RECENTLY PATENTED INVENTIONS.

Pertaining to Apparel.

TROUSERS-STRETCHER.—R. C. MITCHELL, Fayetteville, Ark. This invention has for its object the provision of features of construction for a trousers stretcher which afford a light, strong, shapely and very convenient device of the character indicated, that is adapted for manufacture from metal rapidly and perfectly by machinery, at a moderate cost.

NECKTIE.—M. PRAGER, New York, N. Y. More particularly this invention relates to neckties which are tied or knotted by the wearer. An object of the invention is to provide a tie, cravat, scarf or similar article of apparel which can be tied or knotted by the wearer, which tends to retain its normal shape for an extended time and which does not show creases or fold marks.

GARMENT-HANGER. — A. K. BOWMAN, Greensburg, Pa. The invention is designed particularly to improve that form of hanger that consists of a hanger bar adapted to support a coat, skirt, or other garment, and a suspension hook in the hangers as generally made, being fixidly secured in place, which makes the hangers bulky, and hence inconvenient for packing, etc. The object is to provide a hanger having a detachable hook, thus materially economizing space in the packing, shipping, and storing of the hangers.

Of Interest to Farmers.

CULTIVATING-SCRAPE. — A. F. DAVIS, Marion, Ala. The scrape is adjustably connected with a plow stock in such manner that the former can be run shallow or deep as required, and further, so that the scrape under all adjustments can be run flat, presenting its entire cutting edge to the earth, weeds, bushes, etc., in the most effective manner with the least possible draft resistance and without a tendency to turn in either direction, or to tilt forward or backward while being run or used, thus providing a balanced and adjustable scrape.

HOG-TRAP.—W. S. PHILLIPS, Wolfrun, W. Va. This structure provides a means for properly securing a hog for ringing it or performing other operations on animals. The hog is driven into the structure through a rear door so that the door may be moved forward by ropes and a winding shaft to force the animal to point his head through the slatted front door, where it can be secured. It is adapted to be thrown so as to have the animal on its side when the operation to be performed requires it.

Of General Interest.

DIGGING IMPLEMENT.—J. P. MANAHAN, Red Bank, N. J. The implement or spade has a blade provided with laterally disposed sides, and at the side edges and at the lower edge cutting teeth or serrations, the blade having secured thereto a handle provided with transverse rings and itself having an opening which serves, like the rings, to receive the foot of the operator, who can thus apply his weight at successive supports in forcing the implement gradually into the ground.

PLANE.—A. LINK, St. Paul, Minn. An object of this inventor is to provide a plane for cutting grooves or rectangular cavities and having means for easily and rapidly adjusting the cutter. The device has handles, by means of which it can be manually operated, and has a cutter adapted to be projected from the plane stock, one of said handles controlling the cutter and serving both to operate the plane and to adjust the cutter.

SHAVING-CUP.—J. HOLZSAGER, New York, N. Y. This sanitary cup is adapted to retain a cake of soap in the center of its bottom and provides a rubbing surface about the soap. The bottom is constructed with a central depression and the adjoining portion of the bottom is made at a higher level to provide an annular rubbing surface, whereby the brush may have a complete sweep on this surface around the soap in the production of the lather. A handle and dischage spout are provided, the latter permitting tilting for pouring off an excess of water or draining the cup.

MEASURING-HOPPER.—C. SUITER, Billings, Mont. This invention refers to a measuring or portioning hopper capable of use in many ways, but especially adapted for mixing materials for compositions, the principal object being to provide means whereby predetermined quantities of the materials for a composition can be fed simultaneously from the hopper.

WINDOW.—A. C. GODDARD, New York, N. Y. The object in this case is to provide certain new and useful improvements in metallic windows, whereby the window is rendered dust-proof and the sashes are efficiently held against rattling. By the arrangement an exceedingly strong and durable sash is provided, securely holding the panes in place.

CIGARETTE-CASE.—B. EPSTEIN, New York, N. Y. This invention pertains to pocket cigarette cases such as carried by cigarette smokers. The inventor's purpose is to produce a case which can be very economically formed, and which will present pockets from which the cigarettes may be readily removed.

COMB-CLEANER.—F. FEVOLA, New York, N. Y. Means provide for engaging the opposite ends of the comb and a member supported adjacent to said means and having teeth adapted to intermesh with the comb teeth where one or the other is revolved, the member being interchangeable with other like members and laterally adjustable with respect to the comb in order that the device may be used in cleaning combs having the teeth of varying depths and spaced different distances apart.

SUPPORTING DEVICE FOR UMBRELLAS.—F. B. CUMPSTON, Blooming Grove, Tex. In the present patent the invention has for its purpose the provision of simple means for adjustably supporting an umbrella or the like, from the person of the user of the device, and thus permit the free use of both hands and arms as occasion may require.

FORM FOR ANIMAL-HEADS.—B. COHEN, New York, N. Y. The invention provides a form for heads, made of soft rubber, having a skull portion, an under jaw and snout portion, and a lower jaw or tongue, all rendered practically indestructible and sufficiently flexible, at the same time properly displaying the head of a fur skin fashioned over the form and without danger of losing its shape. It relates to heads such as shown and described in Letters Patent of the U. S., formerly granted to Mr. Cohen.

FOUNTAIN-PEN.—J. BOARD, Chester, N. Y. When the pen is used, the ink will feed to its point, and when not being used, the flow will be shut off. In other words, the flexing movement of the point is utilized to stimulate the feeding action; but the construction is such as to enable the pen to be carried in the pocket even in an inverted position without leakage from the reservoir.

AIR-PRESSURE SYSTEM FOR TURRETS AND THE LIKE.—H. BENSCH, New York, N. Y. The improvement pertains to high power ordnance, and more particularly to means whereby after the gun is fired and the breech block opened for reloading, the gases of combustion are completely scavenged from the bore of the gun and "flarebacks" positively prevented.

ATTACHMENT FOR DRIVING-REINS OF DOUBLE HARNESS.—J. SUTHERLAND, Springer, New Mex. The object here is to provide an attachment for double harness which will prevent an accident occurring, by rendering it impossible for the connecting buckles between the long and short members of each pair of reins from passing through a complementary terret ring, or from becoming so engaged therewith as to prevent full control of the reins and the horses connected thereto.

SAW-FILING DEVICE.—H. F. HILL, Scotia, Cal. This device can be easily set up in position on an ordinary work bench, and which will operate to guide the saw in the filing operation, the arrangement being such that the file may be advanced by a simple movement from one end of the saw to the other as the operation progresses, and the file is constantly maintained in a fixed relation of inclination with respect to the blade, so that the edge given to the teeth will be uniform.

POCKET-KNIFE.—R. L. GUTHRIE, Skagway, Alaska. The object of this invention is to provide an improved handle for use in interchangeably holding all sorts of knife blades, screw drivers, manicure implements, etc., and arranged to permit convenient and quick removal of a tool and the insertion of another.

MACHINE FOR MAKING RIMS FOR SOFT PIES.—J. F. KOHLER, New York, N. Y. One purpose of the invention is to provide a special type of head for automatically pressing dough fed to the machine in rims in pie plates, and constructed in annular sections, which sections act upon the dough consecutively from the inner outwardly, as the head is brought into shaping position, automatically releasing the pressed dough in reverse order as the head rises, thus insuring the pie plate remaining in position during both of the operations, and the dough remaining upon the plate.

Machines and Mechanical Devices.

OPERATING MECHANISM FOR REED-ORGANS.—H. E. CHUTE, Peru, Ind. This improvement is in mechanism particularly adapted for use in reed organs for controlling the notes of the organ, the active coupler, and the like, and resides in the arrangement of this mechanism, whereby the desired movement of the parts may be obtained and controlled by the treadle of the organ.

TRAVELING CRANE.—L. H. MILLER and G. A. NEWCOMB, Tacoma, Wash. In the present patent the invention has reference to traveling cranes, the more particular purpose of the inventors being the provision of a crane having quite a variety of independent movements all reversible and readily controlled at the will of the operator.

GEARING.—W. LESEMANN, Egg Harbor City, N. J. This invention refers to a reversible gearing in which the drive shaft may be given a forward or a backward rotation by simply moving the lever to the right or to the left. Moreover, by moving the lever to a central point the gearing can be released and the loose pulley on the shaft will then revolve idly.

APPARATUS FOR DEMONSTRATING AND ILLUSTRATING WAVE MOTIONS. — C. FORBES, New York, N. Y. In this case the invention is an apparatus for use in the demonstration of the formation and propagation of water or surface waves, waves of condensation and rarefaction, as sound waves, and transverse waves, as the ether waves of light, heat, and electricity.

SPRING.—L. Y. LEON, San Juan, Porto Rico. The more particular object here is to produce a kind of spring consisting of two members each having substantially the form of a ribbon, these two members being disposed symmetrically in relation to each other for the purpose of increasing the durability and the elasticity of the metallic members of the spring.

CENTRIFUGAL PUMP.—L. BELLOT, 3 Boulevard Richard Lenoir, Paris, France. The invention comprises in a pump, the combination of a fixed central distributer and a hollow annular impeller, provided with a series of guides arranged in a general radial direction and having a special double curvature, the concave portions of the guides being arranged contiguous to the distributer, so as to utilize the first impact of the liquid while the outer convex part of the guides serves as a piston.

Prime Movers and Their Accessories.

EXPLOSION-TURBINE.—C. BECKMAN, New York, N. Y. The object of this invention is to produce a prime mover simple in construction and efficient in operation. Further objects are to provide an arrangement which will enable the motor of the machine to act as a carbureter, to provide improved means for feeding the charges to the explosion chambers, and to provide important means for igniting the same.

Railways and Their Accessories.

AUTOMATIC SAFETY-SWITCH.—J. THORNTON and I. WERTHEIMER, New York, N. Y. The inventor relates to railway switches, and the object is to produce a switch which if left open in such a way that a train running at high speed on the main track could run upon the siding, the switch would be closed automatically. In this way accidents will be avoided.

CAR-STAKE.—J. BAGLEY, Tacoma, Wash. This invention is an improvement in car stakes such as are used on flat or like cars, and has for its purpose the provision of a comparatively light and strong device of this character, which may be released instantaneously, with other like stakes at the same side of the car and be easily erected.

Pertaining to Vehicles.

BUGGY-SHAFT SUPPORT.—B. M. PERDUE, Franklin, Ky. When the animal is unhitched, the shafts are lifted out of contact with the ground, so that there is no liability of breakage. When it is desired to hitch to the buggy, the animal may be led under the shafts. In this position, the spring is under tension, since the arms are more nearly in alinement with each other. After the animal is hitched, the tension of the spring keeps the weight of the shafts off the horse's back, and immediately returns them to their elevated position when the animal is unhitched.

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

Full hints to correspondents were printed at the head of this column in the issue of November 14 or will be sent by mail on request.

(10999) A. M. St. C. says: I see in the papers that Halley's comet is expected soon. Can you tell me about when it will be visible and about when it will pass perihelion? A. The search for Halley's comet has already begun at the large observatories by means of photography, and will be kept up till the comet is discovered. It will doubtless be found on photographic plates before it can be seen by the eye. It is due to pass perihelion in May, 1910. We cannot say when it will become visible to the eye.

(11000) F. S. asks: Will you kindly inform me as to whether or not there is any reason for the common opinion of boatmen that waves become heavier in the fall as the water gets colder? Here on Leach Lake every boatman will tell you that this is the case. I can see no reason for believing that there is anything back of this idea. A. We never heard the opinion you give as common among boatmen that waves are heavier in fall than in spring, and cannot give any reason for such an opinion.

(11001) J. L. H. says: Will you be kind enough to advise me what is meant by the use of the term "boring the tubes" in connection with the tunnels under the river; whether the tube was actually driven by hydraulic pressure under the river or dug by the same process as the subway was built, pick and shovel? A. We cannot settle your bet, but we can give you enough information to enable you to judge which of the parties was correct. We cannot give a full explanation of the process of shield tunneling, for which we must refer you to our SUPPLEMENT Nos. 1027, 1028, 1042, and 1122, which give most interesting details of the methods employed in London tunnels and copied almost exactly here, or No. 1474, which gives fairly late particulars of the Hudson tunnel. These are excellent descriptions for the non-technical man, of a most interesting subject, and will be sent you for 10 cents each, postage paid. The shield is essentially and was originally intended to be a portable false work for taking the place of timbering and retaining the roof and sides of a tunnel in soft ground during the process of excavation and until the masonry or permanent ironwork could be placed. The ground in front of the shield is blasted, if rock, and removed by pick and shovel, if soft enough, and when sufficient has been excavated for one "ring" of iron or masonry to be erected behind it, the shield is pushed forward by hydraulic power. In so far the hydraulic pressure has no connection with the actual excavation, but in a considerable part of the tunnels under the Hudson the ground excavated was in so nearly a fluid state that it was only necessary to apply hydraulic pressure to the shield to force it through the silt, which squirted through apertures in the shield like paint out of a compressible tube, directly into cars, by which it was conveyed out of the tunnel. The direction of the shield was controlled by the admission of a greater or less, or a higher or lower portion of the silt. In this use of the shield the hydraulic pressure may certainly be said to have performed the actual excavation. There were also considerable sections of the tunnel in which the shield, with its apertures closed, was simply pushed through fluid silt, which was forced to one side, no part of the ground being "excavated" in the usual sense of the term, but in this use also the tunnel may be said to have been "dug" by the hydraulic pressure, since the latter forced the opening filled by the completed tunnel.

(11002) W. B. H. says: 1. Will you please explain in your notes and queries the wiring and working of an induction coil with only three wire terminals? A. We know no way in which an induction coil can be made with three terminals. A wire is sometimes bridged across from one end of the secondary to one of the primary terminals. This will apparently suppress one terminal, but only apparently. The spark will now jump from the single terminal of the secondary to one of the terminals of the primary. 2. The connections at the dynamo of a three-wire lighting system where either 110 or 220 volts can be obtained? A. There are several modes of making connections for a three-wire system, giving either the whole or half the voltage, 220 or 110 volts. We would refer you for diagrams and explanations to our Sloane's Handy Book of Electricity, pages 497 to 502, which we send for $3.50 postpaid. 3. Have you any SUPPLEMENTS which explain the working of an alternating-current brush motor with slip rings instead of a commutator? A. Alternating-current motors have slip rings and do not have commutators. You will find this subject also fully treated in Sloane's book, pages 348 to 438. This book may be said to be indispensible to one wishing a knowledge of modern electrical machinery.

(11003) For W. G. F.: The article relating to the Fermat formulas, published in our issue of February 1 last, has called forth much correspondence. Yet so far as we can judge none of the letters are from persons versed in pure mathematics. One would think that a proposition which, as the article states, the great mathematicians of the world have not been able to solve, would hardly be solved by those unfamiliar with the subject involved. The theorem is, the sum of the cubes or any higher power of two numbers cannot be equal to the cube or the same higher power of any other number. That is, $Xn + Yn = 2n$, is not true if n is greater than 2. This is the proposition which has never been proved in general terms. Most of our correspondents attempt the proof by citing numbers, and applying the formula to successive numbers. This is not the proof required. One could not to all eternity complete the proof of a negative in this way. There is an infinite series of numbers, which must be tested two by two, and eternity is too short for the task. What is required is a demonstration in general terms that there is no possibility of finding any such numbers. Such a demonstration must be in letters, and not in figures. We do not expect any one to secure the prize offered for the proof of the theorem, and would request that no more letters be sent us on the subject. Any one desiring to submit anything in competition for this prize should send their articles directly to the German address given in the article in our paper.

(11004) J. T. M. says: I would like to know the best oil or the best method of oiling ball bearings, or if it is absolutely necessary to oil ball bearings or not. This information will be greatly appreciated, and I feel that coming from you it will be correct. A. Theoretically it is not only unnecessary to oil ball bearings, but better not to: anything which assists the ball to slip on either surface reduces the static friction between ball and cone, which causes it to roll and makes the bearings nearly frictionless, and if the ball begins to slide it soon wears a small flat patch on it, which prevents its properly performing its function. The better a ball bearing is made the less the necessity of oiling it, but at the same time the almost universal practice of oiling ball bearings (or filling them with solid lubricant) goes to show that it is found to have practical advantages. The excuse for oiling ball bearings is that if not *perfectly* fitted the balls may touch each other,

and if the front side of one ball comes in contact with the hind side of another, both rolling in the same direction, the kinetic friction between them is double that between either ball sliding without rotating and the cone on which it slides. With which explanation of the reasons pro and con we must leave you to judge whether or not it is better in your case to oil or not.

(11005) T. L. G. says: You will do me a favor to decide in your Notes and Queries the following: A holds that centuries are marked at their termination, and cites Gladstone for authority. B holds that centuries are marked at their beginning, and derides the intellectual Gladstone as guilty of this preposterous statement. Who has the better of the argument? A. The last year of each hundred gives the name to the century in which it is counted. We are now living in the 20th century. The last year of the 19th century was the year 1900. The first century began with the year 1 and ended with the year 100, and each century has followed the numbering of the first. This is exactly the same as counting other things. If you counted books, for example, you would count from one to one hundred, and the hundredth book would complete the first hundred books. A is right, although B calls his statement "preposterous."

(11006) G. M. says: Is the weight of the earth always the same, or is it getting lighter or heavier and what is the cause? A. The meteors which fall upon the earth in vast numbers every year add their weight to the earth. Thus the earth is increasing a minute quantity in weight each year, but not enough to be perceptible in thousands of years. Except for the escape of light gases from the atmosphere there is no known way in which the earth can lose weight.

(11007) G. W. M. says: Some time ago you published in the SCIENTIFIC AMERICAN a receipt for making gas from some kind of acids and aluminium; the paper I had has been lost and I would like to get it again if you can get it for me; find inclosed price for the paper. The gas I mean is so it can be lighted and made in a bottle. A. You can obtain hydrogen by means of aluminium in a variety of ways. The simplest method is to put chips of aluminium into sodic or potassic hydrate, using a rather dilute hydrate for the purpose. The mixture should be heated somewhat at first to start the action, but when the gas begins to come off the heat should be withdrawn or the action will be too violent. Another way is to pour hydrochloric acid upon the aluminium chips. This requires no heat. The chemical action will produce a great deal of heat. The acids of fruit will dissolve aluminium in the same way. For this reason aluminium cannot be used for cooking utensils. At one time it was thought that the metal would be of great service in the kitchen, but it had to be abandoned because the compounds formed from the acids of the food were harmful.

(11008) M. E. P. asks: 1. Give colors which have been adopted to indicate what a pipe is carrying. Ammonia pipes are painted one color and steam another, etc. A. There has been, to our knowledge, no sort of standardization of coloring of pipe lines to indicate their contents, and such standardization does not seem to us readily possible, as, if a list were made of all possible pipe contents of different plants, the colors most readily distinguishable from each other would be exhausted long before each content was designated. For instance, one plant may have steam, high and low voltage electric wires, and high and low pressure hydraulic; another may have steam, fire pressure, compressed air, electric wires, and gas, and one system of coloring to cover only those two plants will have already used up white, black, red, yellow, blue, and three other colors less readily distinguishable from the latter. A system must therefore be adopted to suit each particular plant, and the only important feature to be considered is that no two colors which may be mistaken for each other (as blue and green may be by lamplight) be used on adjacent lines, the accidental opening of one of which by mistake for the other in emergency would be dangerous (e. g., if a gas line were disconnected by mistake in looking for a short circuit in electric wires). For your case we would suggest black for steam, white for water, red for fire pressure, blue for ammonia, and yellow for brine circulation, or if there is no object in distinguishing fire from other water lines, red might be reserved for electric wire tubing, but in the light of the foregoing you can probably invent a better system for your special conditions than we can in ignorance of them. 2. What is the wind pressure per square foot at a velocity of 10, 20, 30 40, 50 miles per hour, respectively? A. The following are the pressures per square foot corresponding to the speeds in miles per hour given first:

10 miles per hour = 0.492 lbs. per sq. ft.
20 miles per hour = 1.968 lbs. per sq. ft.
30 miles per hour = 4.429 lbs. per sq. ft.
40 miles per hour = 7.873 lbs. per sq. ft.
50 miles per hour = 12.30 lbs. per sq. ft.

3. How can I determine how much angle to give the blades of a propeller in order to get a certain pitch? A. The pitch of a propeller blade is exactly the same as that of any other screw, a propeller blade being only a section of the surface of a helix, that is to say, the pitch of the propeller is the amount by which any point upon it moves forward (in a direction parallel with the shaft) in one revolution of the propeller. Lay off a helix with the required pitch and the angle which its edge makes with a plane at right angles to its axis will be the angle at which the blades of your propeller must be set to a plane at right angles to the shaft to give the propeller the required pitch.

(11009) G. L. asks: What makes the earth move---not in regard to her three kinds of movements but simply what makes her to move, or in other words, what makes the matter move in the universe? A. The force which causes the earth to move is called gravitation. What its nature is is not known. It acts as if the earth had at some time been hurled into space in a line not directly toward the sun, but to one side of it, and had therefore moved around the sun ever since. Of course we do not think the earth was hurled in this way, but the effect of the attraction of gravitation is such as would have been the result if the earth had been thrown into space by a giant hand. Books of astronomy treat of these matters. One of the most recent is "Moulton's Astronomy," which we will send for $1.75 postpaid.

(11010) H. L. W. asks: In the issue of the SCIENTIFIC AMERICAN for October 3, 1908, in replying to "M. M." (Notes and Queries No. 10872), you say: "We do not know any reason why a person should be affected by lightning striking the water in which he is swimming." Some years ago I was swimming in Lake Luinrigamond, near Worcester, Mass., during a heavy thunderstorm. A very vivid flash of lightning occurred, the thunder being heard at practically the instant of the flash. Simultaneously with the flash, all my limbs contracted strongly, somewhat after the manner of a frog in Galvani's experiment, and I was conscious of a distinct shock comparable to that given by a strongly-charged Leyden jar. The shock was not painful, but was distinctly startling, so much so that I at once made my way back to the float. A friend sitting in bathing trunks on the wet float also said he felt the shock. We afterward found that the lightning had struck on the shore of the lake about a quarter of a mile distant. My knowledge of electricity is quite limited and I should quickly "get over my head" in a technical discussion, but the following explanation of the above facts seems tenable: While, as you state, "the earth is at 2,250 potential and of infinite capacity," would it not be true that at the instant of discharge that point of the earth which is struck by lightning is at a higher potential than the surrounding points? The potential is immediately equalized by the dissipation over the surface of the condenser (the earth) of the charge of electricity, the effects of the dissipation becoming weaker and weaker as the distance from the point of discharge is increased. Now a person submerged in a lake is in very intimate contact with the earth, and the discharge current, if I may use the expression, would pass through his body, as it would through all bodies of equal resistance, not insulated from the earth's surface, and if the current at this point were sufficiently strong, an effect would be produced in the swimmer's body, evidenced in my case by muscular contraction. There is nothing in this explanation except that you do not take cognizance of my assumption that at the instant of a discharge of electricity from a cloud to the earth, the zero potential of the earth is disturbed for an infinitesimal fraction of time, during which time a current is flowing from the point of discharge to be dissipated over the surface of the earth. A. We have read with interest your description of what happened to you when the lightning struck the water near where you were bathing. It would not appear that you experienced much of a shock from the electric discharge. Had you done so, you could not at once have made your way back to the float. It seems to us that your jumping in the water was as likely due to the suddenness of the flash and the sound of the thunder as to any other cause. Still we cannot say that it was so. If one did not experience more shock than from a discharge of a Leyden jar, the lightning was very weak. We entirely agree with your discussion of the conditions of the earth beneath a cloud at the instant of a lightning flash, but do not see that this alters what we said in the query referred to. That a certain degree of electrification should be dissipated from one would not give much of a shock. This is always experienced when lightning strikes in one's vicinity.

(11011) H. W. says: Why is it that, using the same effort and force, a long screw driver will remove a screw nail that cannot be moved by a short screw driver? A. The mechanical advantage gained is entirely and only due to the fact that the longer screw driver has the larger head, and consequently the greater leverage, i. e., the greater difference between the "arm of the power" as represented by the radius of the head and the "arm of the weight" as represented by the radius of the screw head (or half the width of the screw driver point). The only other advantages of the longer screw driver are the usual possibility of assuming with it a more comfortable position, using two hands instead of one, or throwing more weight against the screw driver to prevent the point jumping out of the screw head slot.

NEW BOOKS, ETC.

THE BOY'S BOOK OF STEAMSHIPS. By J. R. Howden. New York: The McClure Company, 1908. 12mo.; pp. 285. Price, $2.

The author has proceeded along very practical lines in the preparation of this admirable book, which will be welcomed not only by boys but by their elders. There is something fascinating about the modern steamship, and the admirable frontispiece, showing the "Adriatic" at Cherbourg, will bring back pleasant memories to many. Of all the works of man's hand and brain, nothing is quite so impressive or fascinating as a ship. Imposing as she may appear when in port, her hull is such a tiny thing when compared to the great and wide sea across which she ventures, that it seems almost impossible that any fabric put together by men's hands could possibly endure the great force of the ocean waves, still less make its way as unerringly as a ferryboat across them to a purposed destination. The author has tried to unveil to his readers the secret which lies behind it all, the secret, namely, of "freedom within the bounds of law"; that man is only permitted to control natural forces for his own ends by obedience to the laws which control them. A recapitulation of the chapters gives an admirable idea of the scope of the book. After an introductory chapter, we come to "Principles of Ship Design," "The Coming of Steam," "Down in the Stokehold," "The Engines," "Propelling Machinery," "The Development of Type," "The Comfort of the Passenger," "Navigating and Engineering Departments," "Steward's Department," "River Steamboats," "Lake and Coasting Steamers," "Ocean Steamships." There are many exceedingly valuable tables scattered through the book. These tables are so valuable, that one almost wishes that the author had called it "The Man's Book of Steamships."

BIOLOGY AND ITS MAKERS. By William A. Locy, Ph.D. New York: Henry Holt & Co., 1908. 8vo.; pp. 439. Price, $2.75.

The author has been frequently in receipt of letters from students, teachers, ministers, medical men and others, asking for information on topics in general biology, and for reference to the best reading on the subject. The increasing frequency of such inquiries and the wide range of topics covered have created the impression that an untechnical account of the rise and progress of biology would be of interest to a considerable audience. This the author gives as his reason for writing this book. This admirably fills a comparatively empty niche in the literature of science. The author has attempted to bring under one view the broad features of the biological progress, and to increase the human interest by writing the story around the lives of the great leaders, naturally the practical execution in the past resolving itself largely into the question of what to omit. The aim has been to keep in mind a picture sufficiently diagrammatic not to confuse the general reader. The book is divided into two sections. In the first are considered the sources of the ideas—except those of organic evolution—that dominate biology, and the steps by which they have been molded into a unified science. The doctrine of organic evolution, on account of its importance, is reserved for special consideration in the second section. The portraits with which the text is illustrated embrace nearly all the founders of biology.

THE STRUGGLE FOR AMERICAN INDEPENDENCE. By Sydney George Fisher. Philadelphia: J. B. Lippincott Company, 1908. 2 vols. 8vo.; pp. 573-585. Price, $4.

The present work is a continuation and an enlargement of "The True History of the American Revolution," published some years ago in one volume. That work, while being a brief general account of the contest, dwelt more particularly on certain phases of the struggle which have been omitted or ignored by historians. It soon became obvious that it did not go far enough, that the original plan should be extended and carried out in more detail, and that the whole mass of original evidence in libraries and historical societies should be made accessible, revealed to the public in as complete and ample form as possible. Our people have little or no conception of what the Revolution really was, no conception of the nature of the original evidence; and the unwillingness of our writers of general history to set forth that evidence keeps it a sealed book to the people. Our national feeling is bound up in the Revolution; the extreme importance of such an event, which was the foundation of our nationality and of the political and social principles by which we are still guided, seems to deserve all the light that it is possible to obtain. Although our Revolution is said to have changed the thought of the world, like the epochs of Socrates, of Christ, of the Reformation, yet no complete history of it has ever been written upon the plan of dealing frankly with all the contemporary evidence and withholding nothing of importance that is found in the original records. Our histories are able rhetorical efforts, enlarged Fourth of July orations, or pleasing literary essays on selected phases of the contest; there has been no serious attempt to delve in the original sources of information and reveal them to the reader, as has been done with the history of England, of France, and of other countries. In view of these facts, Dr. Fisher has written the admirable history which we are now reviewing. There is no one better qualified as a sound and accurate historian than Dr. Fisher, whose writings have been received with respect by all the reading community.

HOW IT IS DONE, OR VICTORIES OF THE ENGINEER. By Archibald Williams. New York: Nelson & Sons, 1908. 12mo.; pp. 484. Price, $1.25.

In these pages the reader will find an account of the great bridges built and in course of construction, and other great railway enterprises during the past few years, including tunnels and car ferries; also the story of the Florida East Coast Railway built over the sea. Ample space is given to the description of the new Croton dam and the Panama canal. The book is excellently illustrated by numerous well-executed engravings, a number of which have already appeared in the SCIENTIFIC AMERICAN.

IN VIKING LAND. Norway, Its Peoples, Its Fjords, and Its Fjelds. By W. S. Monroe. Boston: L. C. Page & Co., 1908. 12mo.; pp. 332. Price, $3.

The present work is the result of two vacation trips to Norway and rather wide reading of the extensive literature of the country. The author's aim has been to give prospective tourists some notion of the benefits to be derived from a visit to Norway, and to inform readers who prefer to travel within the covers of a book. The author also trusts that this book may serve to refresh the memories of those who have already traveled in Norway. In any country so rich in mountains, ice fields, and waterfalls and fjords, it is altogether easy to devote the chief part of a book to those forms and forces. This is precisely what most writers on Norway have done. The present volume, on the other hand, gives prominence to matters of human interest—the people, their habits, customs, and traditions, to the developed and developing civilization of the country. The Viking age appeals strikingly to the imagination of readers and travelers, and the author has endeavored to draw from the chronicles of the old Norse sagas and the existing historic objects which have visible connection with the past such facts as may aid in the construction of a fairly vivid picture of this stirring period. The author has produced a most interesting volume, which has been beautifully illustrated, printed, and bound by the publishers.

BRIDGE ENGINEERING. ROOF TRUSSES. A Manual of Practical Instruction in the Calculation and Design of Structural Steel Truss and Girder Bridges for Railroads and Highways. Including also the Analysis and Design of Roof Trusses and Other Details of Mill Building Construction. By Frank O. Dufour, C.E. Chicago: Published by the American School of Correspondence, 1908. 8vo.; pp. 384; 340 illustrations; half morocco; marbled edges. Price, $3.

The fact that this work by Prof. Dufour has been officially adopted as a textbook at the University of Illinois, is in itself convincing evidence of its value as a contribution to the literature of structural engineering. It is admirably adapted for the general practical use of the engineer. The problems involved in the calculation and design of modern steel structures are complicated, yet are adequately compassed here in a handy volume of moderate proportions. The treatment is exceedingly clear and concise, and free from the abstruse mathematics that ordinarily overburden other works in this difficult field. The section on Bridge Engineering treats fully both Bridge Analysis and Bridge Design, embracing the various types of truss and girder bridges, bridge piers and abutments, bearings, and other details, for railroads, country highways, etc. Every detail is clearly explained by the aid of diagrams, while graphical methods are chiefly used in the computations. The same practical and concise treatment marks the section on Roof Trusses, which covers all details of the analysis, calculation, and design of the various types of roof trusses used for buildings of various spans, the methods of securing good light and ventilation, the layout and other details of mills, shops, etc. Photographs of typical modern structures are shown, with full explanation of the methods followed in their design, and in some cases statements of cost.

A TEXTBOOK ON ROADS AND PAVEMENTS. By Frederick P. Spalding. New York: John Wiley & Sons, 1908. 12mo.; Pp. 340; 51 figures. Price, $2 net.

The methods employed in the construction and maintenance of highways have changed so greatly since the first publication of this book, that in the preparation of this edition it has been found necessary to practically rewrite the entire book. An effort has been made to briefly represent the best recent practice in highway work, and the book has necessarily expanded considerably beyond its former limits. The book contains chapters on "Road Economics and Management," "Drainage of Streets and Roads," "Location of Country Roads," "Improvement and Maintenance of Country Roads," "Broken-Stone Roads," "Foundations for Pavements," "Brick Pavements," "Bituminous Pavements," "Wood-Block Pavements," "Stone-Block Pavements," and "City Streets."