Photographing the Moon at Lick Observatory.

The great telescope of the Lick Observatory is not only a powerful instrument for seeing the heavenly bodies, but it is also a powerful camera for photographing them. The object-glass is three feet in aperture, and it was, until very recently, the largest in existence. A supplementary lens, thirty-three inches in diameter, is provided, which can be attached to the telescope just in front of the thirty-six inch lens. When it is so attached, the combination becomes a great photographic camera—the largest in the world—which is especially suited to do certain classes of work. One of the things which it is particularly well fitted to do is to photograph the moon, and for the past few years considerable time has been devoted to making negatives of the moon during the course of a lunation—from new to full moon. As the shadows on the moon change materially during a few hours, it has been necessary to make a set of such pictures every hour or so, and the whole series gives a very perfect representation of the lunar topography as it is now. By comparing these photographs with others previously made (Rutherfurd, Draper, De la Rue), and more especially with photographs which will be made in the future, it will be easy to detect any important changes which occur in the lunar surface. It is certain such changes must occur, since gravity is constantly working on the moon, as on the earth, to pull down existing structures; and it is to the study of changes that we have to look for a more intimate knowledge of lunar conditions. An accurate plastic representation of the moon's surface is a prerequisite for such a study, and it will be seen that the photographs of the Lick Observatory, when properly examined, afford every desired datum. Most of the photographs made by previous astronomers were on too small a scale and were not precise enough in definition to afford the necessary accuracy. The enlargements from our negatives meet every want, and enable us to construct a satisfactory map of the moon on a scale of ten feet to the moon's diameter. One inch on such a map corresponds to about seventeen miles, or one seventeenth of an inch to one mile. A map of California on this scale would be about forty-one inches long.

The original negatives made in the focus of the large telescope are a little over five inches in diameter. They are extremely beautiful as mere pictures, especially when copied as transparencies on glass. Everything that the telescope will show is contained in these originals, but the scale is still so small that minor features cannot be distinguished. A mile on the moon is only a few thousandths of an inch on the negative, for example. Hence they must be enlarged to be of use. Without enlargement they are of small scientific value. —Dr. Edward S. Holden, in McClure's Magazine for October.

A New System of Medical Treatment.

We all know what homeopathy and allopathy and hydropathy are, but probably few know what the new "pathy," isopathy, is. The word is applied to the medical treatment of diseases of the several organs of the body by the corresponding organs, or preferably extracts of them, of animals. Thus diseases of the brain would be treated by an extract of the healthy brain of an animal, such as an ox; diseases of the spinal cord by an extract of the spinal cord of some animal, and diseases of the heart by an extract of the heart of an animal. While the system is comparatively new to modern scientists, it actually is "as old as the hills." Two thousand years ago it was hinted at by Hippocrates, was mentioned by medical writers in the middle ages and was described at length fifty years ago by a German physician named Hermann. The system died out and attracted little or no notice until about two years since, when it was revived by Dr. William A. Hammond, a celebrated physician of Washington, D. C., Surgeon-General of the United States Army. By a long-continued maceration of the brain, the heart, the spinal cord, etc., for a year or more, by processes that have been fully described in medical journals, principles contained in these organs, but in an inert form, are extracted and modified in a manner similar to that effected within the human body.

These principles are rendered practically indestructible by time. Dr. Hammond says that organic beings possess the power of assimilating from the nutritious matters which they absorb the peculiar pabulum which each organ demands for its development and sustenance. The human body, as well as the body of any animal, makes no mistake in such selection. The brain absorbs such principles as are necessary to sustain its strength; so do the heart, the liver, the muscles, etc. In certain diseased conditions these organs lose the power of selecting the principles which they need, and sickness and sometimes death ensues. The object of the administering of all medicines is to hold disease in check while nature effects a cure. Medicines in themselves cannot cure. Nature alone can do this. The principle of isopathy, therefore, differs from that of other "schools" essentially in the manner in which the remedies are to be introduced into the physical tissues requiring them. The established schools introduce the medicines generally through the stomach, thus requiring more or less time for their active principles to be assimilated with the organs affected. In isopathy the remedies are brought into immediate contact and assimilation with the organ, without being required to pass through the digestive system. This is the main difference, though there also is a difference in the character of the materia medica. It is by the direct injection into the blood of the peculiar matter that an organ requires that isopathists hope to do away with the performance of many vital processes which now are accomplished only by the expenditure of a greater or less amount of vital force.

As an illustration, suppose a person to be suffering from an exhausted brain brought on by overwork. No matter how judiciously the patient attempts to live up to the rules of health, the condition continues. If the concentrated extract of the brain of a healthy animal be injected into the blood of the patient, the pabulum which the organ requires is at once supplied. This rule is applicable to every other organ. Just what success will attend the workings of the new system is conjectural. It is claimed that as far as it has been tried it has been followed by a surprising amount of success. The new system, if it eventually prove to be as great a success as at present indicated, will not interfere with the established schools of medicine. It will be an aid to all and may be adopted by the homeopath and the allopath alike without the abandonment of any of the fundamental principles so dear to the adherents of the different schools.—Troy (N. Y.) Press.

Penny-in-the-Slot Gas Meter.

This is a gas meter in which automatic vending mechanism is used, so that a user of gas may purchase a certain amount of gas by simply placing a coin in a receiver, which is so connected to the meter as to allow a certain number of feet of gas to be used for a given amount. For instance, the apparatus is arranged to receive silver quarter dollars, and is so connected to the meter mechanism that, if the gas is selling at $1.25 a thousand cubic feet, the mechanism would be so timed that upon the insertion of the quarter dollar, 200 feet of gas could be used before the mechanism of the meter would be stopped; five quarters can be fed into the apparatus, so that $1.25 worth of gas, or 1,000 feet, can be paid for at one time. By this means a person can pay for gas in small installments, rather than wait until the sum accumulates.

RECENTLY PATENTED INVENTIONS.

Railway Appliances.

REFRIGERATOR CAR.—Charles S. Hardy, San Diego, Cal. This invention provides means for supporting ice, the devices being adapted to fold out of the way in the car when not in use. The ice box is formed of folding hinged members, a drain guard below the box swinging into and out of position for use. The parts fold and unfold in a simple and secure manner, and provision is made to prevent the drippings from soiling the contents of the car, and to avoid the clogging of the drain pipe, while the whole apparatus is designed to promote economy in the use of ice.

SWITCH.—Charles L. Lincoln, Brooklyn, N. Y. To hold the switch point or rail steadily in position without actually locking it, and in a convenient and easy manner, is the object of this invention. The switch rail is also so arranged, in reference to the car track, that it will lie normally in closed position, and when opened by mechanism on the car will be automatically shifted back by contact with the car wheels. The switch rail has a rearwardly extending ribbed tail piece, and a contact block is held to slide at right angles to one of the siding rails, there being a lever connection between the contact block and the tail piece whereby the pressing out of the block actuates the tail piece and moves the switch rail.

SWITCH WORKING MECHANISM.—This is a further patent of the same inventor, for a mechanism carried by and operated from the car, whereby the switch may be opened or closed at will by turning a crank and operating a treadle on a moving car. Beneath the car platform are vertically swinging levers carrying shifting devices, pivoted hangers supporting the levers and a cross bar connecting the hangers, while on the car is mounted a crank shaft having operative connection with the cross bar.

CAR FENDER.—William L. Shockley, Colorado Springs, Col. This fender is held beneath the forward end of the car and the car platform, and is normally supported so as to pass freely over any ordinary obstruction on the track, but it may be instantly released and caused to spring downward into close contact with the track, even though the car is running very fast. The fender itself is a sort of flat, skeleton scoop, having side straps, and the mechanism by means of which it is held up or thrown down on the track is of a simple and inexpensive character, readily operated from the car platform.

CAR BRAKE.—John C. Miner, Smyrna, Neb. This invention dispenses with the use of brake beams, and provides a simple mechanism for setting the brakes quickly and firmly against the wheels, while at the same time track brakes are forced down upon the rails to slightly lift the truck and prevent the wheels from sliding. Vertically movable racks, operated by a lever and gear mechanism, are carried by the car truck, and brake shoes carried by a portion of the racks engage the car wheels, while a second set of brake shoes carried by the other racks are adapted to engage the track rails.

Electrical.

TELEGRAPH KEY AND SOUNDER.—Philip D. Cox, Jasper, Fla. This invention provides an extremely simple and efficient instrument in which the key is pivoted on a threaded stud whose lower end screws into the base to which are attached the sounder and magnet, the stud extending through a hole in the key, above and below which are nuts, a spring resting on the lower nut and pressing the under surface of the key.

FRICTION BRAKE.—Bergen Davis, Newark, N. J. This device consists of a magnetized drum with a periphery composed of pole pieces separated from one another by a diamagnetic material, electromagnets connected with the pole pieces having consecutive pole pieces of opposite polarity, while a metallic strap or shoe is held for attraction to and frictional engagement with the drum. The amount of braking effect, from a gentle friction up to locking the wheels, is controlled by a rheostat on the platform of the car.

CONDUIT FOR ELECTRIC RAILWAYS.—Michelangelo Cattori, Rome, Italy. Combined with corresponding adjacent sections of each of the conductors is a rotatable circuit closer having a surface partly of insulating and partly of conducting material, with stationary contact pieces adapted for continuous sliding contact with the surface of the circuit closer, the contact pieces and the insulating and conducting portions of the circuit closer being so arranged that the adjacent sections of one conductor are connected when the corresponding sections of the other conductor are disconnected. A high degree of safety is thus assured and sparking is avoided, while one or both rails of an existing track may be utilized as conductors.

Agricultural.

DISK CULTIVATOR.—Andrew L. Brock, Lockhart, Tex. This machine may be used with or without supporting wheels, and in operation cuts stalks or trash while cultivating the ground. The disks are substantially cup-shaped, and turn in brackets or hangers, each disk frame carrying a disk cultivator at each end, the disks being adjustably connected with their frames and also with the main frame of the machine. The disks may be set in any desired position to throw the dirt to or from the rows, and may be carried close together or farther apart to regulate the width of the strip to be cultivated.

Miscellaneous.

RAISING SUNKEN VESSELS.—Edward M. Arnold, Pawtucket, R. I. According to this invention a vessel employing the improvement has a short chain cable firmly attached to it about amidship, there being a strong button on the end of the chain, and attached to the button is a coil of rope at the end of which is a float or buoy, the latter rising to the surface when the vessel sinks and indicating the locality. A specially devised grapple is employed to send down the rope to which the buoy is attached, the grapple sliding over and engaging the button, when the hawser, to which the grapple is attached, may be drawn upon and a firm connection established with the sunken vessel, to be afterward raised by the ordinary means.

CREVASSE CLOSER.—Mathias A. Laska, New Orleans, La. For closing breaks in dams, etc., this invention provides for the pivotal connection of an arm with one of the posts already driven into the ground, and for its detachable connection with one of the posts to be driven, the arm being adapted to carry the post down into the water and hold and guide it into position, permitting of properly driving the post from above. A skeleton frame is also provided to pass between adjacent posts, cross bars projecting at the ends to rest on the front faces of the posts to hold the frame in place.

PUMP.—Charles Rumley, Helena, Mont. This is an improvement on a formerly patented invention of the same inventor, providing a powerful pump of simple construction, but with a valve of less surface motion, and a spurcut-off, which, in connection with the valve, absolutely prevents leakage. There is no intricate mechanism in the pump to become clogged, so that it may be used to pump water filled with mud, sand, etc., and it may be worked in either direction, its ports being used alternately as suction or discharge ports, according to the movement of the pump piston.

PUMP VALVE.—Truckson S. La France, Elmira, N. Y. To prevent the valve packing from being forced into the throat of the port is the main object of this invention, which provides a simple form of construction especially designed for the valves of steam fire engine pumps. The valve seat has an outer bearing and a central bearing on which is a pad or cushion, and fitted to the outer bearing is the valve proper, under which is a supporting plate arranged to abut against the cushion of the central bearing when the valve is closed, the supporting plate being formed to nearly fill the port or valve space when the valve is closed. The packing or valve proper is thus relieved of pressure, and a thinner or weaker rubber may be employed without danger of its breaking down.

LATCH AND LOCK.—John MacLachlan, West Hoboken, N. J. A tubular case, consisting of two semi-cylindrical sections, receives and supports in working condition the improved latching and locking devices designed by this inventor, in very compact, simple, and cheap form, quickly applicable to any door of moderate thickness, the improvement affording an excellent knob latch and lock combined, or a latching device alone, if this is preferred. A lock of this kind may be conveniently adapted for the use of different keys.

GRATE.—Lee R. Andrews, Bath Beach, N. Y. This grate consists of a series of revoluble cylindrical grate bars, strips forming bearings for the shafts of the bars, which are connected by gear wheels with each other. A perforated hood is removably held on one of the strips to cover the gear wheels, the hood having dovetail parts engaging grooves in the bearings of the shafts to lock the latter in place on the strips. The improvement gives the operator complete control of the burning fuel, permitting of conveniently raking it and removing clinkers.

WIRE SUPPORT FOR BEDS OR SEATS.—Gustav Dominick, Cologne, Germany. This invention provides, within a suitable frame, two series of springs running crosswise of each other and essentially parallel to the sides of the frame, the springs of one series being fastened to the frame at both ends, while the springs of the other series are secured at one end only, the other ends being guided in eyes formed preferably by twisting the springs of the first series into coils. The springs of the two series supplement each other in their action, each series yielding to a certain extent, and a mattress made of springs so arranged yielding to the slightest pressure.

CLEANING MACHINE.—William Hebb, Cambridge, Vt. This is a machine especially designed for cleaning pails, tubs and similar vessels. It has a platform with standards in which vertically moves a slide adapted to be raised and lowered to move the brushes into and out of the pail or other vessel to be cleaned, a shaft journaled in the slide carrying a crank arm, by which, through a bevel gear connection, the heads carrying the brushes are revolved. The vessel to be cleaned is locked in position by a clamping and centering device.

CHOCOLATE DIPPER. — Cyprien Gousset, New York City. This is a device to be used for dipping cream drops into a chocolate solution to give them the desired exterior coating. It consists of an open frame crossed by parallel wires, a series of cups formed of serpentine or zigzag wires crossing the frame and resting at their upward bends upon the cross wires, while a second series of serpentine zigzag wires at right angles to the first series have their downward bends crossing the downward bends of the first series. It is adapted to carry a large quantity of cream drops and hold them so they cannot be displaced until perfectly coated.

FOOD SCREEN.—John H. Rhoads and Gustave H. Spannagel, Nokomis, Ill. This is a cheap and simple screen to be placed upon a table to cover the food and all else on the table. The screen frame which holds up the screen may be easily knocked down and snugly packed. It consists of a horizontal base frame, open at one end, arched bars pivotally connected therewith, and a longitudinal rod connecting the arched bars at the top of the arch, locking bars securing the frame in position to hold up the screen.

TEETHING RING.—Martin L. Metzger, New York City. This invention provides for the connection of an unbroken ring with a rubber nipple in a simple and inexpensive manner, whereby the ring will be very durable. The stem is bent upon itself to form two opposing members, a transverse aperture in the lower bent portion receiving the ring, to insert which the opposing members are sprung apart and the ring forced down to its socket.

CIGAR PACKAGE. — Samuel Roman, Montreal, Canada. This package is preferably triangu-

lar, in which shape the cigars are held by a practically rigid frame or band, which holds them in this position whether in or out of the box. The latter is triangular in form and has a base plate and one fixed end piece, the other end piece and two side pieces being hinged. A clasp holds the box closed, and by releasing it, one of the end pieces and the two side pieces may be let down and the cigars well exhibited.

DESIGN FOR A COLUMN.—Amos A. Fenn, Leavenworth, Kansas. This column is angular in form, with plane ends, intermediate of which the several faces have a special style of ornamental configuration.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention. and date of this paper.

NEW BOOKS AND PUBLICATIONS.

ALLEN'S NATURALIST'S LIBRARY. Edited by R. Bowdler Sharpe. (A) A HANDBOOK TO THE MARSUPIALIA AND MONOTREMATA. By Richard Lydekker. (B) A HANDBOOK TO THE BIRDS OF GREAT BRITAIN. By R. Bowdler Sharpe. London: W. H. Allen & Co., Limited. 1894. Pp xvii, 302, and pp. xix, 342. Price $2.40 each.

These beautiful volumes, the illustrations all being in colors and exceedingly numerous, cannot be adequately reviewed by us. The one on birds contains over thirty beautiful plates relating to ornithology and oology. The one on marsupials and monotremes, treating of the curious animals of Australia and their relatives in other parts of the world, has thirty-eight plates of the same description. The illustrations of the kangaroo and the wallaby alone will be found of especial interest. There are other volumes to follow, and a most valuable series will be the result. The volumes remind us of the old time and widely popular "Naturalist's Library," to which it is a worthy successor.

WATER OR HYDRAULIC MOTORS. By Philip R. Bjorling. London: E. & F. N. Spon. New York: Spon & Chamberlain. 1894. Pp. xii, 287. With 208 illustrations. Price $3.50.

The different types of hydraulic motors, from the old fashioned water wheel to the modern turbine, reciprocating and oscillating engines and hydraulic rams, are the subject of this work, which not only describes these different classes of machines with adequate illustrations, but treats of measurement of water and of general hydraulics. It has an excellent table of contents, both of the matter and the illustrations, and an index.

MECHANICAL DRAWING. Projection Drawing; Isometric and Oblique Drawing. Working Drawings. A condensed text for class room use. By Walter K. Palmer. Columbus, Ohio: Charles B. Palmer. Price 80 cents.

When a young man finds that he can draw, he is apt to consider himself a draughtsman, while he may be ignorant of the manipulation of instruments and appliances. There are definite mathematics in drawing, and this little work, designed for the use of teachers, develops the fundamental points which should be understood by a draughtsman, some of which are, doubtless, comparatively little studied.

TAN PILE JIM; OR, A YANKEE WAIF AMONG THE BLUENOSES. By B. Freeman Ashley. Chicago: Laird & Lee. Pp. 259. Illustrated. Price cloth, $1; boards, 50 cents.

This prettily printed and illustrated book gives a picture of life in the British provinces. The author evidently is of a humorous bent, and by means of numerous illustrations the text is fully illustrated.

THE WORK OF HERTZ AND SOME OF HIS SUCCESSORS. Being the Substance of a Lecture delivered at the Royal Institution. By Professor Oliver Lodge. London: The Electrician Printing and Publishing Company, Limited. Pp. 58. No contents, no index. Price $1.

We are glad to find the classical researches of Hertz put into book form. The matter is largely experimental and is elaborately illustrated, so that it will be of more popular interest than the dry statement of the work otherwise would be. Unfortunately, it lacks both index and contents, either of which would add materially to its value.

ALTERNATING CURRENT WIRING AND DISTRIBUTION. By William Le Roy Emmet. New York: The Electrical Engineer. 1894. Pp. 76. No index. Price $1.

We are very glad to see this little work. It will help electricians to recognize the fact that there is more concerned in the distribution of alternating currents of electricity than Ohm's law. The short table of contents of the book gives an excellent idea of its range of topics. The omission of an index is, of course, something to be regretted.

ELECTROMAGNETIC THEORY. By Oliver Heaviside. Vol. I. London: The Electrician Printing and Publishing Company, Limited. 1893. Pp. xxi, 466. Price $5.

Mr. Heaviside has won a fine reputation by his mathematical work on the theory and application of electricity. The title of this book states that it is on the electromagnetic theory. The preface indicates that the author has a pretty good knowledge of human nature and appreciates, to say the least, his own value. His plea for the recognition and correct statement of electrical units is excellently put and makes really amusing reading. The esprit of the author may be deduced from the title of one of the sections on "the nature of antimathematicians," the introduction being divided into sections. His plea for mathematics is most amusingly and graphically put. We strongly recommend the book to aspiring electricians, and hope that it will induce many to take up the mathematics of the subject who otherwise would be content with its general treatment.

PHYSICAL LABORATORY MANUAL FOR USE IN SCHOOLS AND COLLEGES. By H. N. Chute. Boston, U. S. A.: D. C. Heath & Co. 1894. Pp. xvii, 213. Price 80 cents.

Harvard University has led the way in requiring of its applicants for admission the execution of a course of practical physics as one of its alternatives. This excellent little book describes such a course. Numerous illustrations are given, and the different topics in physics are excellently treated.

PRACTICAL WORK IN GENERAL PHYSICS. For use in schools and colleges. By W. G. Woollcombe. Oxford: At the Clarendon Press. 1894. Pp. xii, 83. Price 75 cents.

We have in this volume another of the works on physical experiment, in which is covered the elementary or initial portions of physics. The book takes the form of a description of experiments, and some fifty different examples are given and elucidated as to their performance.

TWO OF A TRADE. By Martha McCullough Williams. New York: J. Selwin Tait & Sons. 1894. Pp. 206. Price, cloth, $1.

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OCTOBER, 1894.—(No. 108.)

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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.

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(6266) J. H. J., Shanghai, China, writes: Will you please tell me through the columns of the SCIENTIFIC AMERICAN how the rule for ascertaining the fall of the earth's surface for any given distance is obtained? The rule I believe is as follows: For the first mile a fall of eight inches; for other distances, multiply by the square of the distance in miles. A. The rule as stated by our correspondent is an approximate one only, and is derived from the formula of the United States engineers, viz., square of the distance in feet divided by the earth's equatorial diameter in feet equals the amount of curvature in feet. This being for curvature alone, a correction for refraction must be made, making the formula $(1-2m)\frac{D^2}{2R}$ in which D=distance in feet, 2 R=twice the earth's radius in feet, and m=0·075 in feet.

(6267) F. M., Kansas, writes: I am desirous of digging a well. I have already made three attempts and failed in each case. The circumstances are these. At the depth of about 17 feet there is a 6 foot layer of sand and gravel, the first two feet of which appears to be quicksand, the remaining 4 feet coarse sand and gravel, after which comes blue clay. We attempted to drive a wooden curb as we dug, but as fast as we removed the sand inside the curb it would fill in from underneath. The water also bothered considerably; we tried pumping it out, but after an hour's pumping, the sand would wear the leathers in the pump, so that it would cease to act, and as before stated, we had to abandon the attempt. Some parties advise me to have a brick and cement wall built on a circular wooden frame, the same to be sunk as sand is removed, but I cannot see why this should prevent sand coming in underneath any better than the wooden curb. Also how can the water be kept out of the way while removing the sand? Advice on the above matter will be greatly appreciated. A. An oak cage curb is the proper guard for protecting the operation of laying the foundation of your stone curb. This may be made of a ring of oak plank cut in segments and lapped to complete two layers for stiffness, also a narrow ring of pine for the top, to be removed when the stone curb reaches it in building. On the outside nail 1½ inch oak strips 5 or 6 feet long, according to depth it is desired to sink the curb below the water line, the strips nearly touching each other to make a strong but not tight curb. Place the wooden curb at the bottom on the water line and build up the stone curb, resting upon the bottom wooden ring as tight as possible without cement and so that the stone work will form a resisting arch circularly against the earth pressure, care being taken to protect the well from an earth cave from the water line to the top by braced sheeting of boards. When the stone curb is finished to the top ring, the work of excavating may be done by shovel as far as the water will allow without pumping. A large sand auger should then be used to continue the taking out of the sand evenly all around the inner edge of the curb to allow it to settle level. Any disposition to tilt may be counteracted by excavating at the high side only. No water should be taken out other than contained in the sand in the auger. A sand auger may be made by any sheet iron worker, from No. 16 iron, by making a cylinder about 9 inches in diameter and no higher than 9 inches, as that is about the depth of sand that can be taken in at one operation. The bottom of the cylinder to be fitted with lips like an auger, but extending around and just overlapping, with an opening from the center to a depth of one inch at the outer part. A strong forked iron stem about 6 feet long with an eye at the top for a wooden handle will complete the auger. Then by screwing the auger into the sand, with a little manipulation like handling a post auger, which by the way will make a good sand auger with a sheet iron guard pipe to keep the sand from washing off. In this way of excavating without removing the water the curb may be settled down to the desired depth. After arriving at the layer of coarse sand, if the curb sticks by the packing of the sand, a pole or rod of iron may be thrust under the lower edge of the curb ring to loosen it, or by removing the upper cage ring the stone curb may be carried up to increase the weight. In this manner by careful management substantial well curbs may be sunk to considerable depth in water-bearing quicksands and gravel.

(6268) N. C. F. asks: Will you kindly give me the true explanation of the reason why a sheet iron heater placed over a kerosene lamp will heat a room better than the lamp will without the heater over it, and why the same flame inside of a sheet iron drum in the form of a gas stove will give more heat than the same flame without a stove over it? A. There is no absolute increase of heat or of heat units by the use of the iron drums as stated; but there is something in the susceptibility of the nerves to the effect of low radiant heat from enlarged metal surfaces, nor is the phenomenon confined to metal alone, as attested in our boyhood, when we enjoyed the low radiant heat from the sunny side of a barn in the cool autumn weather. The radiant heat from the lamp diverges in all directions, and only the area of the body intercepts it, while the extended surface of a sheet iron drum intercepts and converts the entire divergent radiant heat into convergent radiant heat from a large surface, and its effect upon the nerves is to make us feel warm without an actual increase of heat energy from the lamp.

(6269) A. P. H. S. asks for a formula for treating wood patterns to give them the smooth black appearance. I have tried a number of paints and pigments, but thus far have been unable to find anything that will answer. A. Stir refined lampblack into brown shellac varnish until it contains enough of the pigment to cover well. Strain through cotton cloth. Apply two coats. After the first coat is dry rub down with fine sand paper or with emery paper. After the second coat is dry rub with hair cloth or a bunch of horse hair, and finally apply a thin coat of brown shellac with a camel's hair brush.

(6270) L. H. E., Kansas, says: On September 20, at 6:30 o'clock in the morning, the sun shines in a tunnel, or if you were to stand at one end and look through you could see the sun at the day and hour mentioned. What is the per cent of the grade of the tunnel and how do you get it? A. On September 20 the sun is on or near the equatorial plane, and for the assumed latitude of 40° north the sun's path is inclined 50° from the plane of the horizon at sunrise. At that date it rises about 14 minutes before 6, which added to the time of observation, makes it 44 minutes on its course from the horizon. Then 44′ × by the cosine of the latitude=33·7′, the vertical altitude. As 4 time minutes are equal to 1 degree $\frac{33{\cdot}7'}{4}$=8·42 degrees, to which should be added 0·11° for refraction at that altitude, making 8·53 or 8° 31′, the sine of which is 0·148, or nearly 15 per cent as the grade of the tunnel.

Communications Received.

"The Bronze Age in Europe." By W. H. K.
"On Flying." By D. G. E.
"On the Moon." By H. W. E.
"On Bird's Eye Maple." By W. J. B.
"Astronomy as It Is." By H. C.
"A Submerged Atmosphere." By A. E. R.
"On a Remedy for Red Ants." By J. E. B.
"On Phenomena of Regeneration." By E. K.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

October 9, 1894,

AND EACH BEARING THAT DATE.

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

Agricultural machine, convertible, S. J. Conkwright 527,363
Air brake systems, locking stop cock for train pipes of, J. T. Eldridge 527,327
Air compressor, pedal, J. North 527,248
Album, C. Jaeger 527,204
Amalgamating apparatus, electric ore, J. C. Ludwig 527,150
Amalgamator and separator for recovering precious metals from ores, Reading & Rigby 527,076
Anchor, H. A. & H. A. House, Jr 527,061
Anchors, means for raising, H. A. & H. A. House, Jr 527,060
Animal trap, C. L. Brown 527,044
Axle box, pedestal, car, S. J. Van Stavoren ..... 527,087 to 527,091
Axle box, roller bearing, J. D. Mattison 527,121
Ball and socket joint for use in mills, W. N. Hartshorn 527,282
Bandage machine, W. N. Crabtree 527,365
Bank, registering savings, C. A. Richards 527,200
Barge, freight, A. K. McRae 527,215
Barrel, knockdown, H. Ellis 527,328
Basting and roasting pan, J. Stroud 527,362
Bathing apparatus, S. S. Goldman 527,057
Battery. See Electric battery.