

**A Year of Record Breaking.**

This year will be memorable in the annals of athletics, sports, and physical achievements generally for the raising of the old standards of performance. When the trotting season began Nancy Hanks' record of 2:04 had stood unbeaten for a long time. Alix has brought it down to 2:03 $\frac{1}{4}$ . On the pacing track Robert J. has lowered the record to 2:01 $\frac{1}{2}$ , beating Mascot's previously fastest mile by  $\frac{1}{2}$  seconds. Directum has made a new record for two year olds by pacing a mile in 2:07 $\frac{1}{4}$ . Fantasy has made a new trotting record for four year olds by covering a mile in 2:07 $\frac{1}{4}$ . The wonderful performance of Flying Jib at Chillicothe, Ohio, September 29, when, hitched to a running mate, he paced a mile in 1:59 $\frac{1}{2}$ , is the crowning track feat of the season. This feat is made still more astonishing by the fact that the last half mile was paced in 58 $\frac{1}{2}$  seconds. The best previous pacing record made by a horse hitched to a running mate was that of Westmont, who, in 1884, at Chicago, covered a mile in 2:01 $\frac{1}{4}$ . Robert J. still holds the pacing record, but Flying Jib's work has made it probable that in the near future a mile in two minutes or less will be paced by a horse running without a mate. Nearly all the old mile turf records have been broken this season, and we must not forget in this brief review that Ducat, at Sheepshead Bay, on August 28 last, ran a mile in 1:39, carrying 113 pounds—the best one mile time ever made on a circular track.

Passing from fast horses to swift men on wheels, we find nearly all the previous bicycle records have been surpassed in 1894, and probably the next month will break them still more. J. S. Johnson has made a half mile spin against time in 54 seconds. One mile has been flown over by J. P. Bliss in a fraction over 1:52. With standing starts N. Butler has cycled two miles in 4:04 4-5; while J. S. Johnson has spun three miles in 6:26 3-5, four miles in 8:38 4-5, and five miles in 10:48 4-5. E. C. Bald has made a mile in competition in 2:05 4-5. F. J. Titus has covered 26 miles and 1,489 yards in one hour, spinning against time. And the best previous twelve hour competitive race time has been beaten by Walters, in London, who made the astonishing run of 258 miles in that time, or 21 $\frac{1}{4}$  miles an hour.

Many other new athletic world's records have been made within the past month. The best world's running time for 300 yards has been lowered to 31 3-5 seconds. The farthest throw of a 56 pound weight has been increased to 35 feet 10 inches. The best time of a 120 yard hurdle race has been lowered from 15 $\frac{1}{4}$  seconds to 15 3-5 seconds.

The fastest time for swimming 100 yards was 1 minute

and 12 seconds until September 15 last, when it was reduced to a fraction below 1 minute and 9 seconds. A new swimming record for 880 yards has also been made for the world; the old one was 6 3-5 seconds slower.

The greyhounds of the sea, as the Atlantic steamers are not unfitly called, have also been contributing to the record breaking of this phenomenally fast season. The Cunarder *Lucania* made her last passage from Queens-town to New York, or, to speak more exactly, from Daunt's Rock to Sandy Hook—2,782 miles—in 5 days 7 hours and 48 minutes, or at an hourly average speed of 21.77 knots. This beats the best previous record, which was also made by the *Lucania*—5 days 8 hours and 49 minutes. This ocean racer now holds the best records for the eastward as well as the westward run, her eastward time being 5 days 8 hours 38 minutes. The American liner *New York* has broken the best previous record of time between Southampton and New York, which she has steamed, over a course of 3,030 miles, in 6 days 7 hours and 14 minutes. The best run to Southampton from New York is still that made by the Hamburg-American liner *Fuerst-Bismarck*, which made it in 6 days 11 hours 44 minutes.

Truly we live in a rapid age, and if we have not yet reached "the pace that kills," it seems likely that the extreme limit alike of human energy and endurance and of the power of machinery and steam is in sight. As we see from these records, the carefully bred and trained horse can pace a mile in less than two minutes, and yet the trained man on his steel horse can beat him by nearly eight seconds. Neither animal nor human flesh and blood can be expected to go much farther in the way of overcoming the obstacles of space and distance and enlarging the possibilities of time. It is no longer a debatable question whether in physical powers the best men of this age excel the best men of ancient times. There is no well-authenticated record of a Grecian athletic feat that has not been beaten by the athletes of this nineteenth century. Leander's swim across the Hellespont was far outdone when the late Captain Webb swam across the Straits of Dover from England to France. Lord Byron had already equaled Leander's feat. The Spartan runner *Ladas* dropped dead on completing a race of 2 $\frac{1}{4}$  miles, and it was thought to be not surprising that he should, as the distance was regarded as very long. We have no record of the speed at which *Ladas* ran, but as to the distance covered it was trifling as compared with the distances that many of our running athletes cover.

That the modern man is of a bigger breed scientific inquiry has made certain. The size of the heroes of classic days, like most other things about them, was

mythical. It was only in statuary that Ajax and the other large-limbed men of antiquity ever had existence. Many years ago an old-fashioned tournament was projected in England, and the corselets and greaves of the mailed men of the Plantagenet period were pulled out of the closets of the old castles to be used by the modern descendants of the "brave knights of old." It was at once discovered that the nineteenth century Englishman was much too tall in stature and large in girth to get into them. And thereby perished the long-cherished fiction that the human race was physically degenerating, and that the men of to-day were "not the men their forefathers were." We may, as we look over all that has been done on land and sea in lowering the racing records, alike of men, horses, and ships, feel that we are indeed "the heirs of all the ages in the foremost files of time." We have faster runners, stouter swimmers, surer marksmen, better rowers and yachtsmen, finer horsemen than ever were known to the Europe of feudal times or the Athens of Homeric days.—*Baltimore Sun*.

**The German Beet Sugar Industry.**

Speaking of this industry, Consul-General Dundas says German sugar is made entirely from beetroots cultivated by farmers who have an interest in sugar factories. The average yield of sugar in the beet is from 14 to 15 per cent, and in order to secure a good yield the roots destined for culture are selected solely with regard to the percentage of their yield of sugar. Therefore the excellence of the root in regard to yield and the production of the seed is a matter of the first importance. The plant most in demand is the little *Wanzleben*. The factories consume 200 tons to 1,000 tons of beetroot daily, according to size or working capabilities. The process is as follows: The roots cut into strips are edulcorated with warm water, and juice thus obtained is clarified by means of lime. The residue left is then subjected to a process by which all moisture is extracted by means of presses and utilized as provender, which has been found very serviceable. A second and third purification with carbonic and sulphurous acids follow; and the sirup and crystallization operations by evaporation and boiling give the final production of the manufactured article, which is separated by centrifugal machinery from the sirup. The deposit left from this process is the molasses which is so much used in the manufacture of spirit. The number of factories in Germany in 1891 was 406, equipped with 4,717 steam engines of 68,691 horse power, using up 10,623,319 tons of beets, and yielding 24,273,784 cwt. of sugar and 4,815,922 cwt. of molasses.

**RECENTLY PATENTED INVENTIONS.****Engineering.**

**BOILER.**—Harry H. Kelley, Elyria, Ohio. This boiler is designed to generate steam quickly, and be very economical of fuel. It is vertical, having a central sectional column or shell, and on its outside are spiral water circulating pipes having their ends connected with the shell. The shell is preferably made in four sections, connected with each other by joints, each having a ring forming a seat for metallic gaskets, and the heads of the upper and lowermost sections are connected with each other by stay bolts. The shell is supported at its lower end by water legs supported by the brickwork.

**Railway Appliances.**

**SWITCH.**—Ephraim H. B. Knowlton, West Superior, Wis. According to this improvement the switch is set by hand to side track a train, but the train in passing automatically resets the switch to close the main line again, so that the latter never can be left open by the neglect of the switchman. The operating bar is moved by a weighted lever, the bar and lever being locked by a detent, and a depressible bar and tilting frame are arranged to be operated by the wheels of the train to trip or dislodge the detent.

**Electrical.**

**BATTERY.**—Milton E. Smith and Maurice F. Geer, Rochester, N. Y. This battery comprises a jar in which is set a porous cup containing the positive electrode, preferably zinc, the exciting fluid being chromic acid and sulphate of zinc, while outside the porous cup a negative or carbon electrode extends into a solution of sulphuric acid and water, or other suitable fluid. The exciting agent may be used in liquid or solid form, and in general work the proportions preferred are nine parts of chromic acid to one part of sulphate of zinc. It is designed that a high electromotive force shall be obtained with a comparatively moderate destructive action on the elements.

**ELECTRIC HEATER.**—Jesse R. Davis, Parkersburg, West Va. This improvement is applicable to all classes of furnaces or stoves, and converts the current into sensible heat without the use of wire coils. The heating medium forming the walls of the stove or furnace, and made hot by the passage of the current, is composed of finely comminuted carbon mixed in varying proportions with an inert refractory non-combustible material, also a non-conductor, as slaked lime, magnesia, silica, asbestos, etc., so that when the current is passed through the mixture the mass is rendered partly conductive by its carbon particles, but is of high resistance from the preponderance of non-conducting substances. By regulating the proportion of carbon to the inert material, the proportion of heat developed may be adapted to various uses.

**CONDUIT ELECTRIC RAILWAY.**—James E. Toole, Northumberland, Pa. This inventor has de-

signed a strong and comparatively inexpensive conduit, in which the trolley is so hung that it will pass easily around curves, the trolley wheel being guided on the line wire, and means being provided for conveniently raising the trolley to break the circuit. The construction of the trolley is such, also, that the insulation will be perfect, and there will be no danger of grounding the circuit.

**PRODUCING OZONE.**—John T. Donovan and Henry L. Gardner, Springfield, Mass. For the production of ozone in large quantities these inventors have devised a process to work in connection with currents from electric light wires, employing electrolytic apparatus with communicating chambers in which are inserted positive and negative electrodes connected with the electric generator. There are connections for removing the hydrogen liberated from the negative electrode, while the ozone generated at the positive electrode escapes into the surrounding air or may be conveyed away in a tube.

**Mechanical.**

**CABLE SUPPORT.**—Erik G. P. Wern, Brooklyn, N. Y. This invention relates to supports for cables propelling cars to carry buckets of coal, etc., and arranged to swing out of normal position when struck by a device coupled to the moving cable, returning to former position automatically after the device has passed. The arm supporting the cable swings on a fixed pivot, springs connected with the arm being compressed when the arm is swung out of position in either direction, and the springs returning the arm to its normal position.

**CHAIN HOD ELEVATOR.**—Gustaf P. Wern, Brooklyn, N. Y. This inventor provides improvements whereby the driving shafts are securely held in proper position to prevent undue friction and binding in the bearings. Fixed blocks are attached to the standards of a strongly constructed frame and bearing boxes with curved exterior surfaces are seated in the fixed blocks, while a shaft is journaled in the bearing boxes and adjustable blocks engage with their concave under surfaces the bearing boxes opposite the fixed blocks. The adjustable blocks screw on pivoted screw rods carried by blocks fixed in the standards.

**ELEVATOR PLATFORM.**—This is another patented invention of the same inventor, for a simple and durable construction more especially designed for use in elevators carrying wheelbarrows, hods and other vehicles and articles, or which, being very safe and strong, may also be used to carry passengers. Spaced metallic plates are located at the sides of the platform, posts between the plates, and bolts pass through the plates, posts and platform, while shafts with reduced ends are journaled in the plates, safety clutches being secured on the outer ends of the shafts, and means provided for actuating the clutches.

**VARIABLE GEAR FOR SAW MILLS.**—Jacob T. Oberdorfer, Delmont, Ohio. Beneath a vertically movable shaft carrying a friction disk is a count-

ershaft on which is a sliding pulley engaging the disk, while an oscillating horizontal shaft carries a notched quadrant with which a lever fulcrumed on the shaft may be held in engagement. There is an operative connection between the lever and pulley, to slide the latter, and a lever to lift the vertical shaft, the lever riding on a crank on the oscillating shaft. The mechanism is cheap, strong and simple, and by a single lever the saw mill carriage may be driven in either direction, its speed perfectly controlled, or the apparatus be thrown out of gear.

**WOOD BENDING MACHINE.**—John Dawson, Brooklyn, N. Y. This is a machine more especially designed for quickly bending chair backs, and in it a large number of the backs may be simultaneously undergoing treatment, with very little labor and a high degree of economy. It has a steam box adapted to be rotated, and with a series of seats and clamps for each seat, a carriage traveling above the box having lever devices to be moved against the clamps. The machine, besides taking in a large number of articles at one time, effects the bending in an hour's time, as against twenty-four hours formerly required for the same work.

**Miscellaneous.**

**REEFING SAILS.**—Samuel G. Martin, Branchport, N. J. This inventor has devised a fore-and-aft sail which may be readily converted into a storm trysail and quickly restored to its original shape. The sail may be conveniently reefed, then folding regularly on the boom until the reef points are fastened, and when the reef tackle is manipulated the mast hoops are hauled down simultaneously and evenly with the furling of the sail cloth, dispensing with the services of an attendant at the hoops. An auxiliary leech rope is located above the reef points, that when the sail is reefed to its utmost it will draw from the auxiliary leech, a second auxiliary leech forming the upper leech of the trysail.

**OIL CAN CARRIER.**—Jurgen H. Lins, Brooklyn, N. Y. This carrier is designed for use on grocers' wagons and other vehicles, to facilitate the delivery of oil to customers without danger of spilling the oil over groceries or other goods. The invention consists of a box to be fastened to the under side of the wagon body, and having a downwardly swinging door, there being in the box a number of compartments, each adapted to receive and hold a can, and a drip aperture through which any oil that leaks will pass to the ground.

**VEHICLE BRAKE SHOE.**—Henry F. Shephard, New York City. This shoe is designed to follow the curvature of the wheel, affording a full bearing from one end of the shoe to the other, whether the wagon be loaded or unloaded. A barrel is connected with the shoe, and a carrying shaft provided with a spindle is loosely passed through the barrel, a spring encircling the spindle and being compressed within the barrel, whereby the latter is maintained in any position in which it may be placed.

**CARRIAGE TOP WORKER.**—August C. Bendler, Milwaukee, Wis., and William E. Bendler, Chicago, Ill. A two-part crank shaft on the carriage top has a handle forming the coupling which connects the two sections of the shaft, and there is an operative connection between the cranks of the shaft and the braces of the carriage top, forming an extremely simple and strong device, readily applied to any carriage top, enabling it to be conveniently worked from within the carriage.

**KNOCKDOWN BARREL.**—Hartley Ellis, East Liverpool, Ohio. This inventor provides a package specially designed for shipping crockery and glassware, the empty package being readily taken apart and packed for return shipment. It has an interior middle and exterior end hoops, bolts connecting the end hoops with the middle hoop, by which the barrel-like bulging of the staves is effected, the middle hoop holding the staves out and bracing them firmly.

**WORKMAN'S TIME RECORDER.**—Edward G. Watkins, Gardner, Mass. This is a very simple and cheap machine, to be operated by the individual employes when they begin and leave off work, keeping an accurate record of each one's time on a sheet which may be detached and filed away for future reference. No ink is employed, and there are no parts which require constant care and frequent renewal, nor is it necessary to transfer the record before the pay roll can be made out, the figures for a whole department being made up in total on the same sheet.

**DRAWING INSTRUMENT.**—George Thomas, Jersey City, N. J. This is an improvement in compasses or other instruments having a jointed laterally extended arm carrying a tracing device or socket for holding a tracing point. The tracing arm of the instrument has a lateral screw-threaded post at its outer end, and a detachable point or arm to carry a tracing device with a head having a lateral slot to receive the post, on which screws a nut, a sleeve being interposed between the arm and nut. The range of the instrument may be increased or decreased as desired in a quick and simple manner.

**LINER AND MEASURE.**—Sannosuke Katani, Belmont, Cal. A cord-carrying spool is held in a suitable casing, having a pawl and ratchet for locking the spool, and in the casing is an inking well, while a sliding rod, with one end resting on the pawl, is provided with a guide for forcing the cord into the ink well. It is a simple device, readily carried about, by which a straight line may be easily marked, the length of cord withdrawn being accurately shown by an indicator upon a circular dial.

**TOBACCO OR CIGAR MOISTENER.**—Jay A. Robinson, Denver, Col. This device comprises a water tray upon the bottom of which rest a number of hollow porous blocks having open bottoms, the tray being placed in show cases to moisten the air more effectually than is accomplished by the sponges usually employed.

**CASTRATING INSTRUMENT.**—John E. Anderson, Carbon, Wyoming. For the quick and safe cas-

tration of young domestic animals, more especially lambs, this inventor has devised an instrument with curved spring jaws connected with shear-like blades, the jaws meeting only after the blades have made their complete cut.

DESIGN FOR A BELT POCKET.—Richard S. Porro, New York City. This design has a shield-like portion near the top of which is a spring tongue, while below it is a circular figure on the front of the shield.

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.

The New York Observer, the first religious newspaper established in New York City, and for nearly three-quarters of a century a recognized exponent of the best thought of the Presbyterian Church, comes to us this week in new form, and, instead of being a huge blanket sheet, its pages are of the small quarto form now becoming more popular, and so much more convenient for reading and reference. The paper was established by Sidney E. and Richard C. Morse, in 1823, and in 1840 Rev. S. Irenæus Prime became its editor, with whom was afterward associated his brother Rev. E. D. G. Prime. The present editors are a son and son-in-law of S. Irenæus Prime—Wendell Prime and Charles A. Stoddard. The Observer has always had in its service writers whose attainments were of the highest order in all religious and theological fields, and one of the members of its business department, Mr. T. H. Cuthell, has been with the paper more than half a century. The change of form will cause no change in the purpose and spirit of the paper.

SCIENTIFIC AMERICAN BUILDING EDITION.

OCTOBER, 1894.—(No. 108.)

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- 1. Elegant plate in colors showing a Colonial residence at Plainfield, N. J., recently erected for B. A. Hegeman, Jr. Two perspective elevations and floor plans, also an interior view. Cost \$6,000. A picturesque design. Mr. Frank W. Beall, architect, New York City.
2. Plate in colors showing a very attractive stone dwelling recently erected for H. J. Peet, Esq., at Buena Park, Ill. Two perspective elevations and floor plans. A pleasing design. Mr. J. L. Silsby, architect, Chicago, Ill.
3. A dwelling at Bridgeport, Conn., recently erected for Frank Fowler, Esq. Two perspective elevations and floor plans. Cost complete \$5,600. Mr. A. H. Beers, architect, Bridgeport, Conn.
4. A cottage at Stratford, Conn., recently completed for Robert Wheeler, Esq. Perspective elevation and floor plan. A unique design presenting pleasing elevations and a well arranged plan. Cost \$6,200 complete. Mr. Edgar Osborne, builder, Stratford, Conn.
5. The residence at Belle Haven, Conn., recently completed for J. E. Kent, Esq. An attractive design in the modern Colonial style. Two perspective elevations and floor plans. Cost \$6,850 complete. Messrs. Rossiter & Wright, architects, New York City.
6. A Colonial double house recently completed at Bayonne City, N. J. Perspective elevation and floor plans. Cost \$4,800. Mr. Arthur C. Longyear, architect, New York City.
7. A dwelling at Bensonhurst, L. I., recently erected for John P. Jepson, Esq. An excellent example for a suburban home. Two perspective elevations and floor plans. Cost \$5,680 complete, ready for occupancy. Mr. William H. Mesereau, architect, New York City.
8. A dwelling at Flatbush, L. I., recently completed for Richard Ficken, Esq. A design in the Colonial style. Two perspective elevations and floor plans. Messrs. J. C. Cady & Co., architects, New York City.
9. A small Colonial cottage at Bayonne City, N. J. Perspective elevation and floor plan. Cost complete, \$2,800. Mr. Arthur C. Longyear, architect, New York City.
10. A residence at Pompton, N. J., built for Wm. F. Hall, Esq. Cost, \$7,500. A good example of an all-the-year-round residence.
11. The new Protestant Cathedral at Berlin, Germany, costing \$2,400,000. Designed by Prof. Julius Raschdorf.
12. Roman remains at Bath, England.
13. The Temple of Neptune at Paestum.
14. Miscellaneous Contents: Mahogany pavement.—Proportion in architecture.—The architect who never exceeded estimates.—Some difference between the English and American plumbers.—Decay of stone.—Wood water main.—Artificial marble.—Art mouldings, illustrated.—Snow guards for roofs, etc., illustrated.—Double tenoning by machinery.—Transparent bricks for hothouses.—The Capital heater, illustrated.—The Poppert patent improved weight sliding blinds, illustrated.—The new decoration in the apse of St. Paul's.—Preparing walls for papering.—An improved carpenter's clamp, illustrated.—An improved sanitary appliance, illustrated.—Hughes' improved drawing table, illustrated.—Helping the deaf to hear, illustrated.

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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. 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.

(6271) A. E. E., Brunswick, Ga., writes: Inclosed find a sample of a substance which fell from the sky, and which I am told is called "balloon spider's web." It fell in great abundance at four o'clock in the afternoon of September 20, 1892, at Gainesville, Fla., coming from a westerly direction after a series of light showers. I have shown the substance to a number of people in two or three of the Southern States, and while it excited considerable curiosity, no one was able to give me any information concerning it. I am told that the same thing has occurred in Russia and other parts of Europe. Will you kindly enlighten me on this subject or give me the technical name of the same, that I may inform myself? A. The substance received was a white silky fibrous material, very soft to the touch. Dr. L. O. Howard, Entomologist, Department of Agriculture, to whom were referred the matter, says: "The substance is, in all probability, spider silk. The falling of this silk in such abundance in the vicinity of Gainesville, Fla., in the third week of September, 1892, attracted considerable attention at the time, and samples were received at the department from several residents of Gainesville and Arredondo. The matter was carefully investigated by Dr. George Marx, the well known authority on spiders, who in a communication read before the Entomological Society of Washington November 3, 1892, published in Volume II. of the Proceedings, pp. 385-8, gave it as his conclusion that the substance was composed of the matted together webs or threads of gossamerspiders, which sail through the air in such numbers in the sunny days of early autumn. Careful chemical and microscopical examinations confirmed this theory.

(6272) W. C. V., Iowa, writes: Is there an observatory in United States whose latitude and longitude is so accurately known, and whose clock has the time sufficiently correct, and whose telescope is mounted with such accuracy in all its circles and bearings, that the telescope can be set at an altitude and azimuth according to astronomical computations, so that the planet Jupiter will appear in the field at the tick of the clock? Are there computations 200 years old or more, that are sufficiently correct to enable the performing of the above feat? A. Yes; every well regulated working observatory in the United States and other countries can set its transit for a computed entrance of a star or planet into the field. Many of the best equipped observatories can also set their equatorially mounted telescopes to cover the position of celestial objects within their field. Accurate observations have been made on the positions of celestial objects for the past 150 years, which with the present observation have well established the position

and perturbation of all the members of the solar system and the position and changes for many thousands of the starry host.

(6273) E. A. T. asks: 1. What is the voltage of motor 641 wound for dynamo with No. 20 wire? A. We have no record of the factors, and do not recommend the motor as a dynamo. 2. Will small plating dynamo described in SUPPLEMENT, No. 720, give trouble by heating? A. No. 3. Are toothed washer armatures better than plain washers? A. Each has its own good points; one cannot be pronounced better than the other.

(6274) E. H. writes: 1. I have a small Wilmshurst influence electric machine and am much troubled with the plates breaking. They start in the middle and the crack extends until the plate comes in half. They are cemented on to wheels in the center of the plate. Can I stop it in any way, and if not is there any other cheap substance that I could use instead of glass. Would hard rubber do? The plates are ten inches across. A. Possibly the crack is started in your plates by the heat used in cementing. They should not act as you describe. Ebonite will answer instead of glass. 2. Could you tell me of any paint that would do to cover the glass in making Leyden jars instead of tin foil? A. No. Metallic bronze powder might answer, but would be very inferior if put on with varnish. 3. Could you light a small incandescent lamp, say 1, 2, or 3 candle power, with my electric machine? A. No.

(6275) A. M. F. writes: 1. If two insulated points (copper or other metal) are 1/2 inch apart, will a current actuated by a potential of 10,000 volts jump across. A. No. 2. If two points, insulated, are inclosed in a vacuum, and connection is made by quicksilver flowing over the two points, what action will a 10,000 volt current have on the quicksilver? Or, in other words, can quicksilver, under these conditions, be used to complete circuit? A. There is no such thing as a 10,000 volt or any other volt current. Voltage is a measure of potential, not of current. Quicksilver will conduct a current very well, although it is of rather high resistance.

(6276) N. M. B. asks: 1. In making armature for motor described in "Experimental Science," can I with advantage use a section of an iron pipe 2 1/2 inches internal diameter, 2 inches long, and iron 3/8 inch thick, instead of wire armature? A. No; it is inferior to wire. 2. Is there any convenient and reliable test for genuine amber? A. Hardly any can be given; its specific gravity 1.065 to 1.081, hardness 2 to 2 1/2, and its resistance to heat, fusing imperfectly at 550° Fah., are criteria. 3. Does the SCIENTIFIC AMERICAN SUPPLEMENT treat subjects more in detail than the SCIENTIFIC AMERICAN? A. The articles in the SUPPLEMENT are longer as a rule, and hence perhaps go more into detail. The SCIENTIFIC AMERICAN SUPPLEMENT represents the scientific life of the world in all departments better than any other publication known to us, and is an invaluable companion to the SCIENTIFIC AMERICAN.

(6277) J. N. T. asks: 1. Will No. 19 American gauge iron wire do for core of armature? A. Yes. 2. You state in body of article that No. 18 American gauge magnet wire is to be used on armature and in summary No. 16. Which is correct? A. Use No. 18 wire for the armature coils. 3. In your diagram you show that coils on field magnet are wound in shape of a pyramid. Must it be wound with one convolution less in each layer or must it be wound same as directions for armature? A. Our diagram shows the preferable way of winding the magnets. The pyramidal winding is not essential—it is convenient. 4. Can you tell me how to make a plunge battery to run the motor? A. See our SUPPLEMENT, No. 792. 5. Will a gravity battery run it? A. Not unless of very large size. We do not recommend it. 6. I have inspected a number of stove pipes made of galvanized iron, and in a number of cases I have noticed a deposit has run down the outside that has a brownish yellow cast. Can you please inform me what it is? Is it creosote from the smoke? A. We think it is largely empyreumatic matter (creosote, etc.)

(6278) G. P. McD. asks: Is there any hard non-conducting material that will stand the heat of an electric arc without burning for about 2 minutes? A. Lime, zirconia or magnesia approaches your requirements.

(6279) W. B. H.—False Scorpion on a House Fly.—The small brown A thropod, with flattened abdomen, and lengthened maxillary palpi, ending like a lobster's or scorpion's claws, and which fell from a house fly which Mr. W. B. Halsey, of Brooklyn, caught, is one of the false scorpions (Chelifer cancrivores, L.) This species is often found on the legs of flies and of other insects, allowing itself thus to be transported and perhaps feeding upon the red mite, Astoma (Trombidium) muscarum, Riley, which is so frequently attached to the common house fly. The Chelifer is not uncommon about old books and in dark places, where it feeds on mites and book lice (Psocus spp.) The female carries her eggs in a little bunch under the abdomen.—C. V. R.

(6280) F. J. M. says: In what part of bivalves are pearls found? I mean whether they are situated inside of the body of the pearl oyster, or outside between the body and the shell. A. It is believed that most pearls are formed by the intrusion of some foreign substance between the mantle of the mollusk and the shell, which, becoming a source of irritation, determines the deposition of nacreous matter in concentric layers until the substance is completely encysted.—Encyclopedia Britannica.

(6281) W. D. S. asks: Is there any trouble experienced with fire hydrants from freezing? And if so, what is the cause? Is it from difficulty in getting rid of the water in the hydrant after it is shut off from below? A. When fire hydrants are properly set with a cesspool and waste for draining the hydrant when closed, there should be no trouble from freezing. If the waste hole is not provided, or gets stopped, the hydrant will remain full of water, and will freeze solid in cold weather. In cold climates the valve of a hydrant should be 5 feet below the surface, with a pit sufficiently large to quickly absorb the water wasted, and from leakage of the valve.

Communications Received.

- "On the Sun." By T. B. Joseph.
"Theory of the Cause of Solar and Planetary Rotations." By I. E. C.
"The Eucalyptus." By J. F. J.

TO INVENTORS.

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INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

October 16, 1894,

AND EACH BEARING THAT DATE.

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

Table listing various inventions and their patent numbers, including items like Acid apparatus for making sulphuric acid, Alarm clock for doors, Bicycle attachment, and many others.