some neighboring telegraph line. The alternating current hum is from some line, it may be farther off. It is doubtful if you hear wireless telegraph signals, although it is possible that you do so. The remedy is to put in a metallic return on your telephone line. All these sounds will then cease. 4. Does the covering of the high potential electric lighting wires completely protect them, or is it still dangerous to touch the insulation? A. The insulation of a wire is supposed to protect any one from the current which it is carrying. If the covering is in good condition, it will be sufficient to insulate the current.

(10544) I. C. D. asks: I should like to ask upon what do mosquitoes feed other than human blood? What attracts them to a residence? Are vaults favorable breeding places? A. Mosquitoes feed on blood in the imago state. They bite other animals besides man, as you may see by watching them. They fly about and into houses in search of food. Stagnant water is their usual breeding ground. They like cisterns of rain water near houses. They emerge from the water in the afternoon, dry themselves, and are ready to fly at dusk. Any receptacle with water standing in it will be used for bringing up a family of mosquitoes, even old cans for tomatoes and vegetables. All such things should be carefully picked up and put bottom upward where they will not get water into them, if one would be rid of the pest and danger of mosquitoes.

(10545) J. S. J. asks: I wish to ask you a probably very simple question in your estimation, thus: Will an electric light meter register the same at the end of a month when 4 C. P. lamps are used as it would had 16 or 32 C. P. lights been used, voltage being the same in both cases? A. An electric meter usually registers watts, or the product of volts and amperes. A 4 C. P. lamp cannot take as many watts as a 16 C. P. lamp, and a 16 C. P. lamp will use only about half as many watts as a 32 C. P. lamp. The meter only registers the watts which are used. Lamps of 16 and 32 C. P. use 3 to 4 watts per candle when the lamp is in good condition. This quantity the meter should show.

(10546) J. C. R. asks: Will you explain the following experiment? I set the front wheel of a bicycle in motion and then I placed one end of the axle on my first finger. The result: While it revolves on its axle it also tends to revolve in an orbit around me. If you revolve it with the axle vertical, it tends to revolve in an orbit as before. A. The bicycle wheel in your experiments is a form of gyroscope and revolves as this instrument does. You will find it explained in Hopkins' "Experimental Science," where many forms of the gyroscope are illustrated.

(10547) L. C. asks: 1. I have made a siderostat. The rather substantial mirror mount is attached to the shaft of a bicycle forewheel bearing. From a 4-inch pulley on this shaft a belt runs to an inch pulley on the hour sleeve of an ordinary clock. Could you suggest any wrinkles for reasonably accurate adjustment? It is intended for projection work in latitude N. = 45 deg. 30 min. 24 sec. A. You will require that the mirror of your siderostat should rotate in altitude 47 deg., the amount by which the altitude of the sun varies in a year. In December the sun will at noon be 21 deg. above your southern horizon, and in June it will be 68 deg. above your southern horizon. A gear and a rack will be as simple a method of adjusting the mirror as any. The rod can enter the room through an opening and give you the ability of adjusting the beam at any time. 2. What is the longitude of the places in the different time zones whose local mean time is taken for the standard time for the whole zone? A. The longitudes which are taken as the standards for the time zones in the Western Hemisphere are: 60 deg. west, colonial time; 75 deg. west, eastern time; 90 deg. west, central time; 105 deg. west, mountain time; 120 deg. west, Pacific time. This system is independent of the location of places or cities. Eastern time happens to differ less than four minutes from local time at New York. Chicago is about ten minutes from the 90th meridian. The central lines of the time sections are the meridians of even hours from Greenwich.

(10548) R. L. H. asks: Kindly publish in the columns of your paper whether or not the magnetism in a watch can be detected with an ordinary compass. If not, what is the proper method? A. To determine whether a watch is magnetized, place it on the face of a compass in a flat position, and turn it slowly around. If it is magnetized, it will in some positions repel the magnetic needle, turning it away from its north and south position, and in others it will attract the needle. If it is not magnetized, it will attract the needle feebly in some positions, and more strongly when the main spring is near the needle. There will be no repulsion in any position.

(10549) W. M. F. says: Please inform me what would take away the echo from a hall which is on the third floor of a building. I do not want to use a sounding-board, as it is too expensive. I have inclosed a small plan of the hall. A. We do not think a sounding-board would assist the acoustics of your hall. It is just as bad as a hall can be; a square box with a curved ceiling (if we read your drawing aright) and with a hard wall. An abundance of soft hangings along the side walls, such as heavy curtains upon poles, as if there were windows in the wall, is advisable. Such echoing halls are often much improved by stringing fine wires across them, several feet above the heads of people; in your hall this might be done nine feet above the floor. Another decoration can be added which would deaden the noises, by putting up an abundance of bunting or cheesecloth from the center of the ceiling to the sides and corners as when the hall is dressed for some patriotic occasion. A gallery with rising rows of seats would assist much in breaking up waves of sound. You cannot hope to destroy the echoes except by such means as these. The idea is to replace the hard surfaces of the wall by soft and yielding materials, and to break up the rectangular character of the room, and particularly the vaulted ceiling, as much as possible.

(10550) C. N. writes: It has been asserted recently in a photo-magazine that the beam of light entering the lens of a camera during the exposure of a plate for 1-1000 of a second is 185 miles long. (1-1000 part of the velocity of light taken at 185,000 miles per second.) It is stated in support of the allegation that the light entering the lens during an exposure has "its origin in the sun, and the beam, or rather the multiplicity of rays, hit the object, are reflected therefrom, and ultimately reach the plate." Without contesting the explanation of the action of light, is the explanation a sound argument that the length of the beam is 185 miles? If not, is the length merely the distance of the object—say 50 feet from the camera? A. The statement as quoted from the journal is quite correct. As much light strikes the plates as light travels in the time of exposure. A second exposure, and 185,000 miles of light waves strike the plate. The light does not stand still between a plate and an object 50 feet away. It comes from the object all the time. It moves as fast from the object to the camera as it does anywhere in the air. And the action of the light is cumulative upon the plate; 185 miles of waves beat against the plate and affect it 1-1000 as much as 185,000 miles of waves would do.

(10551) H. L. F. says: Can a locomotive make better time on a high mountain than on the sea level, provided that the grade is the same in each case? It appears as though if air is rarer there would be less back pressure, and for that reason the steam would act more powerfully on the piston rod. A. Whatever advantage in steam pressure a locomotive would derive at a high altitude from the reduced pressure of the air would be met by the reduction of the quantity of oxygen in the air. If back pressure is reduced by the former cause, the amount of air needed to consume a certain weight of coal would be increased by the latter. We also think that the steaming qualities would be impaired on the mountain. We have no data of actual runs at hand, but should not expect any great difference between sea level and the altitudes attained by ordinary roads.

(10552) M. F. S. says: Will you please give, in an early number of the SCIENTIFIC AMERICAN, a receipt for polishing horns for hat racks, etc.? A. First scrape with glass to take off any roughness, then grind some pumice stone to powder, and with a piece of cloth wetted and dipped in the powder, rub them until a smooth face is obtained. Next polish with rottenstone and linseed oil, and finish with dry flour and a piece of clean linen rag. The more rubbing with the stone and oil, the better the polish.

(10553) C. R. V. says: If a water pump, plunger type, should be made from a tube having a ½- or ⅝-inch bore, and plunger fitting snugly in same, check valve each side, etc., plunger moving or having a stroke of 4 inches, what would be the limit of revolutions per minute if fastened to a wheel and crank, that it would work satisfactorily? Would it be necessary to decrease the revolutions per minute in ratio to increasing the stroke to gain same results as a smaller or shorter stroke? What is the fixed rule for this? A. The most practical speed for the plunger of all pumps is about 100 linear feet per minute. This speed is irrespective of the size of the plunger and the length of the stroke. If this speed is much exceeded, the valves do not seat properly and the pump does not work smoothly. If the stroke is decreased, the number of revolutions per minute may be increased in the same ratio to keep the piston speed the same.

(10554) H. W. H. asks: Is there more expansion of a charge of air and gas when burnt or exploded in a closed chamber than in a jet in the open? What is the cause of a pipe snapping when steam is first turned in it? A. The result of the burning of a certain charge of gas and air is not dependent upon its being in a closed or open space. The same amount of heat and gases should be produced, whether the explosion takes place in the open or in a closed chamber. In the open air the resulting power cannot be used, and is soon dissipated into the space around. The noise produced when steam is turned into a cold pipe is due to the partial vacuum produced by the condensation of the steam. It is called a water hammer.

NEW BOOKS, ETC.

NAVIGATING THE AIR. By members of the Aero Club of America. New York: Doubleday, Page & Co., 1907. 8vo.; 259 pp.; numerous half-tone illustrations. Price, $1.65 by mail.

This book is intended to give a scientific statement of the progress of aeronautical science up to the present time. Opening with a preface on the "Aero Club of America" by Mr. C. F. Bishop, its president, and an introductory chapter by Carl Dienstbach telling in brief what has been done up to the present in all branches of the art, the book consists of twenty-three chapters proper by leading American aeronauts and experimenters.

A number of these deal with balloons and ballooning in all of its phases, and include articles by A. Lawrence Rotch, William J. Hammer, Augustus Post, Leo Stevens, and J. C. McCoy. Others, such as "The Use of Kites and Balloons in the United States Weather Bureau," by Oliver Fassig, Ph.D., and "The Direction and Velocity of Air Currents," by Charles Fiesse, will be found interesting by all aeronauts and students of meteorology. "The Coming Dirigible Airship" is a very interesting chapter furnished by Capt. Homer W. Hedge.

Turning now to the heavier-than-air craft, the reader will find a brief chapter by Octave Chanute describing "The Wright Brothers' Motor Flyer," and another short essay by the brothers themselves on "The Relations, Weight, Speed, and Power of Flyers." Israel Ludlow describes the experimental flights made with his man-carrying aeroplane, which was towed by a tugboat and by an automobile, and through an attempt at riding in which Mr. Ludlow received a serious injury. Dr. Alexander Graham Bell has furnished an extract from his address on "Aerial Locomotion," which was delivered before the Washington Academy of Sciences last December. This extract is entitled "A Few Notes of Progress in the Construction of an Aerodrome," and it deals with some of his experiments with tetrahedral kites. "How to Fly as a Bird" is the title of a very interesting chapter dealing with an aeroplane constructed along the lines of a Venetian blind. Phillips, in England, found that this arrangement of long, narrow, superposed planes was the most efficient, and Mr. Holland has designed a very interesting machine along these lines. Mr. William A. Eddy contributes an article entitled "Experiments with Kite-Sustained Aeroplanes," and Mr. A. M. Herring describes a simple propeller-testing device with which he has made several hundred tests of various propellers. "Rubber Motors and Flying Machine Models" is the title of a very interesting article by Mr. William R. Kimball. Mr. Kimball has experimented with numerous helicopter models, some of which are illustrated. Prof. William H. Pickering, of Harvard University, also discusses this type of flyer. Prof. David Todd, Ph.D., contributes an article on "Aerial High Speed," in which he discusses the problem of the hydroplane, or gliding boat, and the much more difficult one of the aeroplane. Charles M. Manly, who was the late Prof. Langley's assistant in his experiments with an aeroplane, makes some "Critical Remarks on Progress," and Dr. A. F. Zahn discusses Dr. Alexander Graham Bell's paper, and also furnishes an article on "The Law of Atmospheric Resistance of Wires and Rods." The book is illustrated with some sixty half-tone plates, a considerable number of which have already appeared in the columns of the SCIENTIFIC AMERICAN, while most of the other photographs are from the collection of William J. Hammer. This book will be welcomed by all aeronauts and others interested in the new science, as it gives a very good idea of the state of this science at the present time.

LA TÉLÉGRAPHIE SANS FIL ET LA TELEMÉCANIQUE. A la Partée de Tout le Monde. Par E. Monier. Preface by D. E. Branly. Paris: H. Dunod et E. Pinat. Second edition, revised and enlarged. Price, $1.

An excellent idea of this volume can be gained from the preface to it, written by Dr. Branly, the inventor of the coherer, the translation of a portion of which is given below:

"Although the explanation of the effects obtained does not present great difficulty, the authors who have endeavored to popularize the new methods have thought it necessary to leave them in a sort of half obscurity which imposes on the good nature of the reader, and probably increases his respect for science.

"In dealing with the elementary principles, M. Monier has succeeded in giving a sufficiently precise and complete idea of wireless telegraphy, and he should be congratulated on not having given way to the temptation of writing a heavy, abstract scientific work. Those who may have the good fortune to read his work will owe him great gratitude, for they will know those things that they should know about the subject without having had much trouble in learning them."

THE CONCENTRATION OF WEALTH. By Henry Laurens Call. Boston: The Chandler Publishing Company. 12mo.; cloth; 48 pages.

Mr. Call's paper, read before the American Association for the Advancement of Science, at Columbia College, New York, December 27, 1906, presents in very clear form, backed up by statistics, the fact that the working classes are obliged to struggle more strenuously for existence than formerly, and that the small dealer and the small producer have been entirely crushed out of existence by the trusts. This state of affairs is generally admitted as being a very grave menace to our national development. A remedy must be sought; yet we think Mr. Call's plan of relief too radical and too visionary.

LEHRBUCH DER GERICHTLICHEN CHEMIE IN ZWEI BÄNDEN. ZWEITE GÄNZLICH UMGEARBEITETE AUFLAGE. Bearbeitet von Dr. George Baumert, Dr. M. Dennstedt, und Dr. F. Voigtländer. Zweiter Band. Der Nachweis vom Schriftfälschungen, Blut, Sperma, u. s. w., unter besonderer Berücksichtigung der Photographie. Braunschweig: Druck und verlag von Friedrich Vieweg und Sohn. 8vo.; paper cover; 248 pages, illustrated.

Dealing with such problems only as admit of scientific and tangible solution, this work is of rare service to the criminologist. Various methods of tampering with handwriting are discussed and their detection explained, as are also described the microscopical examination and identification of the many substances that are apt to figure in criminal cases.

TYPES AND BREEDS OF FARM ANIMALS. By Charles S. Plumb. Boston and New York: Ginn & Co. 8vo.; cloth; 563 pages, illustrated. Price, $2.20 postpaid.

Not since 1888 has a volume devoted to the breeds of horses, cattle, sheep, and swine been published in America. The most recent work devoted to the breeds entirely omitted a consideration of the horse. This book differs somewhat from others that have preceded it, in that a number of breeds have received recognition for the first time, these being the ass, the mule, the angora and milch goats, all of which are important in certain localities. The more important breeds have received more minute mention than those that have had less influence in developing the given stock. The photographs of typical individuals, with which the text is freely illustrated, give a better idea of the desirable qualities of the different varieties than could be gathered from pages of descriptive matter.

MODERN METHODS OF TESTING MILK AND MILK PRODUCTS. By Lucius L. Van Slyke. New York: Orange Judd Company. 12mo.; cloth; illustrated; 214 pages. Price 75 cents.

Now that the full danger of impure milk, due either to unsanitary conditions in its production, or to adulteration, is realized, a knowledge of how to test milk is of value to everyone. The tests described by Mr. Van Slyke are chosen from those that do not require complicated apparatus or an undue degree of technical skill, and yet are reliable. The volume is written simply, so that by paying strict attention to details, the experimenter can acquire the necessary expertness with very little practice.

THE WALSCHAERT LOCOMOTIVE VALVE GEAR. By W. W. Wood. New York: The Norman W. Henley Publishing Company. 12mo.; cloth; 193 pages; illustrated. Price, $1.50.

Now that the enormous size of our modern locomotives makes the weight of the "Stephenson link motion" a factor that must be taken into consideration, engine builders are commencing to install a method of valve actuation that has been in satisfactory use in Europe for over half a century, namely, the Walschaert valve gear. The work by Mr. Wood treats of this gear from four different standpoints in as many divisions of his volume. The First Division is a simple analysis of the gear; the Second Division deals with designing and erecting the gear, and is suited for the master mechanic; the Third Division tells of the advantages of the system, and the Fourth Division is devoted to "Questions and Answers on the Walschaert Valve Gear." Numerous drawings accompany the text as illustrations to the various points emphasized; one set especially, showing the valve gear in nine different positions, makes the book a necessity among railroad shop men.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending May 28, 1907,

AND EACH BEARING THAT DATE

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

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Addressing machines, galley for, S. C. Cox. 855,097
Advertising device, G. L. Thorne..... 854,779
Agricultural implement, J. J. Hurt..... 855,247
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