double flanges to receive the thumb and forefinger, and the stem is supported during the cutting operation by the guard.

HOSE COUPLING. — William L. Johnson, Pomona, Cal. In front of one end of the coupling is a latch consisting of a bail, with rearwardly and downwardly extending arms pivoted to the coupling, and semicircular recesses at the junction of the arm with the bail, while a spring-controlled yoke, to which is connected a lifting device, is pivoted to the rear portion of the bale, a lock on the coupling forming a stop for the yoke and holding the bail in locked position. It is a simple device for forming a quick, firm, and close connection with an opposed coupling.

WATCH CASE HINGE. — George Newton, New York City. This invention relates to an improvement in cap joints of cap-winding watches, and provides for strengthening the connection of the pulling knuckles with the joint and cap at the point of attachment of the knuckles with the joint and cap, or dome. A great source of trouble heretofore experienced in this class of watches has been the breakage of the hinge, which is very frail and liable to be torn away from the cap or dome from the extra function of winding imposed on the cap, a trouble which this improvement is designed to obviate.

WATCH BALANCE STAFF. — James E. Swarthout, Elmira, N. Y. This staff is exteriorly threaded, and the balance wheel has an opening in its arms of greater diameter than the staff, on which screws a collar adapted to singly fit in the opening of the balance wheel, while locking sleeves are also screwed on the staff, one above and the other below the wheel, the sleeves having recesses in their inner faces. The improvement provides for the ready removal of the staff when desired, and for the convenient adjustment of the balance wheel up or down, without interfering with its true horizontal alignment.

COIN OPERATED SALES MACHINE. — Alphons Brau, Amberg, Germany. This machine is designed to automatically deliver postage stamps and postal cards, railway tickets, etc., on the insertion of a definite coin in a particular opening provided for the purpose. A hollow lever is pivoted to rock in the casing of the machine, and there is a slotted coin-receiving drum on the outer end of the lever, a spring-cushioned rod sliding in the lever having pronged plates to engage the coins, while an angular spring-pressed lever is pivoted in the path of the rod and a goods-carrying plate slides in the path of this lever and has projections engaged by it.

JOIST OR BEAM BRACE. — William Paine, Sr., Brainerd, Minn. This is a bridging for joists, consisting of a zigzag bar or rod of iron provided with seats adapted to receive and clip over the upper and lower faces of joists or beams, one section being apertured and the other slotted to receive a bolt, by which the sections are adjustably held together. Simple and inexpensive braces and supports are thus formed to tie or hold the beams or joists on which the floor of a structure is laid, distributing the weight evenly upon all the joists.

MANHOLES OF SUBWAYS.—Charles W. Hays, New York City. This invention covers an improvement designed to obviate the danger and inconvenience arising from the filling of manholes with gas, whereby explosions sometimes occur, or from their collecting water to freeze in cold weather. For this purpose a removable box is provided, of a size to nearly fill the manhole, the box having suitable handles whereby it may be readily raised, and a nozzle and vent opening through the top, the latter being usually plugged. The box will so nearly fill the opening as to prevent the accumulation of a large quantity of gas, and if water should become frozen in the manhole, the ice may be readily thawed by introducing steam into the box through the nozzle.

DISINFECTANT HOLDER.—Edward A. McCartney, New York City. This is a device to be applied to water closets, sinks, etc., to give off a disinfectant at every flush of the closet, to unite with the water in washing down the surface of the bowl. The holder is supported in the bowl by a rod, and is preferably cylindrical in shape, its entire surface, as well as the head and screw cap, being perforated, so that the water used in flushing will come in contact with the disinfecting material through the perforations. The disinfecting agent is to be made in shape to correspond with the bore of the holder, being compounded of substances that will retain the desired shape after being moulded.

THILL COUPLING. — Anton Niekamp, Maria Stein, Ohio. In this device the clip is integral with a hollow body having a slot in its upper face and an opening in its front face, the thill having a head adapted to enter the chamber of the body, the slot in which is closed by a lock bar above the head, while a sleeve on the thill iron engages the body and locks the devices. The coupling is an anti-rattling one, employing neither springs nor rubbers, and the fastening devices are readily loosened and tightened by hand, dispensing with the necessity of a wrench.

WINDOW CLEANING CHAIR. — Abner Barnhart, Brooklyn, N. Y. This chair has a body section to which guard rails are pivotally attached, brace beams having a sliding connection with the rear end of

the body and a pivotal connection with the forward uprights of the guard rails, and a clamp, engaged by a locking device, held to slide on the forward end of the body. The improvement forms a portable platform which can be held firmly to a window frame, without injuring the casing, and extends beyond the frame, while it may be compactly folded when not in use.

COOKING STOVE.—Miguel N. Piedra, Lagos, Mexico. The ovens extend from the front to the rear of this stove, and the fire chamber, consisting of a central grate portion and lateral extensions, is formed at the rear of the oven, combustion flues from the chamber extending about the ends, tops and bottoms of the ovens. The fire chamber is designed to take in large sizes of wood, while its location at the rear of the ovens is intended to promote the comfort of the attendant during the work of cooking. The draught is easily regulated, and the products of combustion are caused to pass around the ovens in a manner designed to utilize all the heat produced.

PITCHER NOSE.—Augustus M. Herring, New York City. This invention provides a novel shaped nose for pitchers, to prevent dripping. An angular notch is formed in the downwardly turned portion of the nose, the notch being central and extending toward the body of the pitcher, the extremities of the nose at opposite sides of the notch being turned outwardly. When a liquid is poured from a pitcher having this improvement, the last drops will have a tendency to follow the edges of the angular notch to the apex of the angle, and thence flow back into the pitcher.

ORANGE SPOON.—Austin F. Jackson, Taunton, Mass. The bowl of this spoon has at its end a small lip or projection sharpened to a chisel edge, to facilitate dividing the fruit transversely to its axis, previous to scooping out the juice and pulp from the several cells or compartments. One or more grooves or channels also run down into the bowl of the spoon from this sharpened front edge portion, directing the juice from the ruptured cells into the bowl, instead of permitting it to overflow and drip.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

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Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(3294) F. H. M. asks: Does a permanent magnet part with any of its force (or power) each time its armature is removed? I would like the addresses of some of the leading electrical goods dealers. A. According to Thompson, it is not the removal of the armature that injures the magnet, but replacing it. To avoid injury the armature must be replaced without shock. It would be best to place it at the neutral point and move it to the poles. You will find addresses of dealers in electrical goods in our advertising columns.

(3295) G. A. H. asks: Do you know of any way by which I may locate and discover hidden treasures, money consisting of gold and silver? Is there any way to apply an instrument to discover when known to exist in the radius of small area? A. We know of no royal road leading to the hiding place of the precious or other metals. The reported use of instruments are legends of no truth or value. No treasures have yet been found by their pointing. Iron, magnetic iron ores, some varieties of pyrites, etc., only are susceptible of placement by the magnetic needle.

(3296) J. G. B. asks for a receipt for making curacoa. A. Slice the outside peel very thin from 60 bitter oranges, infuse for 15 days with 4 drachms bruised cinnamon and 2 drachms bruised mace in 5 gallons 95 per cent French spirit, stirring every day. Add 25 pounds white sugar dissolved in 2 gallons of water, color with burned sugar (caramel), stir and filter.

(3297) H. W. D. says: There is a difference of opinion as to whether we can think of two, or more than one thing, at the same time. Would like to see an explanation in your paper. A. Yes; it is apparent to thinkers that many things can crowd the memory at the same instant, but the power of expression or articulation is single, and therefore but one at a time can be delivered. The brain is a vast network of inscribed tablets ever ready, singly or *en masse*, for expression, but must wait for the organ of selection and expression to grind them out in rotation.

(3298) A. O. T. writes: I have been noticing, from time to time, various accounts given in the SCIENTIFIC AMERICAN in regard to some of those pneumatic dynamite guns, and the question has arisen in reference to the explosive force of fifty pounds of dynamite, the charge that some of them are supposed to take. Is there any way by which you can give us an idea in regard to this? A. Dynamite varies in explosive power. It may have 72 per cent of the power of of pure nitroglycerine, or nearly ten times the power of gunpowder. No exact scale of the relative power of explosives can be given, as they vary in quality of explosion as well as in intensity, and the explosion varies according to the circumstances under which it is detonated.

(3299) B. G. asks if copper could not be used instead of carbon in a common bichromate battery. If not, why? And if so, what would be the difference in current, and what is the E. M. F. and amperage of a single cell of bichromate battery plates 3×4 inches and three inches in the solution on short circuit? A. You can use copper in a bichromate battery for temporary purposes, but for continued use it is of no value, because it is soon attacked. The current and E. M. F. is at first about the same as with carbon plates, *i. e.*, 2 volts and from 3 or 4 amperes upward.

(3300) W. F. M. asks: An engine pushes a car along a track at a given rate of speed; on a parallel track another engine pushes two cars at the same rate. If the engines stopped at the same moment, which would go the furthest, the one or the two cars? A. On account of atmospheric resistance, the two cars would go the further.

(3301) P. B. asks: Does the Edison-Lalande cell evolve any gases or create any odor, while in operation? A. No.

(3302) H. C. D. asks (1) how to make a transparent cement that will be waterproof and stand fire. Such has been sold here by agents that claimed it water and fireproof? A. The requirements are almost impossible to fulfill, and the representations of the agents are to be doubted. Caseine cement made by following process comes about the nearest to your requirements. Fresh cheese is boiled in water until it softens to a mass which will draw into threads. To 100 parts of the original cheese, 200 parts of water, 25 of slaked lime and 20 of finely sifted wood ashes are taken. The whole is intimately mixed. It is not transparent. Or try dissolving 5 to 10 parts white glue in 90 parts of nearly boiling water. In a separate vessel dissolve 1 to 2 parts bichromate of potassium in 10 parts of water. Mix and use at once. On exposure to light the glue becomes almost insoluble. 2. How silver soap for polishing plated ware, etc., is made. A. Mix infusorial earth or ground pumice stone or other polishing agent with soap in the process of manufacture. Or remelt good quality tallow soap with water and make the mixture then. Use 10 parts silica to 1 part soap.

(3303) F. H. asks: 1. If a bird is in rapid flight, should the hunter aim directly at it? A. This is a mooted point. In taking snap shots at a bird just flushed or flying among brush it is often a necessity to trust to firing in advance of the bird, estimating the allowance as well as possible, from its distance and rate of flight. In duck and other open shooting where the gun can be moved along with the bird, it is sufficient to fire very slightly in advance. 2. How far south do our migratory birds go to spend the winter? A. Many go to South America and across the equator. 3. Could not the sky lark and nightingale be introduced in this country and successfully bred here? If not, why not? A. Such naturalization has been tried, without any success. Occasionally a nightingale is reported, but very seldom. 4. How do you account for the electricity found in cats? Is it found equally in all? A. There is none in cats more than in other things. Rubbing the fur, which is well insulated by its own nature, generates the charge. The dryness of the fur favors the action. 5. Of what establishments can I get the best stereographic views? Give addresses. A. Consult our advertising columns or apply to any first class dealer in photographs.

(3304) O. S. asks (1) how to make a mat dip for brass and copper. A. Mix 1 volume saturated solution of potassium bichromate and 2 volumes of strong hydrochloric acid. Leave immersed for a few hours. To brighten the color dip afterward into following mixture: Nitric acid (36° B.) 200 parts, sulphuric acid 100 parts, salt 1 part, zinc sulphate 1 to 5 parts. All parts are by weight. 2. Please inform me how the "oxidize" that is put on by electricity is made. A. The silver is first dipped in nitric acid until brightened. It is then immersed in ammonium sulphide, and in contact with it a piece of platinum is placed in the same solution. 3. How the black preparation that is put on fireplace utensils is made? A. In "The Metal Worker's Handy Book," $2.50 by mail, a number of receipts are given for darkening iron and steel. Crane's "Japon" dead black enameloid can be applied with excellent effect where the articles are not heated in the fire.

(3305) W. W. D. asks: What substance is put on the back of an electric push button that makes it shine in the dark? A. Balmain's luminous paint, described in our SUPPLEMENT, Nos. 229, 249. 2. For list of good paying inventions. A. Their name is legion. Every kind of manufacture has its unsatisfied wants. The trouble in successfully inventing is more in seeing the want, and appreciating just what will fill it, than in the act of invention proper. The discarding of approximate solutions of the problem requires even a degree of moral courage, but is necessary.

(3306) C. H. Y. writes: How can I make gas such as is used in small India rubber balloons? I have bought some balloons and filled them with such gas as they use in making soda water, but somehow they failed to go up. A. Pump them full of coal gas, not water gas. As the gas used in making soda water (carbonic acid gas) is much heavier than air, you decreased their buoyancy by so filling them. Hydrogen made by acting on zinc or iron scrap with dilute sulphuric acid may be used. It should be washed by bubbling through water and then dried by passing over chloride of calcium before use.

(3307) C. B. C. T. asks a receipt for a cement that will not be affected by gasoline, to be used in fastening glass to tin. A. Cement to resist benzine and petroleum.—Gelatine mixed with glycerin yields a compound liquid when hot, but solidifies when cold and forms a tough, elastic substance having much the appearance of India rubber. The two substances united form a mixture insoluble in petroleum or benzine, for printer's rollers and buffers of stamps, as benzine or petroleum will clean them when dirty in a perfect manner. Water must not be used with this compound.

(3308) A. D. Y. asks for an easy method of applying the gold lettering on lead pencils. A. Use hot type, dust the surface with powdered resin or bookbinder's glair, apply leaf and stamp with the hot type.

(3309) N. H. M. writes: How can I make a stove polish (paste) that will not dry up? A. To prevent stone polish drying, add a little glycerin to your mixture.

(3310) P. A. A. asks how rubber can be melted so as to be moulded. A. Vulcanized rubber cannot be thus treated. It can be slightly softened and moulded by pressure. We recommend you "Rubber Hand Stamps and the Manipulation of India Rubber," $1 by mail.

(3311) A. H. B. writes: Can you give me a recipe for a good cheap glue or paste, for cementing patches on or mending coarse burlap bags, such as feed is shipped in? I have a great deal of mending on my feed bags, as they come home sometimes with three or four holes in them. I have seen bags with the patches stuck on, and seems to do very well. If you know where such a paste can be got, or give me the name of the articles and how to mix them, I will be greatly obliged. A. Use the leaf gutta percha such as tailors employ for cementing cloth. A sheet of the percha is placed between the fabric and the patch and a hot pressing iron applied. The heat melts the gutta percha and cements the patch, waterproof.

(3312) L. H. asks if kerosene oil is injurious to methematical instruments and fine steel tools that are nickel plated. I have been using it on them to prevent them from rusting, and am told that it will damage them beyond repair if I do not stop its use. A. Good kerosene will not be injurious to your instruments. Vaseline is probably a better application.

(3313) G. B. asks what to use to coat a nickel plated bicycle with to prevent it from rusting, as I wish to take it to Santa Barbara, Cal., for the winter, and fear the salt air will rust it. I want a substance I can get off again without difficulty. A. Vaseline is universally used by bicyclists. You will also find anti-rust applications advertised in sporting papers. Incessant vigilance and putz pomade are to be recommended.

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August 18, 1891,

AND EACH BEARING THAT DATE.

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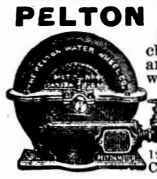

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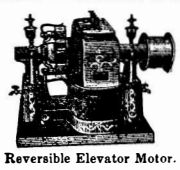

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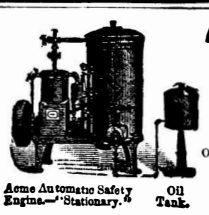

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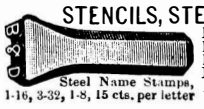

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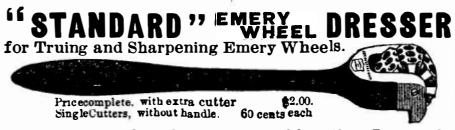

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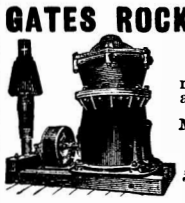

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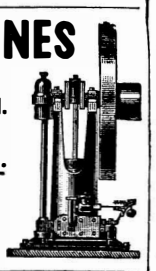

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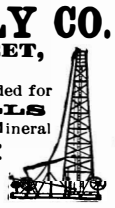

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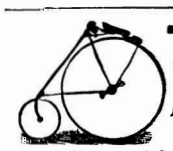

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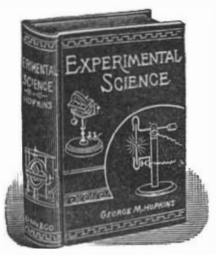

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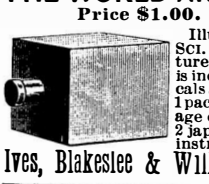

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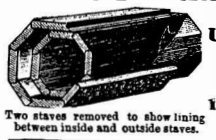

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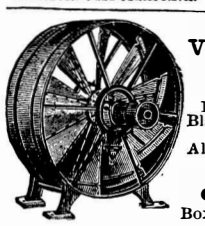

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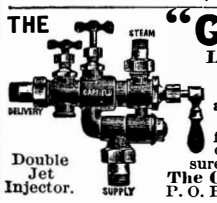

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