wheel antedated the steam engine, being driven by horse power variously applied. Denis Papin is given credit for the first steamboat, and the Scotchmen Miller and Symington are duly recognized as having built steamboats in 1788 and 1802. Fulton's "Clermont" on the Hudson River and Bell's "Comet" on the Clyde are shown and described, the description, by the way, being much superior to the woodcuts. The whole of the book is freely illustrated with woodcuts and half tone engravings of the various notable steamships of the age. The great steamship companies are taken up in their order, a brief sketch of the origin of each being followed by a description of the leading vessels. Portraits of the founders and chief promoters of the various companies accompany the various chapters. Particular attention is given to the development of steam-navigation on the great lakes. The text is written in a clear, concise style, well adapted to the subject.

GRAMMAIRE FRANÇAISE. By Baptiste Méras and Sigmon M. Stern. New York and Chicago: Henry Holt & Company. 1898. Pp. 312. 12mo. Price, cloth, $1.25.

FIRST LESSONS IN GERMAN. By Sigmon M. Stern. New York and Chicago: Henry Holt & Company. 1898. Pp. 292. 12mo. Price, cloth, $1.

FIRST LESSONS IN FRENCH. By Baptiste Méras and Sigmon M. Stern. New York and Chicago. Henry Holt & Company. 1898. Pp. 321. 12mo. Price, cloth, $1.

Perhaps there is no branch of pedagogy which has witnessed such remarkable changes in method within so brief a period as the teaching of modern languages. Prominent among the institutions in the United States which have introduced the new analytic method of teaching a foreign tongue may be mentioned the Stern School of Languages, in New York city. The three volumes which lie before us embody the principles of teaching which have earned for this institution an enviable position among language-schools.

In the "First Lessons" in German and French the foreign language is directly taught without the assistance of the native tongue, and, at first, without the intervention of grammatical rules. The language is learned by imitation and by constant use of the idiomatic forms brought forth in each lesson. Grammar is learned by induction, not by the memorizing of long rules and the innumerable exceptions to those rules. In the "First Lessons" the chapters are divided into a language division, oral exercises, grammatical exercises, and "Woerterklaerungen" in the German book, "Explication de mots" in the French book. For Americans who are not as yet familiar with either language, the "First Lessons" will be of immense service in acquiring that much desired familiarity.

Of the little Grammaire Française, written primarily for those having an elementary knowledge of French, much can be said in praise. Its information is presented so attractively, and its explanations are so clear and concise, that no difficulty should be experienced in studying a subject usually presented in a form repugnant to the average student.

ARMAGEDDON: A TALE OF LOVE, WAR, AND INVENTION. By Stanley Waterloo. New York: Rand, McNally & Company. 1898. Pp. 259. Price, cloth, $1.

Armageddon was the famous battlefield of the Hebrews, upon which, thousands of years after, Napoleon gained a victory over the Turks. The author of "The Story of Ab" lets his imagination travel through the first years of the coming century and gives a vivid picture of the conditions of the world, especially as regarding love, war, and invention. One of his characters invents an airship from which missiles can be thrown that end a war at once. The special interest centers in the reasons for an Anglo-American, in fact, an Anglo-Saxon alliance. A detailed description is also given of the working of a Nicaraguan canal by English and American money and engineers.

THE METRIC SYSTEM OF WEIGHTS AND MEASURES. Hartford, Conn.: Issued by the Hartford Steam Boiler Inspection and Insurance Company. 1898. Pp. 196. Tables. Price $1.25.

This little volume is convenient in size for the pocket and for general reference. It is printed on excellent paper with red edges and is bound in sheepskin with the title in gold. It is a very neat little volume and should command a considerable sale, as it contains everything that a more expensive book would have. The metric system is now so universally employed in foreign books and periodicals that much time is consumed by the American reader in transferring these units into their English and American equivalents; therefore a work of this kind will facilitate comparisons and enable the reader to work out problems, calling for the use of the metric system, in the shortest possible space of time. The first part of the book is devoted to the history of the metric system. This is the best history of the system that we have seen. We hope the time will soon come when the metric system will be compulsory in the United States. When its use has become obligatory, it will undoubtedly work a hardship to some, but in the end it will prove of great benefit to everyone, and the amount of time which it will save will be simply incredible.

PRACTICAL CARRIAGE AND WAGON PAINTING. By M. C. Hillick. Chicago, Ill.: Western Painter. 1898. Pp. 161. 8vo. Price $1.

This work is a full treatise on the painting of carriages, wagons, and sleighs, by a thoroughly practical man. The work embraces full and explicit directions for executing all classes of work, including painting, factory work, letTering, scouring, ornamenting, finishing, etc., with many tested receipts and formulas. The value of a tested formula cannot be overestimated. While we are not familiar with the subject of the book ourselves, we can judge the book sufficiently to say that it is a thoroughly practical and up-to-date book which no carriage painter should be without.

Business and Personal.

The charge for insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue.

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.

(7558) R. J. S. asks: Which is the better—Toepler-Holtz or Wimshurst machine? A. It is difficult to say which is the better, a Holtz or a Wimshurst machine. Both are good. The Wimshurst is the simpler machine. It is described in SCIENTIFIC AMERICAN SUPPLEMENTS 534, 647, 914, 948. Price 10 cents each, by mail. The Holtz machine is described in SUPPLEMENT, Nos. 278, 279, and 282. Price 10 cents each, by mail.

(7559) J. B. R. says: There is a paint made of coal tar which is a good paint for iron, tin, and felt roofs. Can you give me any information as to its good or bad qualities, or the effect it has on metal roofs? I would like you to give me the formula for making such paint out of coal tar. I want to manufacture and use such paint. A. After the paper is put on take coal tar and lime (burnt, but not slaked), boil them together in the proprotion of 15 lb. lime to 100 lb. tar. Put it on hot. To avoid the tar boiling over, stir the lime in the boiling tar very slowly. The mixture must always be heated before putting on. The lime and tar form a chemical connection, which is fireproof, cannot be melted by sun heat or dissolved by steam or hot water, and makes a smooth, glazed roof.

(7560) C. P. E. asks: What strength of current is required to light one 16-candle power incandescent light, and what is the most economical chemical battery which will furnish the required current? A. 16-candle power lamps are made for 50 to 110 volts. No primary battery gives as much pressure as 2 volts per cell; hence about 30 cells will be required to run a 50 volt lamp. The cost of such a battery and the labor of cleaning and recharging it frequently entirely prevents any use of batteries for lighting so large a lamp.

(7561) H. L. B. writes: I have diagrams for a 1,000 watt alternator which call for a field built up of disks of sheet iron with 8 internal poles. I cannot get punchings of this shape or size. Would several thicknesses of cast iron, ¼ inch thick, do? A. To use cast in place of wrought iron in a dynamo or motor will reduce the magnetic flux by about one-half. You would better make the sheets for field by hand than to sacrifice efficiency so much.

(7562) G. N. W. says: Please state a composition to coat the inside of tin cans to prevent the action of sulphuric and nitric acids on the tin. A. Use equal parts of gutta percha and paraffine melted together and used hot. The tin must be very clean and free from grease. Melt the gutta percha first over a water bath.

(7563) W. W. H. asks: 1. How far apart should condensing lenses in a magic lantern be placed relative to their foci? A. Place them nearly in contact. 2. Can acetylene gas be used for brazing, the same as other gas? A. We are not aware that such use has been made of acetylene.

(7564) F. W. B. says: I wish to be informed as to the process of bleaching tallow or making it white. A. In a copper boiler put ½ gal. water and 100 lb. rendered tallow; melt over a slow fire, and add, while stirring, 1 lb. of oil of vitriol, previously diluted with 12 lb. of water; afterward ½ lb. bichromate of potassa, in powder; and lastly, 13 pt. water, after which the fire is suffered to go down, when the tallow will collect on the surface of the dark green liquid, from which it is separated. It is then of a fine white, slightly greenish color, and possesses a considerable degree of hardness. Cleanliness is the great point in treating lard. The fat is freed from all adhering fleshy or discolored matter by cutting. It is then cut up into small pieces and washed until the water runs off clear. It is next melted by direct fire or steam coil until it becomes perfectly clear. It is run through close linen filters into the barrels, in which it is stirred until white and opaque, but only thickly fluid. The great point is when to cease stirring. It is then cooled and tightly covered. Air makes it rancid.

(7565) P. L. H. writes: I want to light one sitting-room with electric light means of a storage battery and primary batteries (chemical). Would you kindly inform me what type of storage battery and what kind of primary batteries you consider most suitable for such a purpose? I should like to have three or four lights of about 4 candle power or more if possible. A. The chloride accumulator is regarded as among the best forms of storage cells. To charge them by a primary battery is a slow process. Probably the gravity battery is the best for the work, since it is most constant in current. Salomon's "Management of Accumulators," price $1.50, gives much information on this subject.

(7566) P. A. M. writes: I have made the eight-light dynamo described in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 600, and would like to know how much and what size German silver resistance wire to use for regulating purposes, it being shunt connected. A. The field regulator for dynamo of SUPPLEMENT 600 should contain 10 ohms resistance, or 200 feet of No. 16 A. W. G. German silver wire.

(7567) B. O. B. asks: 1. Electricity is generated by means of alternators at a power house—water power, for example. This electricity is to be conducted to a place about fifteen miles distant. Suppose it is generated with a pressure of 4,000 volts; would it be well to step it up to 11,000 or 12,000 volts? A. Yes. 2. Could wire be insulated and still carry such a high voltage, and, if it could not, would harm come to birds which came in contact with it? A. Insulated wire should be used, of course, but even then, no one should come in contact with the wire. It would be bad for the bird which should bridge a wire to the earth. 3. Where can I find any information in regard to the Keely motor? Can you give me the names of any scientific or engineering men who have seen said motor work? A. It is supposed that Mr. Keely took the secret of his motor with him when he died. We cannot tell where you can obtain information about it.

(7568) W. H. D. writes: 1. In SUPPLEMENT No. 641, in "How to Make a Simple Motor," by Hopkins, it says in one place to use No. 18 magnet wire on armature and in another place it says No. 16. Which is the wire to be used, and, if No. 18, how much is to be used? A. In SUPPLEMENT No. 641 the size of wire in armature is No. 18. In one place it is misprinted. 2. What size storage battery would it require to run two of these motors? A. Use the same number of cells storage battery as of bichromate. The size of cell is determined by the length of time you wish to run your motor.

(7569) F. S. G. asks: Can you inform me how many feet of No. 18 B. & S. gage iron wire it will take to make the core of an induction coil 10½ inches long by 1 inch in diameter? A. About 460 pieces of No. 18 B. & S. bare wire are required to form a round bundle 1 inch in diameter, if all the pieces are perfectly straight. This makes a little over 400 feet.

(7570) R. McK. asks: Please inform me what size German silver resistance wire to use in making a rheostat for six cells of Edison-Lalande battery, type Q, 3 amperes and 7 volts? A. The maximum current capacity of type Q, Edison-Lalande cells is given as 9·5 amperes. If you wish to use 3 amperes, you will require 1·4 ohms in the external circuit. This includes the resistance of the rheostat and the apparatus, whatever it may be that you are using. We cannot tell you definitely what to use without knowing what you wish to do; but you will be about right if you take 10 or 12 feet of No. 20 bare German silver wire for the rheostat.

(7571) J. H. C. asks for the best receipts and manner of tempering springs, such as gun springs, for main spring and such like. Also receipt for tempering mill picks. A. To Temper Steel Springs. Heat to an even red heat, rather low, to prevent cracking; quench in lukewarm water. Place in ladle with enough tallow to cover it; heat until tallow burns with a large flame extending beyond ladle, then set the ladle aside and allow it to cool.—To Temper a Revolver Spring. Heat the spring to a cherry red, and plunge in linseed oil. To draw the temper to the desired degree, hold the spring over the fire and allow the oil to burn away; take away from the fire, put on more oil, and let it burn away. Burn the oil off three times and plunge in the oil again. The spring is then ready for use. Do not overheat the steel. Test the temper frequently with a file.—To Temper a Small Spring. Heat the spring to a light red, plunge in cold water; hold the spring over the flame of a small fire of shavings until it becomes black, then hold in the fire until the black disappears. Cool the spring by swinging it in the air.—There is nothing peculiar in hardening mill picks, only that they should be as hard as possible and moderately tough. The greatest care should be taken to avoid burning the steel. Where there is much of this work to be done, the picks can be heated in a pot of cherry red hot lead, then dipped plumb into clear water at about 60 degrees. Do not draw the temper. The hardening by the ordinary smith's fire can be well done if charcoal is used and not hurried through the fire. Hurry burns the corners. Much also depends upon the shape of the pick, as to whether it is a sectional or leaf pick, or a thick, solid pick, the last being the most difficult to manage on account of the sharp edge and thick back. They should be laid across the fire so as to heat the eyes as fast as the edge.

(7572) J. S. asks: 1. At 104 volts, 7,200 amperes, how many amperes does the high tension transformer take in the Tesla-Thompson high frequency coil as described in SUPPLEMENT, No. 1085? Can I wind this transformer so as to take only 2 amperes and still use No. 31 wire on secondary coil and step up to 10,000 or 15,000 volts? A. We regret to say we have not the data for variations of the transformer and coil of SUPPLEMENT, No. 1085. Any other ratio of stepping up the voltage can be employed. It is simply the ratio of the number of turns in primary and secondary. The number of amperes which will flow is influenced largely by the self-induction of the turns of the primary. 2. Please give me dimensions for a static machine that will give an 18-inch or larger spark if possible. A. For static machines, see SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 548, 584, 647, 914, 948, price 10 cents each. For an 18-inch spark, you will require plates 36 inches to 40 inches in diameter. 3. Can the length of the spark be doubled by using a large condenser? A. The mere length of spark of a static machine is decreased by the addition of a condenser, but its intensity is increased.

(7573) G. L. asks: What effect will a shrill whistle or any ordinary noise have on a gas light? Will it cause any commotion to the flame in any way? A. A shrill whistle or other sharp sound will produce a strong vibration in a flame which is pitched so as to vibrate in unison with the sound. See Tyndall's "Sound," price $2.50, for much interesting information on sensitive flames.

(7574) Buffon writes: I see in the SCIENTIFIC AMERICAN the description of an oxide of copper battery. I would like to know if this battery is capable of furnishing light to say ten or more incandescent 16 candle power lamps. A. No primary battery of any kind can be used to light 16 candle power lamps with economy. The labor of caring for the battery and cost of materials is prohibitory. The entire time of an intelligent workman would be needed for your plant, and a new set of materials every few days, varying with the number of hours of use per day. We can safely say no such outfit is in existence.

(7575) C. F. W. asks: 1. What advantage have telephones with bridging bells over those with series bells? A. The inductance is greatly reduced by putting the bells in parallel with the line, or bridging them, as it is called. 2. How many instruments having 10,000 ohm generators and series bells can be used on one short line? A. We do not know what the practical limit is. 3. How many with bridging bells? A. More than thirty bridging bells have been worked successfully across one line. 4 Can series and bridging bells be used on the same line. A. To an extent they can be, but it would be very poor economy. 5. What should be the resistance of ringer coils in series with 10,000 ohm generator? A. Ordinarily about 100 ohms. 6. Of bridging coils? A. About 1,000 ohms. Webb's "Telephone Handbook," price $1, and Poole's "Practical Telephone Handbook," price $1.50, are indispensable to everyone engaged in telephone work.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

JANUARY 10, 1899,

AND EACH BEARING THAT DATE.

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

Adjustable chair, D. E. Carter	617,638
Alarm. See Bicycle alarm. Fire alarm.	
Alcohol from aldehyde, purifying raw, C. Killing	617,460
Annunciator drop device, W. O. Meissner	617,[illegible]
Ash can, E. Nathan	617,44[illegible]
Automatic gate, C. M. Kortner	617,[illegible]
Automatic regulator, G. S. Neeley	617,598
Axle, P. Sharkey	617,[illegible]
Baling press, S. Hurt	617,531
Bandage machine, W. S. Ross	617,542
Bed, folding, J. Levy	617,586
Bell, bicycle, O. Price	617,602
Bicycle, L. B. Gaylor	617,329
Bicycle, W. L. Martin	617,535, 617,536
Bicycle alarm, J. M. Butcher	617,412, 617,413
Bicycle attachment, J. M. Gilbert	617,685
Bicycle coin controlled lock and holder, H. G. Shultz	617,693
Bicycle drive chains, protecting casing for, J. D. Farmer	617,683
Bicycle frame, J. A. Reed	617,604
Bicycle gear, W. Bowers	617,392
Bicycle gear, chainless, K. Brooks	617,635
Bicycle mud guard, R. A. M. Hermann	617,504
Bicycle or similar machine, J. A. Kelly	617,578
Bicycle propelling mechanism, G. F. Beebe	617,390
Bicycle propelling mechanism, W. J. Bosch	617,631
Bicycle saddle, M. J. O'Farrell	617,654
Bicycle support or rest, H. W. Roby	617,448
Bicycle valve, J. Harrison	617,337
Bit. See Driving and medical bit.	
Blind slat tenon, A. D. Miller	617,468
Blow overs, apparatus for removing, E. P. Gleason	617,333
Blow overs, device for removing, E. P. Gleason	617,334
Boat canopy, J. C. Harlow	617,571
Boiler. See Steam boiler.	
Boiler flue check, E. Hanstein	617,570
Boiler furnace, C. M. Day	617,521
Boiler supporting lug, G. H. Drake	617,524
Boiler tube cleaner, Forsyth & Bell	617,327, 617,439
Book, manifolding check, I. Moore	617,469
Boring and mortising machine, Parsley & Cottrell	617,473
Bottle, non-refillable, Hanlon & Reuber	617,395
Bottle washing apparatus, C. Kirschner	617,341
Bottles, etc., closure for preventing refilling of, A. A. Blise	617,629
Box. See Match box. Paper box.	
Box fastener, R. C. Kuhn	617,582
Brake. See Car brake.	
Braking and feeding apparatus, C. M. Day	617,523
Bridge and locking device therefor, draw, W. L. Sampson	617,606
Bridge and wharf floor construction, J. G. McMillan	617,471
Broom spreader, F. C. Bowen	617,556
Brush, N. F. Carryl	617,316
Bulkhead doors, apparatus for closing or opening, A. W. Montgomery-Moore	617,593
Bulletin board, F. E. D'Humy	617,574
Burner. See Gas burner. Vapor burner.	
Bustle, Taylor & Hammond	617,452
Calendar, memorandum, E. A. Armstrong	617,387
Camp chair and cane, combination, U. Smith	617,661
Can. See Ash can.	
Can filling apparatus, oil, R. Dreyer	617,566
Cane and folding chair, combined, N. Christianson	617,641
Car brake, E. B. & A. L. Gesche	617,650
Car door, grain, W. M. Linvill	617,444
Car engine, reciprocating, McIntyre & Baltzley	617,470
Car grain door, railway, B. W. Davis	617,642
Car, band, J. Milliron	617,344
Cars, portable horse stall for railway, J. P. Young	617,623
Carding apparatus, W. J. Donigan	617,481
Carpet stretcher and tacker, C. Gosemann	617,569
Cash register and indicator, E. B. Hess	617,485