over a mile long. The breakwater was constructed with the aid of caissons. The huge ship by which the Vatican obelisk was brought from Egypt was filled with concrete until it sank, then it was strengthened with rocks until it was above the level of the sea, when it was crowned by a lighthouse. The Emperor Trajan, in A. D. 103, founded Porto, as the harbor constructed by Claudius as a substitute for that of Ostia had soon shared the same fate. Trajan constructed a new canal, which now forms the main arm of the Tiber. Trajan's port is now two miles inland, and is a shallow lake surrounded by ruins. It resembled in every way a modern port; it was hexagonal in shape, and the basin communicated with the Port of Claudius. Trajan's harbor is one of the most interesting works of Imperial Rome.

Egypt alone shipped 190,000,000 bushels of grain to Rome, and Sicily, Sardinia, and other places poured in their enormous supplies of foodstuffs. In addition to this may be reckoned the vast quantities of building materials, especially marble, which were imported. The Claudian harbor was also used as a great naval station, and here was also the central post office for foreign correspondence. In modern times harbors have been constructed on even a larger scale than the three harbors mentioned, which successively served to receive the great ocean-borne commerce of Rome, but none of them ever possessed the same magnificence.

IN addition to the discovery of the mummy of King Menepthah, the "Pharaoh of the Exodus," there have been other remarkable discoveries. The season was a productive one as regards exploration in Egypt. M. Legrani, while setting up the fallen columns of the temple, came upon a city gate, the first that has been found in Egypt; it is of great height and is made of large blocks of squared limestone and is double, having one gate within another. Two chariots could easily pass through it abreast. It was built by Amenhotep II. of the eighteenth dynasty. The Exploration Fund has been restoring the temple of Der-el-Bahari at Thebes, and one day while Mr. Carter, the inspector of antiquities in Upper Egypt, was riding up to the door of the house occupied by the excavators, he noticed that his horse's hoofs sank in a hole in the ground. Further investigation brought to light under the house the entrance to a large tomb of the eleventh dynasty in a perfect state of preservation.

Correspondence.

"The Armor-Plate Fiasco."

To the Editor of the SCIENTIFIC AMERICAN:

Your article on page 370 on "The Armor-Plate Fiasco" is true in every word; not only that, but because of the foolish acts of Congress, the government has laid itself liable for more than half a million of dollars damages to the contractors for detention of their work and delay in delivering their ships.

The Cramp firm already have a large claim against the government for just such detention on account of non-delivery of armor, and they will collect it too, not at this Congress or the next probably; but it will be collected. *Vide* the large collections made by the contractors of the Civil War, and the claims for damages for all the present contractors are much more meritorious than any of those of the Civil War.

And from the expenses of navy yard work, no one believes that the government can manufacture armor for less than $1,000 per ton.

Then, again, how about the up-keep of the establishment when we do not need armor?

JOHN R. THOMAS.

Washington, D. C., June 15, 1900.

Removing Foreign Substances from the Eye.

To the Editor of the SCIENTIFIC AMERICAN:

A simple way of removing cinders or any foreign substance from the eye, is to gently hold the eye open with the fingers and thumb of one hand, while with the other hand to dash light handfuls of water in and across it, so as to produce a current of water flowing over all the surface of the eye, and the under side of the lids. The effect of this almost invariably is to push the intruding object from the eye.

This simple method should not be mistaken for washing the eye or immersing the face in water and opening and shutting the lids. Any misdirected help often tends to imbed an object so that the removal is difficult.

The eye should not be rubbed or one lid drawn over the other, or a silk handkerchief drawn across the affected part, but the eye should be kept from winking as much as possible while prompt action is being taken to cause a current of water to pass over the surface of the ball.

This method is a copy from nature, for when very fine dust enters the eye, nature seeks to relieve it by means of the fluids which moisten and lubricate the eye; and when larger objects enter, and cling more tenaciously, the irritation causes a copious discharge of tears so that the eye overflows, as nature tries by flushing it to propel along and float away with the current the cause of the irritation. M. T.

Springfield, Mass., June 16, 1900.

[Our correspondent's advice, while excellent, will not, we think, answer in all cases. In turning metal on a lathe, chips are very apt to fly into the eye with considerable force, producing painful, if not serious, wounds. To add to the difficulty the chips are often hot. Water would hardly tend to dislodge foreign particles of this kind. It is also essential to have clean water for flooding the delicate tissues of the eye. Chips of metal in the eye are of such a serious nature that many eye hospitals have most powerful magnets for use in removing the chips.—ED.]

The Current Supplement.

The current SUPPLEMENT, No. 1278, has many articles of unusual interest. "The Mount Prospect Laboratory" describes the chemical and biological laboratories for the examination of Brooklyn (New York) drinking water. The various forms of apparatus for collecting samples are illustrated, as well as the portable ice chest for transporting the bacteria samples. "The Duddell Oscillograph" describes a most ingenious electrical testing instrument. "Liquid Air as a Means for the Manufacture of Oxygen" is by Prof. Henry Morton. "The Palaces of Fine Arts of the Exposition of 1900" is accompanied by two large engravings. "Hot Water Heating from a Central Station" is by H. T. Yaryan.

Contents.

(Illustrated articles are marked with an asterisk.)

RECENTLY PATENTED INVENTIONS.

Agricultural Implements.

RIDING-CULTIVATOR.—DANIEL V. FORSBERG, Laurel, Neb. Each shovel-beam of this riding-cultivator can be quickly and conveniently adjusted by the hands of the rider, either to be raised or to be shifted sidewise. The shovel-beams can be vertically adjusted at their forward ends and held in adjusted position, enabling the beams to be set so that the shovels will enter the ground to a greater or less degree.

MECHANISM FOR OPERATING CUTTING APPARATUS OF MOWING-MACHINES.—JOHAN A. DAUGAARD, 1 Helgolandsgade, Copenhagen, Denmark. Contrary to the usual custom, no cog-wheels are used for transmitting the motive power from the axle of the machine to the connecting-rod actuating the knives of the cutting apparatus. A driven wheel has an undulated periphery engaged by two of the arms of a three-armed lever, the third arm being provided with a socket in its end, by which a pin carried by a lug is received. A crank-lever has one member connected with the lug, the other member being connected with a pitman operating the cutter-bar. By regulating the length of the arms, the necessary movement of the knife can be obtained, even with very flat waves upon the rim of the driven wheel.

WEEDER.—LOUIS J. KLINGER, Dufur, Ore. This weeder comprises a short main frame attached to an axle. A draft-tongue is extended in front and rear of and beneath the frame, and is flexibly connected therewith. A cross-beam is rigidly attached to the rear end of the draft-beam and is provided with plows or scraping devices. The construction relieves as much as possible the strain put upon the draft animals and enables the weed-cutters to be readily raised or lowered.

Electrical Apparatus.

ELECTRIC-BATTERY ATTACHMENT.—HENRY B. WARE and CHAUNCEY C. CORNELL, Wymore, Neb. This invention provides an insulated tray to be placed between the elements of a gravity-battery to catch any particles that may fall from the upper or zinc element, thus preventing waste and the oxidation of the copper element, and maintaining an equal internal resistance of the battery and a uniform electromotive force.

TROLLEY.—JOHN H. WALKER, Lexington, Ky. The inventor has devised a simply-constructed trolley-harp and efficient means for catching and directing a trolley-wire into the groove of a trolley-wheel. Protracted cold weather will be but a slight impediment to the practical working of the device, for the exposed surfaces and bearings are so arranged as to afford ice but little opportunity to accumulate in the joints. The trolley-harp and catch device not only prevent a large percentage of the wear and tear of the wire and wheel, but also obviate the occasional expense caused by the pulling down of the wires and breakage of suspension-poles.

ELECTRIC RAILWAY.—AUGOST CASAZZA, Hoboken, N. J. The invention relates to a class of electric railways in which the cars or trains take their supply of electricity from a sectional power-conductor, the sections of which are successively connected with the live wire as the car or train passes over them. In Mr. Casazza's arrangement, a second sectional conductor is employed together with switches, each of which is connected in series with two adjacent sections of the second or switch conductor and controls the connection of the power-conductor sections with the feeder. In applying this system to overhead conductors, the inventor employs a special construction of supporting plates for the sectional conductors.

Engineering Improvements.

VALVE-GEAR FOR GAS-ENGINES.—CHARLES WERNER, Pine Grove, Penn. A spring-closed air-admission valve is employed, to which an arm is secured, provided with a catch. The catch is engaged by a hook carried on a rod reciprocated from the engine. Devices are controlled by the exhaust-valve-operating mechanism, whereby the engagement of the reciprocating rod with the air-admission valve is controlled and made to follow the opening of the exhaust.

Mechanical Devices.

FLOUR-BOLTER.—FREDERICK W. BROWN, Lee Bell, W. Va. The inventor arranges the bolting-chambers in triangular form, suspends them from the angles of the triangle, and locates the operating mechanism in the space formed by the chambers. Thus a compact bolter of great capacity is produced, which can be easily balanced to secure a uniform, gyratory motion without any backlash. Provision is made for supporting three bolting-chambers from three links and equally distributing the weight on the links. A portion of one chamber is made to serve as a housing for the cut-off of the adjacent chamber, when the cut-off is withdrawn from over its bolting-cloth.

FAN ATTACHMENT FOR ROCKING-CHAIRS.—FRANCIS C. and GEORGE E. MERTZ, Port Chester, N. Y. The object of the invention is to produce a device which is attachable to any rocking-chair and which is adapted uniformly to rotate a set of fans mounted to turn upon the chair. The result is secured by the insertion of a spring between the operating mechanism and the fan, the spring being wound up by the rocker and running down as the fan-carrying shaft is turned.

FUEL-PRESS.—GEORGE W. MURPHY, Northfield, Minn. This press is designed to press straw into compact form for use as fuel. The apparatus has a spirally-threaded conical compression-chamber at the large or receiving end of which a plunger is mounted to reciprocate, serving to force the material to be compressed longitudinally into and through the compression-chamber. The thread of the compression-chamber serves to turn the material to be compressed, causing it to be rolled into compact form.

SPEED-GEARING.—ABRAHAM A. A. LEVIN, Manhattan, New York city. By means of this simple gearing the speed of an operated machine or device can be gradually increased over the speed of the driving-engine, thus saving steam. A series of independent main crank-shafts are employed, on each of which a gear-wheel is mounted. Supplemental and independent crank-shafts are also employed. Connecting-rods join the cranks of opposite crank-shafts. Pinions on the auxiliary crank-shafts engage with the gear-wheels on the first-named crank-shafts. On a power-shaft, gear-wheels are longitudinally movable to engage the pinions. By this device three separate machines can be operated.

WIRE-TIGHTENER.—JAMES P. HADDIX, Mems, Neb. The wire-tightener comprises a frame having a notched segment and feet for engaging a fence-post. An angular lever is fulcrumed on the frame and has forked members. Notched bars are pivoted to the forked members of the lever and are adapted to extend on opposite sides of a fence-post. A pawl is carried by the lever and engages the notched segment in tightening the wire.

CAN-FILLING MACHINE.—DAVID F. BALDAUF, Eden, N. Y. On a frame, shafts, geared together, are mounted. Cams are extended on the shafts in opposite directions and are designed to move frames at the ends of the machine. A tray holds the cans to be filled; and a hopper feeds the material. The beans or other material are placed in the hopper. When motion is imparted to the shafts, the tray and hopper are rocked up and down alternately at opposite ends. This movement will cause the material in the hopper to spread out evenly and pass into the cans.

COMBINED LATCH AND LOCK.—LEWIS C. WETZEL, Bellefonte, Penn. This invention provides a novel gravity-operated lock, so constructed that the sliding latch-bolt serves as a locking-bolt which can be operated only from the outer side of the door by a suitable key. The lock can be cheaply constructed and is efficient in operation.

MACHINE FOR UNDERMINING COAL.—ANDI OCHTINSKY, Rockvale, Colo. This invention relates to mining machines and provides a portable machine adapted to be operated by hand and capable of easy shift laterally and in an advanced direction as the picks undermine the coal. The invention consists in special forms of devices for feeding the machine forward and for turning it laterally, and in other details of construction and arrangement of the parts.

TURBINE WATER-WHEEL.—JOHN W. TAYLOR, York, Penn. The object of the invention is to improve the construction of that class of turbines which receive the water upon the upper part of the buckets through stationary chutes surrounding the wheel, the admission of water being controlled by means of an annular or cylindrical gate, adjustable to open or close the water-inlets or chutes. The inventor provides a gate which is adapted to open downward and close upward, so that water is admitted at the top of the wheel, to produce the greatest effect practicable before being discharged from the wheel.

Miscellaneous Inventions.

WATER-COCK.—JAMES P. BENTON, 167 Second St., Dalles, Ore. The invention relates to water-cocks and faucets, intended for out-door purposes. The construction of this mechanism permits of the automatic bleeding or venting of the water of a stand-pipe. This is readily and completely effected without siphoning the water in the hose back through the stand-pipe. It causes the bleeder to be put into action by the stand-pipe instead of by keys, thereby venting the pipe every time the water is shut off.

THILL OR POLE COUPLING.—ALBERT H. FORSYTHE, Sarcoxie, Mo. Mr. Forsythe, in this invention, improves upon a former coupling. He combines the several parts so that they can be conveniently applied to any axle, and so that the shaft can be coupled to or uncoupled from a vehicle with less trouble and greater rapidity than heretofore. All rattling is completely prevented. The coupling comprises a clip, having cheeks which receive the knuckle of the pole. The clip has an attachment consisting of side pieces. A pin is secured to one of the pieces, the opposing piece being arranged for locking with and disconnecting from the pin. In pivotal contact with a locking and an opposing side piece, is a connecting bar. This bar carries a spring, the free end of which extends transversely below the pin.

PORTABLE BUILDING.—JOHN C. KARR, 1020 East Ravenswood Park, Chicago, Ill. By this method a light, portable building can be constructed so as to be quickly set up and taken down. The foundation comprises a plurality of sections with mitered ends where they meet at the corners and square abutting ends where they meet along the sides or ends of the building. Cast plates bolted to the wooden foundation have semicircular upward projections at the section joints, and other plates have circular projections secured to the foundation with bolts, which have hooks at the end to catch brace wires. An angle iron on each section receives siding, so that when the pipe-posts are set in the projections, the pieces are fastened together. This supports the siding, posts and roof on the foundation.

ACETYLENE GAS GENERATOR.—WILLIAM BURROWS MINOR, Deposit, N. Y. The operation of the apparatus is automatic. Arranged to prevent waste of carbid, the apparatus permits a ready recharging without danger of the escape of gas into a room, or without interruption of its generation. A supply-pipe and a series of generators are arranged to receive water; valves are adapted to govern the supply. Floats in the generators open and close the valves. A locking device at all the generators except the last, automatically holds the respective valves in position, and a connection between the locking devices and the float of the last generator allows the former to release the valves when the float is raised.

VENTILATOR.—CONRAD J. VOLLMER, Lafayette, Ind. The ventilator or grate in this device has a frame. Slats terminating at their upper ends below the top of the frame form a space between the frame top and the upper ends of the slats. The grate has a cover provided with slats for covering the spaces between the slats of the grate. It is free to move transversely through the space formed between the frame top and the upper ends of the grate slats. Lugs on the cover abut against the frame top to hold the cover in a nearly horizontal position. The ventilator is for use on buildings, and permits the passage of air to or from the part to be ventilated; or, allows its exclusion in winter time or during rainy weather.

HYDROCARBON-GENERATOR.—FRANCIS M. BAKER, Lomira, Wis. The device embodies novel means for regulating the generation of the vapor, by transmitting to the retort the necessary heat. The transmission is through separate conducting parts which are in contact to transmit the heat, and which upon being moved out of contact cease to pass the heat. In this way the generation of vapor is stopped. A wick feeds the oil or alcohol to the retort by capillary attraction instead of by gravity air-pressure.

ARITHMETICAL SLATE.—HARRY CLAUD SEILER, Milton, Penn. A slate-frame, a slate therein having

sight-openings spaced apart from it, and disks arranged between the bearing-bars and the slate, and made to expose portions of their surfaces through the sight-openings in the slate, together with pulleys and gearings for operating the disks—these comprise an apparatus for use in teaching and drilling in primary arithmetic, whereby problems in addition, multiplication, subtraction, and division can be quickly and accurately indicated.

CUFF-HOLDER.—LOGAN CUMMINS, Memphis, Tenn. The arrangement of this mechanism furnishes a convenient attachment to a coat-sleeve at any needed point of its length for bringing the cuff into the desired position relatively to the sleeve. The construction permits an easy attachment or detachment of the holder from the cuff. A spring-clasp engages the inner edge of the cuff, a spring attaching device having prongs to engage with a sleeve, and a link for connecting the spring attaching device with the clasp.

TAILOR'S SQUARE.—DOMENICO SEBASTIANO, Manhattan, New York city. This square has two blades. One is used for getting the position of lines extending across a pattern and which locates certain positions upon the garment, such as the bottom of the arm-opening and the waist-line. The other is laid out with groups of marks arranged in plural series, the groups of each locating points upon the cross lines on the other blade of the square. The marks of each group are so disposed with reference to the corner-angle of the square as to place corresponding patterns of different sizes.

SUSPENSORY BANDAGE.—ALFRED CHARLES MOSS, Streator, Ill. The harness supporting this bandage is suspended from the shoulders instead of from the customary waist-line. It can be worn without discomfort or irritation. Metal buckles or fastening devices are not required; so that the fastenings employed are flexible, readily adapting themselves to the body and permitting an effective adjustment to the person. There are two loops connected at the back by straps, one of the loops being provided at its lower end with an extending tape, and the other with a series of longitudinally-arranged loops with which the free end of the strap or tape can be interlaced.

MANDOLIN-CITHERN.—FREDERICK MENZENHAUER, Jersey City, N. J. In this instrument the strings are sounded by means of picks, so that a tremolo or mandolin effect is produced. The picks are actuated by keys depressed by the fingers of one hand, while the other hand or a separate motor yields the power necessary to vibrate the entire pick-carrier, the speed of which will be such that the strings will be sounded two or three times before the key is released, so that a sustained tremolo impression is produced. By turning the handles at varying speeds, a changing degree of tremolo is obtained. The cithern has a keyboard extending across the strings.

TOY MAN-OF-WAR.—MORTON E. CONVERSE, Winchendon, Mass. The construction makes this toy virtually an ironclad, the hull and turrets or mountings for the primary battery being of metal. The sponsons, ports, and guns of the secondary battery are offset from the hull by embossing their parts, the guns of the primary battery being detachably mounted in the upper or deck structure. There is a wheeled support for the toy. The hull is hollow and open at the bottom, whereby all the parts can be stored away in the hull, together with the wheels. This enables the toy to be easily packed in a small compass and shipped without danger.

LIQUID-AIR CONTAINER.—JOHN SPRATT WRIGHTNOUR, Oil City, Penn. This device is for the economical utilization of liquid air in hospital wards, residences, auditoriums, etc. It consists of an open cup for liquid air, situated in the middle of the floor of a chamber or reservoir made of thin heat-conducting materials to contain the gases evaporating therefrom. The reservoir filled with these evaporated gases, with its frost-covered surface, will make an excellent cooler for the room. There are outlet-pipes controlled by cocks for the issue of the evaporated gases. By proper manipulation, some of the oxygenated liquid air in the cup is permitted to flow out on the floor and wall of the reservoir to evaporate, highly oxygenated air being thus obtained. The liquid air left in the cup is retained for later use as desired, evaporation therefrom being retarded by insulation by the cold air above it.

CUT-OFF VALVE FOR HYDRAULIC ELEVATORS.—PHILIP F. CANTLION, Manhattan, New York city. The inventor has devised a valve for automatically cutting off the water-supply to the pressure-cylinder, should the elevator move too far upward, and to retard an outflow of water should the elevator move too far downward, thus preventing accidents should the ordinary valve mechanism become inoperative.

PIPE-FASTENING.—JOHN M. SPEAR and WINNIE R. STRAW, Plainfield, Wis. By means of this device, the diameters of pipes, thimbles, or elbows can be adjusted so that they can be readily made to fit the parts with which they are to be used. The pipe is split longitudinally and has a part of one edge formed with a lap turned outward and laterally and extending a part of the length of the pipe. The pipe has at its other longitudinal edge a lap extended inwardly and latterly throughout the length of the pipe. The laps are inter-engaged. The pipe has its side edges fastened rigidly together throughout the length of the first-named lap, leaving the edges at one end free. The two parts of the pipe can be relatively moved to adjust the diameter.

Designs.

BELT.—LOUIS SANDERS, Brooklyn, New York city. The leading feature of this design is found in a peaked frontispiece, connecting the ends of a back section. A ring or chain ornamentation is provided for the frontispiece.

GARMENT-REGULATING ATTACHMENT FOR BELTS.—LOUIS SANDERS. Brooklyn, New York city. The attachment consists of a small plate, the formation of whose body includes a lower transverse section and upright sections connecting with the end portions of the transverse section. A corresponding flange is formed at the bottom of the transverse section. The attachment is easily adjusted and performs its functions efficiently.

NOTE.—Copies of any of these patents can be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

Business and Personal.

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

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

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.

(7905) B. G. J. writes: 1. In a spark coil for a current of 98 volts and 50 amperes, what would be the size of the insulated wire, of the short wires forming the core? A. You may make your spark coil with a core of No. 14 iron wires cut 12 inches long, and annealed by heating red hot. The core should be about one inch diameter. Upon this wind the coil, insulating each layer with brown paper. Use No. 12 copper magnet wire, double covered with cotton. Six layers should give a good spark; more can be put on, if necessary. 2. What is the formula for birdlime? A. For birdlime boil the middle bark of the holly, gathered in June or July, for 6 or 8 hours in water, until it becomes tender; then drain off the water, and place it in a pit under ground, in layers with fern, and surround it with stones. Leave it to ferment for two or three weeks, until it forms a sort of mucilage, which must be pounded in a mortar, into a mass, and well rubbed between the hands in running water until all the refuse is worked out; then place it in an earthen vessel, and leave it for four or five days to ferment and purify itself. Remarks: Birdlime may also be made from mistletoe berries, the bark of the wayfaring tree and other vegetables, by a similar process. Should any of it stick to the hands, it may be removed by means of a little oil of lemon bottoms or turpentine. Use: To rub over twigs to catch birds or small animals. It is said to be discutient when applied externally. 3. Has any number or numbers of the SCIENTIFIC AMERICAN directions for making spark coils, motors or dynamos? If so, what number? A. We have published the plans and descriptions of many dynamos and motors. See SUPPLEMENT, Nos. 161, 600, 647, 759, 761, 783, 844, 865, 720, 793, 1202, 1210. And for coils, see SUPPLEMENT, Nos. 160, 569, 1087, 1124. Any or all of these can be sent you for ten cents each by mail.

(7906) T. L. C. writes: Suppose a cannon was placed perfectly level. When fired, would the ball rise when it left the muzzle or would it commence to drop the instant it left the gun? A. Gravity acts constantly, and the ball commences its downward curve at the instant it leaves the gun.

(7907) O. S. writes: I intend to erect lightning conductors at my buildings; they will be made of two-inch tubing below, reduced to one inch at the top, connected by a heavy copper wire running from the top, of one conductor to the other above the building. A. With reference to lightning rods we advise you to buy our SUPPLEMENT, No. 998, price 10 cents, which will give you much information upon the matter. 1. How high above the building should the conductor and wire be and how far away from the buildings should the conductors stand? A. The conductor should be carried to all high points of the building, and not merely to its highest point. It is not wise to erect very tall pointed rods projecting several feet above the roof. The conductor should be next the building and not stand away from it, and all metallic masses, such as water spouts, should be connected to it; though all authorities are not agreed in regard to this point, the latest opinion is in this direction. 2. Would lead joints do to connect the tubing with, or should the joints be iron? A. Connections may be soldered, riveted or screwed. In whatever way the parts are joined, the joint must be firm. 3. Would four feet in the ground with a lot of old iron at the bottom of the conductors be all right? A. If the ground is permanently wet, yes. The moisture of the earth is the important element, and not the depth. The rod must extend to water, no matter how far that is. 4. Will wood do to hold the wire and conductors to the building, or should I use glass? A. Opinions vary upon this point. We are inclined to think a wooden fastening is as good as any. 5. Will it do to put the ends of the wire inside the tubing at the top and drive a plug in tight? Would this make a good connection? A. No. What has been said above regarding connections, answers this question. Nor should you change to a copper wire. Copper is not considered to have any advantage over iron. A galvanized iron telegraph wire is sufficient if carried liberally over the roof and all high parts of the building. Nor is a two-inch pipe desirable. A one-inch pipe is entirely sufficient. Size is not important. Lightning often leaves a heavy rod and takes to a fine wire on its way to the earth.

NEW BOOKS, ETC.

DIGEST OF UNITED STATES AUTOMOBILE PATENTS FROM 1789 TO JULY 1, 1899. Including All Patents Officially Classed as Traction Engines for the Same Period. Compiled by J. T. Allen, Examiner United States Patent Office. Washington, D. C.: H. B. Russell. 1900. Quarto. Pp. 700. Sheep. Price $25.

The compiler has performed a difficult task with great credit to himself. He has previously compiled a digest of patents for cycles and velocipedes which has been of the utmost possible use, also of seeding machines and implements, plows and attachments, cultivators and wheel plows. All the patents relating to horseless vehicles are included in the portly volume. The patent drawings are reproduced photographically and no drawing is omitted, every sheet being given, which is most important to those who are engaged in inventing along the line of automobile vehicles. The remaining portion is a reproduction of essential descriptions of the inventions, with claims in full, with full data as to the patent, and further there is furnished a complete index to the references cited against the patents while pending as applications by number, name and date, and also the interferences, if any, the parties thereto and the decisions. The index is alphabetical. The patents are arranged chronologically under the heads of spring, steam, gas, air, electricity and gearing, while under the head of traction engines are given all traction engine patents as officially passed upon. There are various indices adding to the value of the book. The automobile patents are continued from July 1, 1899, in the United States Electrical Weekly, which is also compiled by Mr. Allen.

THE GENESIS OF WORLDS. By J. H. Hobart Bennett. Springfield, Ill. 1900. 12mo. Pp. 345. Price $1.65.

SYSTEM OF MEASUREMENTS ADOPTED BY THE NATIONAL ASSOCIATION OF MASTER HOUSE PAINTERS AND DECORATORS OF THE UNITED STATES. New York: The Painter's Magazine. 1899. Quarto. Pp. 60. Price $1.

This book contains a great deal of useful information for the architect as well as for the painter and decorator, giving the result of the labors of the committee appointed by the National Association to formulate a system of measurements of painter's work, which should be thoroughly accurate in every particular. There are six lithographic plates, measuring 16× 0 inches, showing the application of the system to houses of various designs and different interior and exterior details. It is only necessary to measure the work in accordance to the rules laid down, and apply the local price per square yard of plain surface, which is governed by cost of material and labor, to be able to correctly estimate the most complicated job of painting.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending

JUNE 19, 1900.

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Air brake for railway cars, H. W. Libbey 652,233
Air compressors, construction of double-acting, E. M. L. Duval 651,837
Air drying apparatus, J. Gayley 652,178
Air drying process, J. Gayley 652,179
Air, liquefier for atmospheric, C. E. Tripler 652,058
Anchor, folding, G. W. Blackburn 652,162
Annunciator, Beach & Doughty 652,013
Annunciator system, hotel, C. B. Clark 652,084
Armor plates, hardening and toughening, E. Ehrensberger 651,865
Automobile, J. C. Rantz 652,006
Axle brass, car, E. Jacquemin 652,026
Back pedaling brake, N. Mitchell 652,131
Bag. See Water tight bag.
Bag fastener, L. S. Short 651,937
Baling press, T. J. Corning 651,830
Baling press, T. D. James 652,115
Barge, fueling, S. B. Peck 651,931
Barrel, A. A. Porter 652,140
Bearing, ball, J. H. Little 651,870
Bed, J. K. P. Beard 652,158
Bed, sofa, W. T. Rolph (reissue) 11,831
Belt, electric, M. A. McLaughlin 652,217
Belt, electric, W. C. Sedwick 651,978
Bicycle, A. J. Harlan 651,993
Bicycle, C. von der Heide 651,907
Bicycle, chainless wheel, P. J. Freize 651,967
Biscuit machine, A. Pouey 651,885
Blotting pad, A. D. Glueck 651,844
Board. See Press board. Washboard.
Boiler setting, J. C. Black 652,075
Book, separate leaf, L. M. Morden 651,950
Boots or shoes, antislipping device for, D. A. McDonald 652,036
Bottle washer, A. P. Petterson 652,040
Box. See Mail box. Molding box. Oil box.
Box covering machine, J. F. Kachline 652,000
Brake. See Air brake. Back pedaling brake.
Brake lever, S. W. Hyatt 651,997
Brake releasing device, drive wheel, W. O. Pelham 652,218
Bridge, draw, J. Edwards 652,020
Bridge, rocking bascule, F. G. Vent 652,201
Bridge, swivel draw, J. Edwards 652,019
Broom holder, C. W. Brown 651,821
Brush, whitewash, W. McMahon 651,975
Brushes, manufacture of, C. E. Flemming 651,841
Buckets, detachable tooth for steam shovel, B. Brown 651,944
Buckle, E. Reyhing 652,043
Buggy top dust hood, Daugherty & Knoderer 652,090
Building construction, J. C. Pelton 652,219
Burner. See Gas burner. Liquid fuel burner. Vapor burner.
Button fastener, M. E. Krudemann 652,122
Calcimine compound, W. A. Hall 651,851
Calcium carbid, furnace for producing, Zimmerman & Prenner 651,916
Calendar, perpetual, E. G. Tasso 651,940
Can. See Oil storage can.
Car brake appliance, D. Taggart 652,055
Car draft rigging, C. F. Street 651,898
Car, dumping, S. Stewart 652,198
Car, railway, R. Harding 651,968
Car, railway, F. J. Sprague 652,049
Car replacer, E. Best 652,205
Carpet stretcher, F. B. Johnson 651,924
Caster, W. J. Martin 652,128
Caster, furniture, W. J. Martin 652,127
Chain links, machine for automatically bending, H. Spuhl 652,147
Chain links, welding swage for, H. Spuhl 652,146
Chair. See revolving chair.
Chart blank, W. H. Goodwin 652,023
Checkrein, W. Berry 652,151
Chuck, magnetic, O. S. Walker 651,908
Cigarette making machine, F. J. Ludington 652,151
Clamp. See Tube clamp.
Cleaner. See Cotton cleaner. Street cleaner.
Clinometer, F. T. Cable 652,078
Clip. See Toe clip.
Clip, W. Whiteley 651,910
Clock, phonographic, E. Treitschke 652,152
Clock, program, W. H. Hall 651,850
Cloth folder, A. Sinzheimer 652,048
Clothes holder, W. A. E. Henrici 652,025
Clothes line hook, E. H. Wilson 651,912
Clutch, friction, J. T. Ford 651,842
Clutch, friction, A. McNair 652,135
Clutch, friction driving, M. Backstrom 651,816
Coat, apparel, M. L. Kelley 652,117
Coin controlled lock, E. M. Harrison 651,854
Cooker or grill, T. H. Dibble 652,170
Cork polishing machine, Campbell & Dodge 652,165
Corset closure, apparel, Sheardown & de Palkowska 651,955
Cotton cleaner and feeder, J. W. Seifert 651,979
Cotton separator, distributer, and feeder, E. E. Bateman 651,986
Counting device, G. Schneider 651,892
Coupling. See Shaft coupling.
Crate, spring egg, J. P. Riley 651,887
Crushing mill, Hadfield & Jack 652,208
Culinary vessel, J. H. Rose 651,977
Cultivator, J. Youngblood 651,915
Currycomb substitute and massage block, A. S. Littlejohn 652,189
Curtain fixture, C. C. Thompson 651,984
Cutter, C. Muller 652,133
Cycle saddle, F. Rosenberg 651,933
Cycle seat tube, Hinrichs & Kruger 652,183
Defibrating machine, M. A. Torre 652,057
Dental heater, W. F. Slack 652,197
Dental instrument, W. E. Harper 651,922
Derrick apparatus, S. Mattson 651,972
Desk, register, J. W. & W. L. E. Appleyard 651,815
Dial, geographical, C. E. Davis 651,832
Dial sun, E. G. Hewitt 652,108
Diaphragm motor, G. W. Lewis 652,032
Diffusion cell, C. Pfeiffer 651,883
Disintegrator, R. Hathaway 652,106
Door, grain, J. C. Munro et al 651,974
Door securer, R. W. Schutz 652,046
Dovetailing machine, J. E. Erickson 651,946
Draft equalizer, H. J. Freark 651,991
Drill. See Hand drill.
Dust and scrubbing pan, combined, F. C. Lillis 652,125
Dust, condensing flue, R. Ruetschi 652,045
Ear drum, artificial, L. H. Vickers 652,202
Egg case filler, E. R. Lionberger 652,126
Electric motor, C. L. Bundy 651,945
Electric motor, H. O. White 651,909
Electric motors and apparatus therefore, controlling, H. Leitner 652,124
Electric switch, automatic, P. S. Tirrill 652,151
Electrical distribution system, S. Krohn 652,187
Electrical waves and apparatus therefor, reducing attenuation of, M. I. Pupin 652,230
Electrical waves, reducing attenuation of, M. I. Pupin 652,231
Electrodes for storage batteries, machine for making, Hanscom & Hough 651,853
Electrolytic apparatus, M. Haas 651,849
Elevator. See Water elevator.
Elevator safety attachment, C. Kimball 652,118
Engine. See Explosive engine. Rotary engine. Rotary steam engine.
Engine starting and reversing device, combustion, E. S. Haines 652,104
Exhibitor, card, J. A. Mangold 652,192
Explosion engine, G. A. Fleury 651,966
Extractor. See Nail extractor.
Eyeglasses, L. A. Dupaul 651,989
Fastener, J. D. Strickler 651,983
Faucet, beer, H. S. Johnson 651,999
Feeder, boiler, R. McDougall 652,134
Felly shield for vehicle wheels, J. R. Singer 651,981
Fence, C. Stierlin 652,050
Fifth wheel, J. H. Little 651,871
Filter, R. P. Lawson 651,948
Filter valve, C. E. Torrance 651,901
Filtering apparatus, water, C. L. Deutsch 651,833
Firearms, cleaning rod for, F. K. Dunn 652,096
Fire escape, portable, J. A. Hoyt 651,995
Fire extinguisher, D. W. Diggs 651,836
Fire extinguishing sprinkler systems, pneumatic hydraulic alarm for, Hill & Richardson 651,857
Fireman's helmet, J. R. Chappell 652,080
Fireproof structure, J. Streifler 652,051
Flagstaff holder, W. I. Sherwood 651,980
Flask and heater, combined, A. Pearlstine 651,952
Frame. See Mattress frame.
Fur unhairing machine, Hedbavny & Rothe 652,182
Furnace. See Ore roasting furnace. Smelting furnace. Smokeless coal burning furnace.
Furnace, L. T. Buck 652,163
Furnace, Hughes & Bishop 652,110
Fuse igniter, M. O. Smith 651,939
Gage. See Marking gage.
Game, parlor, H. J. Tait 652,056
Garment hanger, O. C. Kavle 651,970
Garment pad, G. Goldman 652,102
Gas burner, H. F. Gabel 652,167
Gas burner, acetylene, K. H. Raupp 652,141
Gas generator, acetylene, O. D. Fry 652,095
Gas generator, acetylene, J. H. Green 651,845
Gas generator, acetylene, J. S. Harger 652,201
Gas generator, acetylene, C. M. Lindholm 651,869
Gas generator, acetylene, A. McKenzie 651,881, 651,882
Gas generator, water, J. W. Chrisholm 652,082
Gas igniting device, A. Martini 651,875
Gas injecting apparatus, E. Sterne 652,149
Gas, manufacturing, J. W. Chisholm 652,081
Gas or other burners, mixer for, C. W. Claybourne 652,085
Gas purifier, G. P. Washburn 651,959
Gases, etc., and manufacturing same, receptacle for, H. Platz 651,884
Gate, J. C. Dunter 652,018
Gate, A. Wyllie 651,911
Generator. See Gas generator.
Glass, producing attachment surfaces upon, A. J. Davis 652,091
Golf club, H. C. Cushing, Jr 651,920
Governor for fluid pressure engines, F. M. Rites 651,958
Gramophone motor, L. P. Valiquet 651,904
Grinding machine, E. Rivett 652,007
Gun carriage or other vehicle, J. A. Wilding 652,154
Hand drill, J. E. Olsen 652,137
Hanger. See Garment hanger.
Hat packing ring machine, L. T. Hallock 651,992
Hat rack and advertising device, combined, W. M. Hurlburt 661,858
Heater. See Dental heater. Tank heater. Water heater.
Hinge, H. Meyer 651,876
Hinge, lock, O. A. Keil 652,001
Hog trap, H. L. Ground et al 652,103
Hoist, E. B. Achee 652,069
Hook. See Clothes line hook.
Hook and eye, E. C. Beecher 652,160
Hoop. See Metal hoop.
Hotel registers, advertising desk for, H. Hatch 652,225
Hub and spindle, vehicle, J. P. Byne 651,823
Ice, manufacturing, E. R. Butler 651,963
Ink supply for ink bottles, automatic, I. L. Davenport 651,831
Inking apparatus, H. H. Jacobus 652,113
Iron rest, S. O. Hubbard 651,996
Jack. See Lifting jack. Lumber jack.
Jack, C. W. Doane 652,094
Joint. See Railway rail joint.
Knitting machine, H. A. Klemm 652,186
Ladder and roof bracket and window jack, combined, G. K. Wheeler 652,010
Lamp, acetylene gas generating, A. C. Einstein 652,173
Lamp, binnacle, G. A. Baker 652,012
Lamp, carbureting, A. L. Taber 652,054
Lamp, electric arc, A. B. Walton 651,985
Lamp, electrical incandescent, von Recklingbausen & Vogt 652,194
Lamp, incandescent, I. Kitsee 651,866
Lamp, spirit incandescent, K. Lehmann 651,925
Land roller, J. Gilbert 652,100
Last, E. C. Wright 652,011
Lathes, combination back knife for turning, Miller & Knapp 652,130
Leather stretching machine, J. Brooks 651,820
Ledger, loose leaf, H. Swalley 651,899
Lifting jack, F. I. Joyce 651,860
Liquid fuel burner, P. E. Thurow 651,900
Lock. See Coin controlled lock.
Lock, C. E. Johnson 651,947
Locomotive sanding device, J. C. Hooper 655,212
Locomotive whistle signal for railway crossings, automatic, H. B. Smith 652,145
Loom, H. I. Harriman 652,105, 652,224
Loom, E. S. Stimpson 652,222

(Continued on page 412.)