NEW BOOKS, ETC.

FUNDAMENTAL PRINCIPLES OF CHEMISTRY. An Introduction to All Textbooks of Chemistry. By Wilhelm Ostwald. Translation by Harry W. Morse. Chemistry. By Wilhelm Translation by Harry New York: Longmans, Green & Co., 1909. 8vo.; pp. 349.

Prof. Ostwald's name is one to conju with in almost every branch of science and in chemistry particularly. It would be difficult indeed to mention a chemist who has contributed more to the advancement of his science in our time. or one who occupies a more eminent position In this book Prof. Ostwald has as a teacher. presented with remarkable ingenuity and simplicity the actual fundamental principles of the science of chemistry, their meaning and connection, and stripped them so far as possible of irrelevant additions. The book may be regarded as an attempt to work out chemistry under the form of a rational scientific system without bringing in the properties of individual substances. Hence, it has been necessary to restate elementary principles in a new light, and to bring out many new connections in regions hitherto untouched. That is why this work will be found different in its treatment from any other work on chemistry that has ever been written. The pedagogic value of the preceding can be judged only by the instructor of chemistry. But to anyone familiar at all with chemistry, its merit must be apparent from an it apparently is, grows faint from the impartial consideration of the book.

A HAND BOOK OF PRACTICAL CALCULATION AND APPLICATION OF REINFORCED CON-CRETE. Kahn System Standards. Compiled and published by the Engineering Department of the Trussed Concrete Steel Company. 12mo.; 126 pp.

The rapid growth of reinforced concrete construction makes necessary a hand book on design, similar to those in use for the ordinary classes of building material. The object of this hand book is to present to the designer tables and information in such form as to be made immediately available for use in actual designs, and at the same time to have these tables founded on scientific formulæ approved by our best engineering practice. The work as presented deals mainly with the Kahn trussed bar. The Kahn system of reinforced concrete, however, uses in its application several other types of reinforcement, including metal, hy-rib, cup bars, column hooping. rib lath, and rib studs.

HOW TO OBSERVE AND RECORD THE WEATHER.

(Continued from page 412.) mounted very nearly horizontally. These two instruments are usually supported as they appear in Fig. 3.

The minimum is read and then "set" by raising it gently until the index slides to of the receiver; so that a rainfall of one the surface of the alcohol (Fig. 5). The inch in the receiver stands ten inches maximum must be lowered to a vertical in the measuring tube. The scale by position before it is read (Fig. 4). After which the water is measured is graduthis reading is taken and recorded, the thermometer is then "set" by gently inch on the scale is really ten inches long swinging it up and down, until that amount of mercury is shaken back into the bulb that represents the difference in are only a few rains in a year when a temperature between the maximum and reading of one inch is observed. A fall of ing, Annealing and the present, if any. When no more mercury can be returned to the bulb, the thermon; a precipitation recording three or mometer is allowed to hang vertically, more inches is the exceptional record of and a second reading is taken. The mercury now gives the temperature at the by strong wind, vivid lightning, and aptime of reading; and this reading is re- parently heavy downpouring of sheety corded as "set maximum." In other words, the maximum thermometer serves | five to sixty or seventy hundredths of an in place of two thermometers. First, it \mid inch; while other rains, not so accomrecords the highest temperatures during the twenty-four hours; and secondly, disturbances, occasionally give a reading when it is set, it gives the temperature of an inch or more. Only an experienced at 7 P. M.—the time of reading.

EXPOSURE.—The marked variation between the readings obtained from ther- tion; and at best his guess is subject to mometers owned by private persons and the errors that so commonly invalidate Weather Bureau thermometers is due all suppositions. much more frequently to the difference in the manner of exposing them than to difference in quality, accuracy, or cost price. Thermometers exposed against buildings, on verandas, in windows, cannot often be trusted to give even approximately the true temperature of the atmosphere. For the air is not a stationary body, but is a continuously intertwisting, expanding, and contracting gas perpetually seeking an equilibrium, which is seldom even momentarily gained, than it is instantly lost. All gross inaccuracies attending exposure of thermometers are overcome by the shelter adopted by the Weather Bureau and provided to all observers (Fig. 9).

The outside dimensions are 42 inches long by 36 inches wide by 36 inches least height, and a second roof, 6 inches above, has two ends open. The air has free ac-

cess to the interior, for the four sides of the shelter are louvered; that is, composed of shutters. These shutters over lap, and have a pitch which enables them to shed water, and intercept also the rays of the sun, even when level at sunrise or sunset.

Shelters ought to be placed in a large open space, or upon a house top or other high building, where the circulation of the air is unimpeded. Correct temperatures are recorded only when the air flows freely round the shelter as well as through it. When the shelter cannot be situated in an open area, it may be set up on the north side of a building, with a space not less than four inches interven-

Sunshine does not give the average temperature of the air, but the highest; and so a thermometer, hung in the sun, falsifies or greatly exaggerates. If the temperature is 87, a thermometer in the sun will run up to 100 or more. The confiding observer, suddenly aware how hot imaginary heat, runs for a fan, and rapidly raises his bodily temperature by his vigorous gesticulations trying to cool himself.

Instruments that measure the depth of the fall of rain are neither well known by sight, nor is the method by which they record the rainfall very familiar.

Fig. 7 shows the essential parts of a rain gage, which are a receiver, a measuring tube, and an overflow. The rain is caught by the receiver, the bottom of which is funnel shaped, and falls into the measuring tube. Should the amount that falls be excessive, and more than fill the measuring tube, the excess overflows into the outer cylinder. The rain gage is designed to catch the precipitation of rain, and to facilitate the reading of the amount by mechanically magnifying the quantity. The diameter of a Weather Bureau rain gage receiver at the top is 8 inches; the diameter of the meas uring tube is 2.53 inches. In consequence of this difference in area, the water in the measuring tube stands ten times deeper than if spread over the area ated in hundredths of an inch; but that (Fig. 8).

In the normal temperate climate, there rain amounting to two inches is uncoma decade or two. Some rains, attended rain, give a reading as low as twentypanied by electric phenomena and aerial observer is competent to make a fairly close guess of the amount of precipita-

Snowfall is caught in the large cylin-(Continued on page 419.)

INDEX OF INVENTIONS

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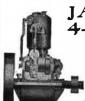
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	Car door hanger, Frame & Harrington. Car, dump, J. B. Rhodes Car fender, Youngberg & Parnall. Car, railway, H. S. Hart Car, steel box, Frame & Harrington. Car- ventilator, railway, J. E. Ward. Car wentilator, railway, J. E. Ward. Car wentilator, railway, J. E. Ward. Car wentilator, D. W. Snow Cars, passenger controlled register for street, O. Speckenbach. Card attachment, J. E. Raiph Carriage and wagon checking attachment, W. F. Young Carriers, automatic dumping device for elevated, T. O. Werner Cash register, W. J. McKee Caster, G. W. Bent. Caster, Self-adjusting, T. C. Luce Cat guard, Z. D. Underbill Causticizing tank, E. F. Parker Cement washtub mold, T. V. Galasse. Centrifugal extractor, W. Bartholomew. Chair, C. J. Travers Ohair, E. H. Milner Chair fan attachment, L. Hildreth Chairs, hinding means for, A. G. Walter Checkrein, J. S. Mirgan Churn, F. A. Grant Circuit hreaker, automatic, Lawrence & Torchio Clamp and rail brace, Griffin & Muth. Clasp fastener, M. Pugatsky et al. Clock, alarm, W. E. Porter Clothes line proj, W. Hetherington Clothes pounder. E. W. Lynch Clothes reel, R. W. Robinson Clutch, Hovey & Stebbins Clutch, F. P. Huyck Clutch, frietion, P. Evans Coasting record device, Hedley & Doyle. Coating machines, feeding and dusting device for M. Schenck Cock, compression, C. S. Frishnuth.	941,069 940,893 940,772 941,299 941,067 941,299 941,067 940,346 941,273 940,771 940,781 940,771 940,781 940,782 940,783 940,785 940,785 940,785 941,139 940,888 940,888 940,888 940,888 941,131 940,893
	Car door hanger, Frame & Harrington. Car, dump, J. B. Rhodes Car fender, Youngberg & Parnall. Car, railway, H. S. Hart Car, steel box, Frame & Harrington. Car- ventilator, railway, J. E. Ward. Car wentilator, railway, J. E. Ward. Car wentilator, railway, J. E. Ward. Car wentilator, D. W. Snow Cars, passenger controlled register for street, O. Speckenbach. Card attachment, J. E. Raiph Carriage and wagon checking attachment, W. F. Young Carriers, automatic dumping device for elevated, T. O. Werner Cash register, W. J. McKee Caster, G. W. Bent. Caster, Self-adjusting, T. C. Luce Cat guard, Z. D. Underbill Causticizing tank, E. F. Parker Cement washtub mold, T. V. Galasse. Centrifugal extractor, W. Bartholomew. Chair, C. J. Travers Ohair, E. H. Milner Chair fan attachment, L. Hildreth Chairs, hinding means for, A. G. Walter Checkrein, J. S. Mirgan Churn, F. A. Grant Circuit hreaker, automatic, Lawrence & Torchio Clamp and rail brace, Griffin & Muth. Clasp fastener, M. Pugatsky et al. Clock, alarm, W. E. Porter Clothes line proj, W. Hetherington Clothes pounder. E. W. Lynch Clothes reel, R. W. Robinson Clutch, Hovey & Stebbins Clutch, F. P. Huyck Clutch, frietion, P. Evans Coasting record device, Hedley & Doyle. Coating machines, feeding and dusting device for M. Schenck Cock, compression, C. S. Frishnuth.	941,069 940,893 940,772 941,299 941,067 941,299 941,067 940,346 941,273 940,771 940,781 940,771 940,781 940,782 940,783 940,785 940,785 940,785 941,139 940,888 940,888 940,888 940,888 941,131 940,893
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der by removing the funnel and tube. It is measured by first melting the snow, then pouring the water into the measuring tube, and ascertaining the quantity exactly as for rain. The measuring tube may be filled to the brim with warm water, and this poured on the snow, which will soon melt. The measuring tube is filled once, and then emptied; the remainder of the fluid represents the precipitation from the snowfall. A third way of arriving at the snowfall is to cut a section of snow by turning the receiver down over it where the snow is level and not blown away nor drifted by wind. The section is then carefully lifted by a small shovel or paddle board, melted, and measured. To learn approximately the depth of water in a snowfall, one-tenth of the thickness of the layer of snow is taken, ten inches of snow being estimated to contain one inch of water; but this gives too little if snow is wet.

EXPOSURE OF RAIN GAGE.—It will not do to set up a rain gage anywhere and expect to get exact measurements of precipitation, for the rainfall varies as much as thirty per cent below the normal according to location, owing to the action of wind currents, to the intervention of buildings, trees, or fences unduly near the gage. A roof must be at least sixty feet square, and level, ere the wind action on the side walls of a building is eliminated from influencing the rain gage in

Wind brakes are desirable around an instrument; the rule being that obstructions must be removed a distance equal to their height. For this reason, a fence surrounding a rain gage, four feet high and four feet away, will favorably overcome the wind, so that on a large open space more water will be caught by the receiver. For it is to be understood that the fluctuations of amounts caught between two rain gages near each other is to be ascribed to the wind. Consequently, rain gages protected at a suitable distance from the violence of the wind by bushes, fences, trees, or buildings catch more water than unprotected rain gages. This may be attributed partly to side currents whirling near the ground, and partly to the splashing of the drops of rain if they strike the gage through these intertwisting ground currents (Fig. 10).

RIVER GAGES.—A river gage is a scale by which the height of water in a stream may be measured; and the stage of water, whether low or high, may be observed and recorded. The Weather Bureau endeavors to get reliable data of all streams that affect inland navigation. It so happens that it is sometimes important to receive reports of the condition of the upper reaches of certain tributaries that are themselves unnavigable, but whose flooding may seriously imperil towns below, and materially swell the high water of the navigable rivers into which they empty.

A river gage can be a simple contrivance, and answer all practical purposes for creeks and small rivers. A graduated board extending below the lowest known level, fastened against a bridge abutment, is unexcelled, if it be convenient to read it at all times. The stone facing of an abutment itself may be smoothed and graduated, and be made to answer almost as well as an elaborate device (Fig. 6).

Strips of brass or of lead, securely inset or marks burned in, will do for graduations. The "feet" should be plainly numbered, lest in reading the gage, when the water is very high, a mistake is made. Great care must be exercised to graduate the sloping timbers of this style of gage; for which nothing less than an engineer's level is sufficiently accurate for governmental requirements. The illustration explains how this may be done with a carpenter's level.

The book in which the observations are written is called the "Meteorological Record." The pages of this record are ruled for date, maximum, minimum, range, set maximum, precipitation, prevailing direc-(Concluded on page 420.)

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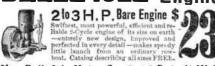
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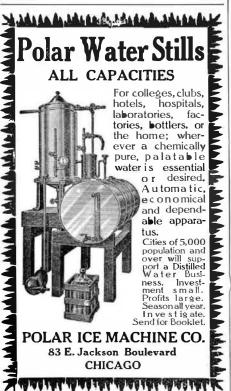
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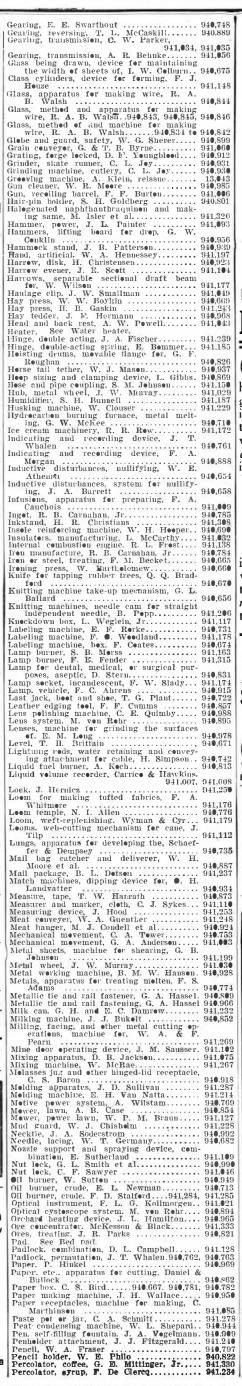




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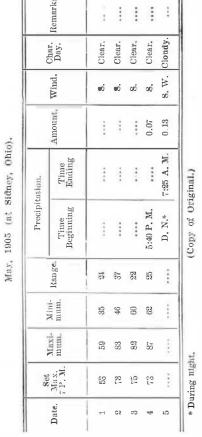
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361 Broadway New York tion of the wind, character of the day, and remarks.

Opposite the date is set down the reading of the highest and lowest temperatures; the difference is placed in the range column; the set maximum, as explained above, is the temperature at the time of reading. The time of beginning and the time of ending, with the amount of precipitation, is next entered in the record. The prevailing direction of the



wind is that direction from which the wind blows the most hours of the twentyfour. The character of the day refers to the sky, whether it is cloudy, partly cloudy, or clear. A sky of 70 per cent freedom, or more, from clouds is said to be "clear"; 50 to 60 per cent without clouds, is called "partly cloudy"; none to 20 per cent without clouds is accounted "cloudy." In the column for remarks may be entered notes descriptive of unusual phenomena, such as severe storms, meteors, killing frosts, remarkable depths of snow, floods in the streams of the vicinity, aurora borealis, deaths by lightning. To make the record valuable by the uniformity of its keeping, it is highly important that the readings be taken at the same hour each day, preferably at 7 P. M., seventy-fifth meridian time. A column for the water gage may be added, if the levels of a stream are to be ob-

TESTING THE MAN-ENGINE.

(Continued from page 413.)

is gaged by another attachment electrically joined to this clock. At the height of the subject's shoulder are arranged, upon a bar, two small hinged uprights. His hand is placed against one of these little posts and he is told to move it as quickly as possible in the direction of the other and to knock both of them down in the least possible time. The clock measures the time interval between the fall of the two uprights, and thus it is possible to time the swiftest movement of the arm in passing through a yard or foot of space. Men are found to be twice as rapid in this movement as women; Indians much slower than whites; negroes more constant than whites in rate of movement.

Another ingenious man-engine gage is a cylinder revolved by clockwork and covered with paper against which rests a marking point moved by air pressure exerted through a tube connecting with any number of attachments. This apparatus is used largely in comparing the workings of the body while under normal conditions and during hard thinking or strong emotion, or after great intellectual or physical effort. Thus when an

(Continued on page 421.)

Permutation lock. J. E. Le Myre
Pictures, pieces of music, and other per- formances, apparatus for producing audible moving, F. E. Thormeyer. 941,211 Pie rimmer, A. J. Perron 941,337 Pincers, lasting, W. Huck 941,254
Pincers, lasting, W. Huck
Pincers, lasting, W. Huck 941,294 Pipe, J. A. Irving 941,019 Pipe, L. Morris 941,027 Pipe coupling, automatic, Doane & Ceeder. 940,678 Pipes, etc., coupling for train, J. E. Forsyth 941,066 Pipes, flanging, C. D. Murdock 940,702 Plate attachment, pie, H. Isaacs. 941,074 Plates, making half-tone, J. Hartnet, Jr. 940,808 Pilers, wire skinning, G. W. Goodridge. 941,192 Plow, B. T. Bethune 941,224 Plow motor, W. T. Bennett 941,299
Plows weed turning attachment for T J
Plumbing trap, J. T. Costello 941,062
Potato vine cutter. G. P. Gregory
Draper 940,861 Preserving edible substances, A. J. Baldwin 940,848 Press. J. C. Fiddyment 940,961 Pressure generating, controlling, and apply-
Printer's galley, J. L. Lee
Propeller, O. P. Smith 940,743 Pulley, split metal, E. Philips 940,720 Pulp screening machine, J. F. Fisher 941,017 Pump N McCarty 940,703
Pump, W. T. McLean et al. 940,817 Pump, auto matic air, E. Reed 940,892 Pump, multiple impeller, A. E. Guy 940,871 Pump, vacuum, G. H. Zschech 940,913
Rail curve seat. J. E. Dougherty 941,312
Rail fastening device, Mason & Ohe 941.264 Rail joint, G. H. Barbour 90.7 77
Rall joint, G. H. Barbour 90.7 r7 Rall joint, J. Schushey 941.279 Rall joint, insulated, G. W. Whiteman 941.175 Rall tie, O. Carrell 941.307 Ralls, etc., instrument for measuring the cross section of, R. Barthelmes 941.297 Ralls, treatment of steel, F. H. Daniels 941.134 Rallvay autematic safety appliance, W. G. Daring 941 233
Rails, treatment of steel, F. H. Daniels 941,134 Railsvay automatic safety appliance, W. G. Daring
Daring 941,233 Railway, cable, G. F. Roughan 940,825 Railway crossing gate, automatically operated, W. J. Cook 940,786 Railway frog, H. G. Elfborg 940,863, 940,864 Railway rail structure, E. S. Nethercut 940,818
Railway frog, H. G. Elfborg
bers
Railway tie, F. Schumann 940,740
Ruzor, safety, F. Cupelli 941.231 Reel. See Clothes reel.
Refrigerator, J. H. Manon 940,700 Reinforced fabric, unvoven, Bayne & Subers 940,770 Repair device, adhesive, W. N. Shelton 941,047 Reversing mechanism, J. C. Ross 941,275 Ribbon feed mechanism, C. M. Crook 941,327 Rim holder, spare, B. B. Bradley 941,341 Rond construction and repair, S. G. Howe 940,971 Rock drill, H. J. Hibschle 941,251 Roundabout, vertical, W. A. Sullivan 941,252 Rogar, W. E. Rivers 941,042 Saggar, W. E. Rivers 941,038 Sash lock, Pearson & Lindquist 941,038 Sash lock, G. M. Blandford 941,038 Sash lock, Fearson & Lindquist 941,038 Sash operating mechanism, S. E. Cibulas 941,038 Saw drag, F. Hornquist 940,876 Saw swaging and shaping device, T. W. Cross 940,778 Scale, C. M. Sturgis 941,113 Scale, platform, M. H. Winslow 941,111 Scraper, Bingaman & Miller 940,666 Screen holding device, wire, Smiston & German 941,282 Self-cleaning rake, F. W. Wieman
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W. H. Hooper
Shaving mug and brush easing O Liles 940.883
Sheet metal bodies, apparatus for forming hollow, Adriance & Calleson
Shoe polishing machine, F. Humphreville. 941,343 Shoe rack, S. Hermann 940.812 Shoulder brace. J. U. Adams 940.775 Shoveling machine, W. Whaley. 940.997 to 940.997 Sign, R. J. Lackner 940.897 Sign, illuminated, F. Ward 940.847
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United States. Subsequent orders for cigars filled at \$7.00 for 100; \$3.50 for 50.

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Concrete **Reinforced Concrete**

Concrete Building Blocks

Scientific American Supplement 1543 contains an article on Concrete, by Brysson Cumiugham. The article clearly describes the proper composition and mixture of concrete and gives results of elaborate tests.

Scientific American Supplement 1538 gives the proportion of gravel and sand to be used in

Scientific American Supplements 1567, 1568, 1569, 1570, and 1571 contain an elaborate discussion by Lleut. Henry J. Jones of the various systems of reinforcing concrete, concrete construction, and their applications. These articles constitute a splendid text book on the subject of reinforced concrete. Nothing better has been published.

Scientific American Supplement 997 contains a article by Spencer Newberry in which practical notes on the proper preparation of concrete are given.

Scientific American Supplements 1568 and 1569 present a helpful account of the making of concrete blocks by Spencer Newberry.

Scientific American Supplement 1534 gives a critical review of the engineering value of reinforced concrete.

Scientific American Supplements 1547 and 1548 give a resume in which the various systems of reinforced concrete construction are discussed and illustrated.

Scientific American Supplement 1564 contains at article by Lewis A. Hicks, in which the merits and defects of reinforced concrete are analyzed.

Scientific American Supplement 1551 contains the principles of reinforced concrete with some practical illustrations by Walter Loring Webb.

Scientific American Supplement 1573 contains an article by Louis H. Gibson on the prin-ciples of success in concrete block manufac-ture, illustrated.

Scientifio American Supplement 1574 discusses steel for reinforced concrete.

Scientific American Supplements 1575, 1576, and 1577 contain a paper by Philip L. Wormley. Jr., on cement mortar and concrete, their preparation and use for farm purposes. The paper exhaustively discusses the making of preparation and use for farm purposes. The paper exhaustively discusses the making of mortar and concrete, depositing of concrete, facing concrete, wood forms. concrete sidewalks. details of construction of reinforced concrete posts.

Each number of the Supplement costs 10 ents.
A set of papers containing all the articles bove mentioned will be mailed for \$1.80.
Order from your newsdealer or from

MUNN & CO., Inc. 361 Broadway, New York City hand will record upon the paper the expansion and contraction due to breathing. Arthur MacDonald, an anthropologist of Washington, has used this instrument in studying the influence of intellectual and emotional states upon breathing and has found that, in general, concentration of thought, as in mathematical calculations or in reading, considerably decreases the breathing. Inasmuch as a falling off of oxygen in the blood results from decrease of respiration he suggests that this may partly explain the proverbial thin-blooded condition of deep students. Prof. Hugo Münsterberg, of Harvard, finds with such an apparatus that sudden pleasure makes the respiration weaker and quicker; displeasure, stronger and slower; excitement, stronger and quicker; acquiescence, weaker and slower. A similar apparatus when attached to the wrist writes a record of the pulse-beats, showing that pleasure heightens and retards them; displeasure weakens and accelerates them; and that excitement strengthens and quickens them.

There is connected to the same recording instrument a device having two rods which press between the lips and transmit a record of their slightest movements to the paper upon the revolving cylinder. Similar gages keep score on the movements of the larynx, soft palate, and tongue, and thus are all of the physical elements of voice measured while various emotions are being experienced. In one of these laboratories, an instru-

ment when attached to the hand, measures its involuntary movements in three directions-forward and backward, from right to left, or upward and downward; these three elements being recorded upon one revolving cylinder by a separate marking point. Experiments with this device indicate that the hand unconsciously follows the direction taken by the mind. When the subject commences to obey instructions to concentrate his mind on some object, above or below, or to his right or left, the record paper shows that the hand has been moved in the direction of that object. One test used by Prof. Münsterberg is to ask the subject to think attentively of a special letter of the alphabet and then spread in a half circle about the instrument cards bearing these letters. The average subject's hand will quickly record an impulse toward the letter of which he is thinking though he is unaware of it. Thus it will be seen that whither the mind leads the hand will follow unwittingly, and here we have an analysis of gesture and also of the phenomena of 'planchette" and "ouija board," as well as of the old-time parlor game of "mind reading"-really muscle reading.

These man-engine gages are revealing many other hitherto hidden truths concerning the mind's unconscious control of the body's movements and actions, and perhaps the prettiest demonstration of this is given by a device consisting of a great tray containing a man lying flat upon his back and balanced upon two knife blades at such a delicacy of poise that the least movement sets the tray to see-sawing. The subject is so placed that his center of gravity rests over the blades and so long as he relaxes his mind and holds his breath a spirit level shows but as soon as he commences to breathe it commences to rock itself in cadence with his inspirations and expirations. When the subject, in response to a command, commences to solve a problem in mental arithmetic the end of the tray toward his head sinks and that holding his feet rises, all of which indicates that when there is any call for special activity of the brain the blood rushes to that organ, as if to nourish thought. But now. if the subject relay his mind as before the tray will again balance horizontally. Next a little device which rapidly revolves two mirror-studded panels is placed before his eyes and may so fatigue

(Continued on page 422.)



Imagine for a moment that from twenty to forty years have been added to your life-that you have reached the age of fifty or sixty.

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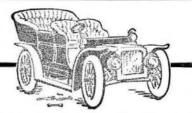
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Advertising in this column is 75 cents a line. No less than four nor more than 10 lines accepted. Count seven words to the line. All orders must be accompanied by a remittance. Further information sent on

request.
READ THIS COLUMN CAREFULLY,—You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. There is no charge for this service. In every case it is necessary to give the number of the inquiry. Where manufacturers do not respond promptly the inquiry may be repeated.

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WANTED. Manufacturer of enamel ware to man-ufacture a useful, patented article on royalty basis. Mrs. Sarah W. Hitchcock, 407 E. 3d St., Dixon, Ill.

Inquiry No. 8918.—For manufacturers of "Wydt's Electro-Cat ytic Sparking Plug."

PATENTS FOR SALE.

Inquiry No. 8987.—Wanted, the manufacturers of the van Winkle Woods & Sons, and the Weber power meters.

FOR SALE. Patent No. 900,457. An improved lathe rest for holding cylinders while being bored in an engine lathe. For further particulars address A. E. Whiting, Weston, W. Va.

FOR SALE.—Patent No. 201.971. Shock cushioning neck-yoke. Something new, nothing of the kind on the market. Sell outright, reasonable. Address William Kleineschay, Campbellsport, Wisconsin.

Inquiry No. 8990.—For information regarding shoes not made of leather but similar to the same and are as durable.

DO you want to manufacture electric heaters? The best patent that ever was issued in the United States is No. 12,7-2; for sale. Write Moise Landry, Hotel Carolyn, Turlock, Cal.

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THE SANBORN BAG LIFTER. A device to assist in handling bags of grain, cement, etc. Saves the fingers and avoids damage to bag. Sample sent free onrequest. H. & E. Sanborn, Forlland, Maine.

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FOR SALE.—Engine lathe, swings 9½ in., takes 25 inbetween centers. Complete with full set change gears to cut all size threads, \$to 40 in. Price only \$4350. Address L. F. Grammes & Sons, Allentown, Pa.

Inquiry No. 90:23.—Wanted, to buy silk machines from re-reeling, to the final process of making it into clothes.

FOR SALE.—An Alvin Clark 4-inch Equatorial Telescope, 5 eye pieces, prism, sun glass and tripod. Cost \$325.00. Sherman, 523 East 46th Place, Chicago, Ill.

Inquiry No. 9025.—Wanted, address of rubber manufacturers in Germany.

FOR SALE.—Patent 928.216. Improvement on pipe wrench. Simple in construction and automatic. For full information, write A. C. Pearson, Attorney, 37% Virginia Avenue, Indianapolis, Ind.

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TYPEWRITERS.

REAL REMINGTON, \$1875.—One machine only in new localities to secure desirable agent. Special agents prices supplied on all makes of typewriters. 3 ribbons \$1.00. Standard Typewriter Exchange, 23 Park Row, New York.

Inquiry No. 9029. — Wanted, catalogues and all information on machinery for braiding straw in manufacturing straw hats.

MISCELLANEOUS.

"LIGHT, HEAT, MAGNETISM AND ELECTRICITY are all one and the same thing." If you want to know what they are, send fifty cents for a copy of this pamphlet to A. M. Howland, El Paso, Texas.

Inquiry No. 9034.—For manufacturers of machinery that could reduce stumps to kindling wood.

W ANTED.—Designs for a successful single pulley drive for adaptation to machinery tools. Address A. E. Anderson, 79 Dearborn Street. Chicago, Ill.

Inquiry No. 9036.—Wanted, the address of the manufacturers of "Cycle Ball Bearing Suspenders."

HAIR GROWS when our Vacuum Cap is used a few minutes daily. Sent on 60 days' free trial at our expense. No drugs or electricity. Stops falling hair. Cures dandruff. Postal brings illustrated booklet. Modern Vacuum Cap Co., 556 Barclay Block, Denver, Colo.

Inquiry No. 903%.—Wanted, the address of the Chipman Electric Puritying Co.

LISTS OF MANUFACTURERS.

COMPLETE LISTS of manufacturers in all lines supplied at short notice at moderate rates. Small and special lists compiled to order at various prices. Estimates should be obtained in advance. Address Munn & Co., Inc., List Department, Box 773, New York. Inquiry No. 9042.—Wanted the address of Farney Safety Razor Co.

A LIST OF 1,500 mining and consulting engineers on cards. A very valuable list for circularizing, etc. Price \$15.00. Address Munn & Co., Inc., List Department. Box 773, New York.

Inquiry No. 9043.—Wanted the address of the manufacturers of mirrors that are transparent when the light in the rear is stronger.

Inquiry No. 9044.—Wanted to buy outfits neces sary for agate polishing. Inquiry No. 9045.—Wanted the address of the International Lumber and Development Co., manufacturers of hardwood.

Inquiry No. 9046.—Wanted, machinery used for scale shows his error. the manufacture of all kinds of fruit boxes, baskets and

Inquiry No. 9047.—Wanted the address of parties who install plants for making oxygen or ozone gas.

Inquiry No. 9048.—Wanted, address of manufacturers of metal table slides for extension tables.

Inquiry No. 9049. -Wanted, to buy rotary brushes suitable for a shoe shining machine.

Inquiry No. 9050.—Wanted, to buy equipment or manufacturing starch and denatured alcohol from otatoes, also manufacturers of equipments for vege-

Inquiry No. 9051.—Wanted to buy machinery for extraction of cotton seed oil on a small scale.

Classified Advertisements them that sleep will ensue. If so the and that holding his feet will fall, showing that in sleep the blood leaves the brain for the extremities. For a somewhat similar purpose is a large glass jar holding the arm, submerged in water. When any action of the mind causes the blood supply of the arm to increase or decrease—as the vital fluid is attracted toward or repelled by the brain—a marking point resting upon the paper of the moving cylinder above described is raised or lowered. With this has been determined that every emotional excitement speaks in the blood supply of every

How our states of mind unconsciously alter, also our powers of performing muscular work, are nicely demonstrated FOR SALE.—Pateut No. 936.000. A spring wheel to substitute the rubber-tire wheels actually used for automobiles. Address Luis I. Leon, San Juan, Porto ger, generally accepted by physiologists Rico. as the index to the body's muscular tone. A vise holds the forearm and hand outstretched, palm upward, upon a table, and the finger is harnessed to a cord hanging Inquiry No. 8996.—Wanted addresses of manufacturers of machinery for working orange wood manical and straightened it care sticks. raises and lowers the weight and at the same time a recording point worked by the cord keeps score upon a revolving cylinder. It has been discovered that if the subject concentrates his mind upon the effort of thus contracting his finger frequently and each time raises the weight with his utmost force, his finger will weaken and after a time will scarcely stir the weight. But if he continues to make this effort regardless of the results -without worrying about them-sooner or later the strength of the finger will begin to return and will move the weight almost as much as before. Thus he will continue with alternate periods of fatigue and almost complete recovery-a phenomenon akin to that of the athlete's "second wind." The experiment plainly demonstrates how fear of the results of effort will wear upon the muscles with which the effort is made.

> Among the most important of the gages which measure a man-engine's comparative powers of self-direction are those which record the acuteness of the senses -of those telegraph systems over which are dispatched, from the various objects to consciousness, the subtle messages upon which our total impressions of perceived objects are based—the raw material, in fact, out of which our every thought is manufactured.

Acuteness of hearing is tested by a device in which balls of cork fall a certain distance upon a plate of glass, the ear being distant so many inches. At the outset of this test the height from which the balls fall is so slight that the ear does not perceive their impact, but the length-of drop is gradually increased until the sound commences to be audible. The acuteness of each ear is measured upon a scale in units of the length of drop at which perception of the sound just barely commences. Then there is a gage measuring the ear's estimate of direction. A graduated horizontal circle surrounds the head and after the subject has been blindfolded a sound is made with a telegraphic sounder moved to the different degrees marked in the circle. The subject's estimates of the direction whence the sound issues are compared with its actual direction.

Acuteness of seeing is measured by devices too numerous for description. One of the most interesting exposes a long black surface across which extend three movable white strips. Two are placed a certain distance apart and the third, moving automatically, is stopped by the subject at the point which he estimates to be exactly between the others. A concealed

When his acuteness of smell is tested the subject sits before an instrument from which protrude into his nostrils a pair of tubes connecting with a metallic case shielded from his eyes. The examiner fits to the open end of the tubes various cylinders filled with substances of different perfume, whose strength varies

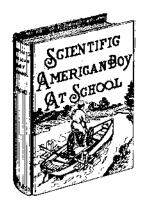
(Concluded on page 423.)

Three New Interesting Books

The Scientific American Boy at School

By A. RUSSELL BOND

12mo. 338 Pages. 314 Illustrations. Price \$2.00 post paid.



HIS book is a sequel to "The Scientific American Boy," many thousand copies of which have been sold, and has proven very popular with the boys. The main object of the book is to instruct how to build various devices and apparatus, particularly for outdoor use. The construction of the apparatus, which is fully within the scope of the average boy, is fully described and the instructions are interwoven in an interesting story, a feature which has assisted in making the "Scientific American Boy" so popular with the boys.

It takes up the story of "Bill" and several of his companions at boarding school. They form a mysterious Egyptian society, whose object is to emulate the resource-fulness of the ancients. Their Chief Astrologer and Priest of the Sacred Scarabeus is gifted with unusual powers, but his magic is explained so that others can copy it. Under the directions of the Chief Engineer, dams, bridges, and canal-locks are constructed. The Chief Admiral and Naval Constructor builds many types of boats, some of which are entirely new. The Chief Craftsman and the Chief Artist also have their parts in the work done by the Society, over which Pharaoh and his Grand Vizier have charge. Following is a list of the chapters:

Chapter I, Initiation; Chapter VI, Building a Dam; Chapter III, The Skiff; Chapter of Ancient Engineers; Chapter VI, Midnight Surprise; Chapter VII, The Modern Order of Ancient Engineers: Chapter VII, Surveying; Chapter XIV, Hunting with a Camera; Chapter X, Signaling Systems; Chapter XI, The Howe Truss Bridge; Chapter XVI, The Aunted House; Chapter XIII, Surveying; Chapter XXII, Water-Kites and Current Sailing; Chapter XXII, The Wooden Canoe; Chapter XXIII, The Bicycle Sled; Chapter XXII, A Geyser Fountain. Index.

Handy Man's Workshop and Laboratory Compiled and Edited by A. RUSSELL BOND

12mo. 467 Pages. 370 Illustrations. Price \$2.00 postpaid.



VERY practical mechanic, whether amateur or professional, has been confronted many times with unexpected situations calling for the exercise of considerable ingenuity. The resourceful man who has met an issue of this sort successfully seldom, if ever, is averse to making public his methods of procedure. After all he has little to gain by keeping the matter to himself and, appreciating the advice of other practical men in the same line of work, he is only too glad to contribute his own suggestions to the general fund of information. About a year ago it was decided to open a department in the Scientific American devoted to the interests of the handy man. There was an almost immediate response. Hundreds of valuable suggestions poured in from every part of this country and from abroad as well. Not only amateur mechanics, but professional men as well were eager to recount their experiences in emergencies and offer useful bits of information, ingenious ideas, wrinkles or "kinks," as they are called. Aside from these, many valuable contributions came from men in other walks of life—resourceful men, who showed their aptness at doing things about the house, in the garden, on the farm. The electrician and the man in the physics and chemical laboratory furnished another tributary to the flood of ideas. Automobiles, motor cycles, motor boats and the like frequently call for a display of ingenuity among a class of men who otherwise would never touch a tool. These also contributed a large share of suggestions that poured in upon us. It was apparent from the outset that the Handy Man's Workshop Department in the Scientific American would be utterly inadequate for so large a volume of material; but rather than reject any really useful ideas for lack of space, we have collected the worther suggestions, which we present in the present volume. They have all been classified and arranged in eight chapters, under the following headings:

I, Fitting up a Workshop; II, Shop Kinks; III, Soldering of Metals; IV, The Handy Man in the Fac

Concrete Pottery and Garden Furniture

By RALPH C. DAVISON

196 Pages. 140 Illustrations. 12mo. Price \$1.50 postpaid.



HIS work should appeal strongly to all those interested in ornamental concrete, as the author has taken up and explained in detail in a most practical manner the various methods of casting concrete in ornamental shapes. The titles of the thirteen chapters which this book contains will give a general idea of the broad character of the work. They are entitled:

I, Making Wire Forms and Frames; II, Covering the Wire Frames and Modeling the Cement Mortar into Form; III, Plaster Molds for Simple Forms; IV, Plaster Molds for Objects Having

Molds for Simple Forms; IV, Plaster Molds for Objects Having Curved Outlines; V, Combination of Casting and Modeling—An Egyptian Vase; VI, Glue Molds; VII, Colored Cements and Methods Used for Producing Designs with Same; VIII, Selection of Aggregates; IX, Wooden Molds—Ornamental Flower Pots Modeled by Hand and Inlaid With Colored Tile: X, Concrete Pedestals; XI, Concrete Benches; XII, Concrete Fences; XIII, Miscellaneous, Including Tools, Waterproofing, and reinforching

forcing.

The first two chapters explain a most unique and original method of working pottery which has been developed by the author. The chapter on color work alone is worth many times the cost of the book inasmuch as there is little known on this subject, and there is a large and growing demand for this class of work. The author has taken for granted that the reader knows nothing whatever about the material and has explained each progressive step in the various operations throughout in detail. These directions have been supplemented with half-tones and line illustrations which are so clear that no one can misunderstand them. The amateur craftsman who has been working in clay will especially appreciate the adaptability of concrete for pottery work, inasmuch as it is a cold process throughout, thus doing away with the necessary with the former material. The book is well gotten up. and is printed on heavy glazed paper and abounds in handsome illustrations throughout, which clearly show the unlimited possibilities of ornamentation in concrete.

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Valve gear, Cbubb & Mullen 941,188 Valve, rotary discharge, O. Mantius 941,024 Vaporizer, oil, J. F. Malcom 940,981 Vegetable cutter, J. Spenko 940,831 Vegetable cutter, J. Moreau 941,161 Vegetable masher, B. litsuka 941,071 Vebicle brake, automatic, C. E. Crumm 941,061 Vehicle canopy top, J. Reid 941,272 Vehicle, dümping, W. H. Phillips. 940,722 Vehicle, motor, J. A. Charter 941,124 Vehicles, gear actuating mechanism for motor, G. H. Lanchester 941,261 Vehicles, pole attaching means for, J. G. Maloney 940,983 Velocipede, G. C. Worthington 941,121 Vending machine, W. H. Laraway 941,073 Ventilator, J. M. Rose 941,171 Vests, trousers, etc., means for adjusting, Vests, trousers, etc., means for adjusting, Vests, trousers, etc., means for adjusting, Vests, M. Schmidt 941,272	
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Wagon, camping, D. L. Hardin	
Wallet, J. R. Cardwell	
Washboard attachment, M. G. Sarno 940,890 Washer. See Steam wesher	3
Washers. See Steam washer. Washers, bearing for sterilizing, W. Bartholomew.	۱۱,
Washers, bearing for sterilizing, W. Bartholomew 940,665 Washing machine, Lewis & Graves 940,88; Washing machine w. E. Devore 941,344 Washing machine attachment, S. Bowman 941,305 Washtub cover, A. Adams 941,055 Watches and clocks, individual hair spring stud index for, C. Teske 940,75 Water bag, F. A. Gordon 941,24 Water closet, etc., tank, G. H. Bailey, 940,951, 940,951 Water closet, ventilating, C. H. Tbompson 940,83; Water heater, G. Madsen 940,83 Water heater, G. Madsen 940,98 Water heater, G. H. Wade 941,21 Water power applying apparatus, F. T. Newberg 10,000	
Washing machine attachment, S. Bowman. 941,30 Washtub cover. A. Adams 941,05	1
Watches and clocks, individual hair spring stud index for. C. Teske 940.75	0
Water bag, F. A. Gordon	5
940,951, 940,955 Water closet, ventilating, C. H. Thompson. 940,83	2
Water fountain, B. Kaminsky 940,873 Water heater, D. Hanlon 940,683	5
Water heater, G. C. Madsen	0 5
Newbery 941.09	١٥
Web folding mechanism, E. Klein	3
C. E. Sweet	9
Welding tool, W. A. Sparks	3
A. Pollard	5
tions thereof, G. A. Pittman 941,20 Wheel guard or fender, vehicle, J. O. Rob-	4
erts	9
Water power applying apparatus, F. T. Newbery	1
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basco 940,82	5
Yeast compound, dry, J. E. Yost 940,97	i

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SEALED PROPOSALS (in duplicate) will be received at the office of the Chief Clerk of the Bureau of the Census until December 22, 1909, at 2:39 p. m., at which hour the bids will be opened, for furnishing all material and labor nevessary to the construction and installation of metal cases in the fireproof vault of the Bureau of the Census, at Washington, D. C. Plans and specifications may be procured upon application to the Chief Clerk of the Bureau of the Census. The right is reserved to reject any or all bids. Address proposals to E. Dana, Durand, Director of the Census, Department of Commerce and Labor, Washington, D. C.

WANTED.—Third-class assistant inspectors of engineering material at \$448 per diem. An examination will be held at the Navy Yard, Brooklyn. N. Y. and the Office of the Naval Inspector of Ergineering Material, Homestead Steel Works, Munball, Pa., December 15, 1969, to fill the above positions. For furtherinformation address "Commandant, Navy Yard, Brooklyn, N. Y.," or "Naval Inspector of Engineering Material, Homestead Steel Works, Munball, Pa."

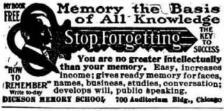
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The Middle West Number SCIENTIFIC AMERICAN

On December 11th, 1909, the Scientific American will issue a number devoted entirely to the wonderful Mid-dle West region of the United States, a number which will set forth broadly and lucidly not only the agricultural interests of that region, but also those larger engineering undertakings which are des-tined to transform the Middle West, in part at least, into a manufacturing ter-

With that object in view the Middle West Number will publish articles on the following

HOCENT

I. The Chicago and Gulf Waterway.—Anilustrated description of Chicago's drainage canal, an entineering work which stands without a parallel in the world.

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VEST NUMBER

II. Chicago as a Railroad Center.—Chicago is the greatest railroad center in the world. 111. The Wonderful Grain Trade of Chicage.

—Chicago is an enormous wheat bin, into which much of the grain raised in the middle West is poured.

IV. Shipping on the Great Lakes.—Most of the iron orethat is now smelted in Pennsylvania is mined in the middle West. To transport it to the blast furnaces of the East at a cost which will enable American steel makers to compete with foreign steel makers, it has been necessary to devise a new kind of lake transportation. Ships of 10,000 and 12,006 tons burden bave been constructed which convey ore at small cost through the Great Lakes, and which are without a counterpart anywhere in the world.

VI. Freighting on the Mississippi.—Freighting on the Mississipul is a more important industry than most of us may realize.

VII. The Steel Industry.—One of the greatest steel plants in the world is that which has been built at Gary.

VIII. The Freight Subway System of Chicago.—Chicago can boast of a rational system of handling freight by means of subways.

IX. The Water Supply of Chicago.—Chicago's source of water is Lake Michigan. The city is supplied with water by means of a tunnel which extends two miles out into the lake. X. Reclaiming Arid Lands.—The United States Government has under way many irrigation projects for the purbose of reclaiming lands which are arid, but which will clossom if properly watered.

through the Great Lakes, and which are without a counterpart anywhere in the world.

V. The Handling and Shipment of Iron Ore.—
The above-mentioned fact that iron ore is mined in the middle West and smelted in the East has necessitated not only the construction of special freisht-carrying steamers, but also the designing of special machinery for loading and unloading the ore from the steamers.

X1. Harvesting the Grain of the Middle West.—Farms that cover not acres but square miles, rops that agreet the original to simply bushels, but car-loads, have rendered it necessary to plant and harvest on an upprecedented scale in the middle West. The incompact of the middle west in the middle with the second of the middle west. The incompact of the middle west in the middle west in the middle west. The incompact of the middle west in the middle west in the middle west in the middle west. The incompact of the middle west in the middle west in the middle west in the middle west. The incompact is the middle west in t

The Middle West Number will be more than twice the size of the regular SCIENTIFIC AMERICAN. It will be lavishly illustrated. It will be contained in a colored cover which strikingly depicts Chicago's grain elevators at work. Order from your newsdealer or from

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with the distance to which the cylinders are moved back beyond the tube ends. This distance is marked by a scale upon which is read the point where the subject first perceives the perfume, and thus is the acuteness of each nostril determined.

Taste is measured by solutions of sugar, quinine, tartaric acid, salt, etc., which are more and more diluted with water until the tongue—to which they are applied with a dropper—no longer perceives the flavors; and the weakness of the solution marks the acuteness of the subject's sense of taste.

When testing for acuteness of touch, the examiner holds what appears to be a rimless wheel from whose hub radiate a score of slender spokes. From the free end of each hangs a thread of slenderest cocoon fiber suspending a small disk of elder pith. All of the disks are of equal size and apparently of equal weight, but in reality are surmounted by tiny buttons of metal which give them different weights; varying from one to twenty milligrammes (1/65 to 20/65 of a grain).The subject being blindfolded, the examiner, commencing with the lightest disk, successively lowers one at a time upon the subject's skin. Several of the lighter disks are not felt, but soon there is applied one that is, and the weight of this lightest disk perceived determines the subject's sensitiveness. There are additional devices for measuring the various other elements of feeling, such as perceptions of weight, temperature, pressure,

INDOOR BED TENTS.

(Concluded from page 416.)

in the room, and two persons can sleep in the same bed, while only one uses the tent.

This, so far, has been a most successful device for admitting fresh air on sanitary principles to a sleeping room. It enables one to breathe the outside air without danger of being chilled or exposed to drafts and colds. Some who tried this tent felt that the fresh air was too cold in storms or wet weather, and they use an outside awning, which can be adjusted at pleasure. With these tents the body can be kept warm, while the head, which is toughened to the cold, can obtain the stimulation it needs. This last can be modified by a Canton-flannel hood, which can be made so it will come down over the shoulders, and have a face opening large enough to leave the eyes, mouth, and nose exposed. The cape of this hood covers the shoulders if by any accident the bed clothes slip off them.

Fresh air allays sweating, provides good sleep-these tents are capital for insomnia-and helps the appetite. The cold air increases resistance to disease, purifies the blood, and prevents consumption, three reasons why one should breathe it at night. The theory of keeping the head in the cold and the body warm is that the body loses eighty to ninety per cent of its heat through the skin by radiation, and cold is bracing only when it comes in contact with the respiratory organs. On this theory, no good results are obtained when the feet and lower limbs get cold. On a cold night one can move away at least twelve inches from the window and still be under the tent, get perfect circulation, and be sure of getting up in a warm room in the morning.

Not so many years ago Americans as well as foreigners were afraid of the night air, though we have no such malarial districts as around Rome. Fortunately, we are learning to know better, and workers in Little Italy and the slums where foreigners congregate in cities are pushing the fresh-air movement with all their might. Fresh air and plenty of it is the best preventive for consumption, the grip, bronchitis, common colds, and pneumonia. Some sort of inside window tent and paper napkins, tissue paper, or pieces of gauze which are now used by some people for handkerchiefs, are destined to go a long way toward keeping people well, warding off disease and the