

Correspondence.

Force and Energy.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue May 11, 1895, an editorial article appears under the above caption. While the subject is discussed in a profound and intelligent manner from the standpoint of experience, yet in the mind of a less intellectual person, like the present writer, there is more or less doubt on the conclusions arrived at, and stated as axioms. The terms energy, force, and work are plainly defined, as is also the various relations of the trio. The assumption that "the doctrine of the conservation of energy tells us that the available energy of the universe is tending to zero" is without foundation on bed rock. Your statement that "energy is defined as the capacity of doing work" cannot be doubted, but that such energy in the universe is tending to zero may be confuted by a reference to that which has existed without diminution for all known time in the past. Our earth has continued in its revolutions and circles around the sun, as well as all the bodies in our solar system, for all past ages without deviation. The power or energy which causes the lightning's flash and the thunder's bolt, with all its destructive effects, is the same to-day as it was a thousand years ago. Why should it be said that the accomplishment of what is termed "perpetual motion" is impossible? Who knows but that some genius may arise who will grasp the situation and comprehend the power or energy that moves the worlds? There is no steam engine in the clouds to run a motor. Yet the lightning comes forth with a power that cannot be computed! A million horse power could not produce the effect that a single flash has been known to accomplish.

The age for doubt has gone by, and he that will look around and behold the wonders that have been accomplished within the past fifty years will set no bounds to the future. There are certain fixed laws in Nature which are as unalterable as were ever the laws of the Medes and Persians, and much more perpetual, that may be yet used by the coming man.

We are constantly learning something, and new and unexpected results follow investigation.

Energy will yet accomplish many things that are now deemed impossible, among which will be a contrivance that will move by Nature's fixed forces, without any outside help from man. The mistaken notion that man must produce the energy is but human. Nature will produce and furnish all energy necessary to accomplish great ends; and it only remains for man to put the giants in harness and stand at the helm.

May the good time hasten on!

Asbury Park, N. J. DAVID H. WYCKOFF.

Science Notes.

The Decimal System in the Measurement of Time and Angles.—According to the *Genie Civil*, the Geographical Society of Toulouse has for some years been studying the possibility of the application of the decimal system to the measurement of time and angles. As a result of these studies, a scheme has been devised which is to be presented to the coming Geographical Congress at London. It is proposed to divide the circle into 100 "cirs" (abbreviation of *circulus*), with decimal subdivisions of "decirs," "centicirs," "millicirs," and "dimicirs." The letter X (initial letter of Greek *κυκλος*) is chosen to represent the cir, and an angle of 7 cirs, 77 centicirs, and 51 dimicirs would, therefore, be written 7x7751.

For the decimal measurement of time, the day, from midnight to midnight, is divided into 10 decimal hours, each hour into 10 "cés" (abbreviation of *centijour*), each cé into 10 "décicés" or decimal minutes, and the latter into "centicés," "millicés," "dimicés," etc.

The passage from the present measurements to the new ones will be easy to realize. The conversion of the degrees, minutes, and seconds of arcs into cirs and divisions of the cir will be effected by means of a table that Mr. De Rey Pailhade has calculated up to less than a half unit of the seventh decimal, that is to say, to less than 0.000648'.

From experiments made in Italy for calculating the time gained by the use of decimal measurements, it results that such use shortens the duration of the work by two-sevenths (almost one-third), either in observation or in calculation. It will be seen that such a gain is not negligible.

Tannin from Palmetto Leaves.—The extraction of tannin from the leaves of the palmetto has now become a practical industry, and it is claimed that leather tanned with this product can be produced more economically than that which is treated with oak or hemlock bark, while the residue forms a valuable paper stock, which is also utilized. In the process of extraction the leaves and stems are separated, the stems are crushed flat through rollers, while the leaves are finely shredded. This material is then placed in a large wooden tank and covered with water, the mass is brought to the boiling point, but not allowed to boil violently, being kept near but below the boiling point

for forty-eight hours, the liquid being then ready for the tannery. After the tannin has been extracted, the palmetto is steamed in a chemical solution, which removes the silicate contained in the leaves and changes the glossy shield to a gummy mass that can be removed without injury to the fiber. But in making imitation horse hair this gummy mass is allowed to dry, since it adds elasticity to the fiber. There are several combinations in which the production of tannin and fiber is said to be practicable and advantageous, so that tanneries situated in the vicinity of paper mills can grind the palmetto in the same manner as bark, and the residue, after bleaching, is in proper shape for the paper mill.

Origin of Chemical Terminations.—The terminations in the words "sulphate" and "sulphite" are of French origin. In 1787 the method of chemical nomenclature proposed by Morveau, Lavoisier, Berthollet, and De Fourcroy was published, and this still forms the basis of the present system. Lavoisier's ideas were most prominent in the scheme which was practically an embodiment of his antiphlogistic doctrines. The compounds of oxygen were divided into oxides and acides, and the names of the latter were distinguished by the terminations -eux (Ang. -ous) or -ique (Ang. -ic) respectively, according as the acids contained more or less oxygen. The important rule was also introduced, and is still maintained with its original force, that the names of salts formed from acids distinguished by names ending in -eux (-ous) should terminate in -ite, and those from acids in -ique (-ic) should terminate in -ate.—*Pharm. Jour.*

New Adjunct to the Balance.—In order to enable workers with the balance to read the position of the pointer more accurately and readily, resort is often had to the device of fixing a magnifying lens before the divided scale. Another simple contrivance is suggested by W. H. F. Kuhlmann (in *Zeitschrift für Instrumenten*), in which the scale is reversed, so as to face a concave cylindrical mirror attached to the column that supports the balance. The pointer is made finer at the end than usual, and moves between the scale and the mirror in which a magnified image of the pointer and the scale appears.

Influence of Trades on Faces.—A curious paper is contributed by Dr. Louis Robinson to a recent number of *Blackwood's* on the influence of trades on faces. It is pretty generally agreed that association with horses gives a person a horsey look; but it appears that circus riders and ring-masters are exempt from the general rule, because with them the horses are regarded as mere "properties," and their minds are occupied solely with the achievement of certain feats to the satisfaction of the public. Dr. Robinson takes as types professional musicians, priests, actors, actresses, and blacksmiths, and shows how their pursuits induce strongly marked facial expression. Even the style of hair which has become associated with musicians is not altogether dependent on fashion, but is evidence of trophic changes resulting from mental habits. The growth and vitality of the hair are profoundly influenced by emotions. Priests cannot change their priestly countenance if they wished. For some mysterious reason the subcutaneous tissue over the cheekbones and under the jaws of the cleric's face gets an undue supply of nourishment, which leaves distinctive marks, while the consciousness of a share in the apostolic legacy gives a muscular set to the lips. Dr. Robinson goes on to discuss the other classes mentioned in the same strain, and he ends by saying that the aim of the paper is to aid those who are endeavoring to place physiognomy on a sound basis. The task is a difficult one, because in the course of the article he admits that not only may the organic part of a man show every sign of guilt when there is no guilt, but only temptation; but it may even go further, in attaching a slanderous libel to the countenance, owing to the interlocking mechanism of emotion, passion, and nutrition.

Masonry Bridges.—Two masonry bridges have recently been constructed in Austria which are said to be the largest of their kind in the world. One of them, situated at Jaremeze, has a main span of 206.5 feet. The other, situated at Jaruna, has a span of 157.5 feet. About thirty-five thousand cubic feet of cut stone were used for the first of these bridges. About fifty-five tons of Portland cement and some four thousand cubic feet of ordinary mortar were used in the work. In beginning the work, the centering was loaded simultaneously at eight different points. The weight over the haunches is relieved by spandrel arches. The other bridge is similar in design. The total cost of the Jaremeze bridge was \$36,000.

Improving the Flavor of Butter.—Prof. H. C. Conn, says *Food and Sanitation*, has for the past two years been experimenting in the direction of discovering and cultivating the proper bacteria for improving the flavor of butter, and recently experiments have been made by him in the production of creamery butter. As a result of such experiments, it is now stated that Prof. Conn has discovered a species of bacterium to which he has applied the insignificant name of "Bacillus No. 41," and which has given the most promising results as an

organism for the artificial ripening of cream in butter making. These experiments, as carried on by him, were thoroughly satisfactory, and were made in the following manner: One-half a pint of milk was sterilized, by incessant steaming, during a period of three or four days. Then this bacillus No. 41, which had been cultivated in the bacteriological laboratory of Wesleyan University, was inoculated into the milk, and for two days was allowed to develop. The large creamery at Cromwell, Conn., was then visited, and six to eight quarts of cream were put into a metal vessel and "pasteurized." The cream was then heated to 158 degrees Fah., and left for ten minutes. The vessel was removed and cooled quickly by means of cold water, and when the temperature had dropped to 80 degrees bacillus No. 41 was poured in and the mixture stirred thoroughly. The vessel was then covered and put into the ripening room. After a couple of days the cream was churned, and the buttermilk remaining was set aside for future use. These six quarts were ripened for the purpose of increasing the number of bacteria, and securing a strong culture for use in the large cream vat of the creamery. The buttermilk was then inoculated into the day's cream supply, and this cream allowed to ripen in regular time, at a warm temperature, and churned as usual. Before churning a quantity was set aside to use for inoculation in the next day's supply, and in this manner continued indefinitely. The effect was always uniform. The first six quarts of cream produced moderately good butter, but not quite of the flavor wanted. The first large churning was a trifle better, and each day's product was an improvement. A delicate flavor also developed, which seemed to deteriorate after two or three weeks. This deterioration was remedied by a fresh inoculation from the laboratory. Two vats of cream, from which June butter was made, were taken. One quantity was inoculated, and the other was not. The butter produced by each was of high quality, but that which had been inoculated with bacillus No. 41 had an aroma stronger and more pleasant than that without. It was also superior both in taste and odor. One lot was sent to a Mr. Beck, in Massachusetts, who makes the highest grade of butter, and who commands a very high price in the Boston market. Mr. Beck used the culture and reported a decided improvement. It is the purpose of Prof. Conn to introduce this inoculation process in all the large creameries in the United States within the next year.

The Size of Drops.—At a recent meeting of the Royal Society of Edinburgh a communication "On Drops" was read by Mr. J. B. Hannay, who appears to have obtained experimental verification of Tait's conclusion reached some years ago. Thus, the size of the drop does not depend upon the weight of the liquid, but is proportional to the diameter of the delivery tube, while its separation is regulated by surface tension rather than by cohesion. In the experiments, the disturbing element of viscosity was got rid of by causing a given liquid to drop into another of different specific gravity. The separated particles of water, for example, were allowed to rise in oil. It was further ascertained that when water was dropped in an atmosphere of benzine vapor the drops formed were much smaller than when the surrounding medium was ordinary air.

Diffusion of Perfumes.—J. Passy (*Comptes Rendus*, cxx, 513) considers that the fixation of perfumes by solid bodies, when diffused in an inclosed space, must be due to a process of solution similar to that by which dyes are fixed in tissues. He argues that, in the same way that crystallized fuchsine is greenish with a metallic luster, and only manifests its characteristic color when in solution, so coumarin in the crystalline state does not present its characteristic odor. Presumably, therefore, tissues perfumed by coumarin contain it, as it were, in solution.

Recovery of Tin from Tin Plate Clippings.—Mr. T. Hunter extracts the tin from scrap tin plate by treating the latter with a solution of sulphate of copper, which dissolves the tin in the state of sulphate, while at the same time metallic copper is deposited. In the presence of the iron sulphate of tin is decomposed in turn with the setting of metallic tin at liberty and the formation of a solution of copperas.

In reality, it is found that the solution of copper corrodes the iron and detaches the tin that is fixed to it. Beneath a double bottom, upon which the tin clippings are arranged, there collects a mixture of tin and copper, which is separated, or which is utilized directly for the manufacture of stanniferous brasses or bronzes.

Prevention of Boiler Scale.—To prevent the formation of scale in steam generators, Mr. Alwin Nieske, of Dresden, recommends the addition of chromic salts to the feedwater. The lime existing in the latter in the state of bicarbonate or sulphate is precipitated by such salts in the form of a non-adhesive light mud. Bichromate of potash may be used in the proportion of two pounds for a small boiler; but an excess of the salt would be attended with no inconvenience.

TRUNK wires to connect London by telephone with Edinburgh, Glasgow, and Dublin have just been erected by the British post office.

[FROM THE NEW YORK SUN.]

The Horse and the Bicycle.

The present prices of horses of average and even the better quality are lower than ever before in the history of the market. The business of horse raising has ceased to be profitable, unless it is confined to varieties of the breed for which there is a fashionable demand or which are distinguished for their speed. At the same time there is a falling off in the demand for carriages. With very good reason, the horse dealers attribute this decline in great part to the present passion for bicycle riding: and the use of electricity and cables for horse traction on the street railways throughout the Union has, of course, very much to do with it. The horse has been displaced, to a large extent, by these new agencies both as a beast of burden and an animal used for pleasure. The dealers, however, profess, and perhaps feel, confidence that the competition of the bicycle is due to a merely passing fancy or hobby. They say that the passion for bicycle riding is too violent to last, and that in the course of one or two years the horse will resume his place in the interest and affections of men and women, and the machine will be laid away as a toy of which people have grown weary. The diminution of the demand for draught horses because of the substitution of electricity for horse power, they admit, will continue indefinitely and steadily become greater. Here in New York, for instance, the time is near at hand when it will displace horses entirely from the street railways, and the same will be the case with the cities and towns of the Union generally. The experiments with carriages run by electricity or petroleum, which have been made recently in France, suggest that the horse will have a new competitor not merely in the cities, but along country roads and in agricultural operations. As it is, a very fair horse can be bought for about the price of a cow. The rare and incontestably superior beast may fetch about as much as ever, but the ordinary horse of ordinary and even good breeding is very cheap.

The use of the bicycle has increased at a rapid rate during the last year. It would be safe to say that there are three times as many wheelers as there were last summer, though then the number was great. Probably there are five times as many. The level roads in the neighborhood of New York are crowded with bicycle riders on Saturday afternoon more especially, and on all days they are numerous, and much more numerous than the people who drive horses for pleasure. Men who were once accustomed to take a drive for recreation when they reached the country from town, now to a large and increasing extent prefer bicycles. Consequently the driving has undergone a very perceptible diminution. Neither are they generally young fellows of sporting proclivities. Very many of them are gray haired men, who declare that they find in wheeling a needed recreation which driving does not furnish. Very many of them also are women, old and young. A great part of the country girls themselves are now expert wheelers, and the feminine visitors from town swell the numbers largely. Doubt as to the propriety of riding a bicycle has passed away, for fashion has set its stamp of approval on the practice and supplied conspicuous examples of it which have released the feminine mind from fear of offending conventionality by mounting a bicycle. Accordingly, man and wife, father and daughters, are frequently seen wheeling along the roads together in a high state of enjoyment.

The ambition to acquire the art of managing the machine, thus stimulated, is rapidly extending among men and women both, and as it is easily gratified now that numerous schools for the preliminary instruction

have been established, the practice of bicycle riding is increasing faster than at any previous time since the machine was introduced and brought to perfection. If people cannot afford to buy bicycles they hire them. Meantime the use of the bicycle simply as a means of transportation and for business purposes is extending correspondingly. It is in general employment in the country by messengers, mechanics, professional men, merchants, school teachers, and all persons who have long or considerable distances to go in the pursuit of their business. Children ride it to school. Clergymen

five more years remain of this century, but they are likely to be accompanied by some of the most important changes in civilization, wrought by new means of transportation and locomotion, which have occurred since this wonderful nineteenth century of mechanical invention and scientific discovery was ushered in.

Naval Notes.

The plans for the two new battleships, the construction of which was authorized by the last session of Congress, are now being drawn. The act provides that the cost shall not exceed \$4,000,000 each and that they shall be designed to carry the heaviest armor and the most powerful ordnance suitable to vessels of 10,000 tons displacement. It is also provided that one shall be built on the Pacific coast and the other on the Atlantic coast.

In the matter of protective linings against leakage from shot holes, both fire and water tests continue to show the advantages of the cornstalk cellulose over the cocoa product. The cocoa fiber was made to flame by an ignition which only blackened a little of the cornstalk cellulose. Streams of water were directed against the holes made in the cofferdams by the guns in the recent tests at Indian Head proving grounds. The hole made by the six inch shot in the cocoa cellulose washed out in half a minute to the depth of eighteen inches and that of the cornstock cellulose to a depth of less than four inches. Powerful

streams were directed upon the eight inch shot hole, and the cocoa cofferdam was bored completely through in nine seconds, but the cornstalk cellulose took twice as long.

The war ship Columbia made the trip across the Atlantic on her way to Kiel in a little less than nine days, being about 50 per cent longer time than the mail steamers require. When the Columbia entered the British Channel, she made a short spurt at the speed of 20 knots.

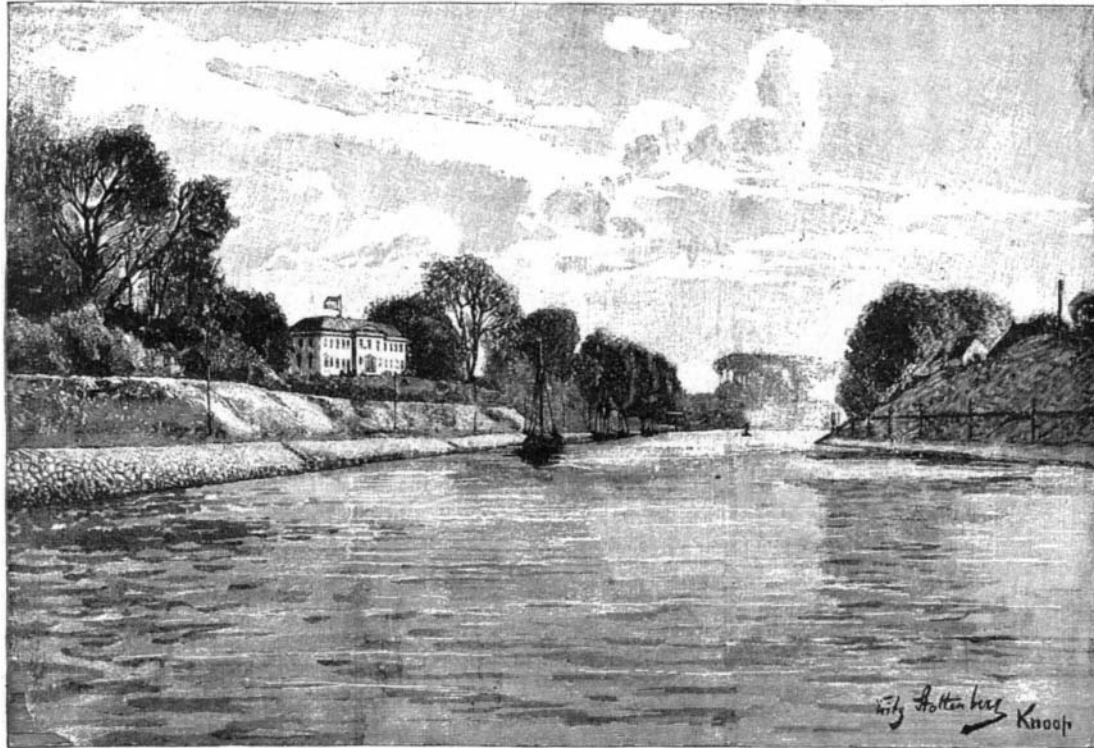
A complete frame from the battleship Iowa will be set up at the Indian Head proving ground, a fourteen inch armor plate will be attached to it, heavy guns will then be fired at the plate. The structure will be about eight feet high and five feet thick. It will include a sufficient number of ribs to back the plate about sixteen feet. Five inches of wooden backing will be used and the Harveyized armor plate will be attached to it by twenty-six bolts of new design. The frame is to be constructed at the Norfolk Navy Yard. The frame will be attached to the hillside, so as to secure the same conditions as in battle.

The Arawaks.

In the Port Royal Mountains, Jamaica, an interesting archæological discovery was recently made of a cave containing the skeletons of at least twenty-four of the aboriginal Arawaks. When Columbus discovered the island in 1494 the Arawaks were estimated at about 600,000. A century and a half later, on the capture of Jamaica by the English, they had completely disappeared, even to their bones, as only the skulls until now had been found. These showed a frontal depression with lateral expansion, an artificially formed deformity that is also found

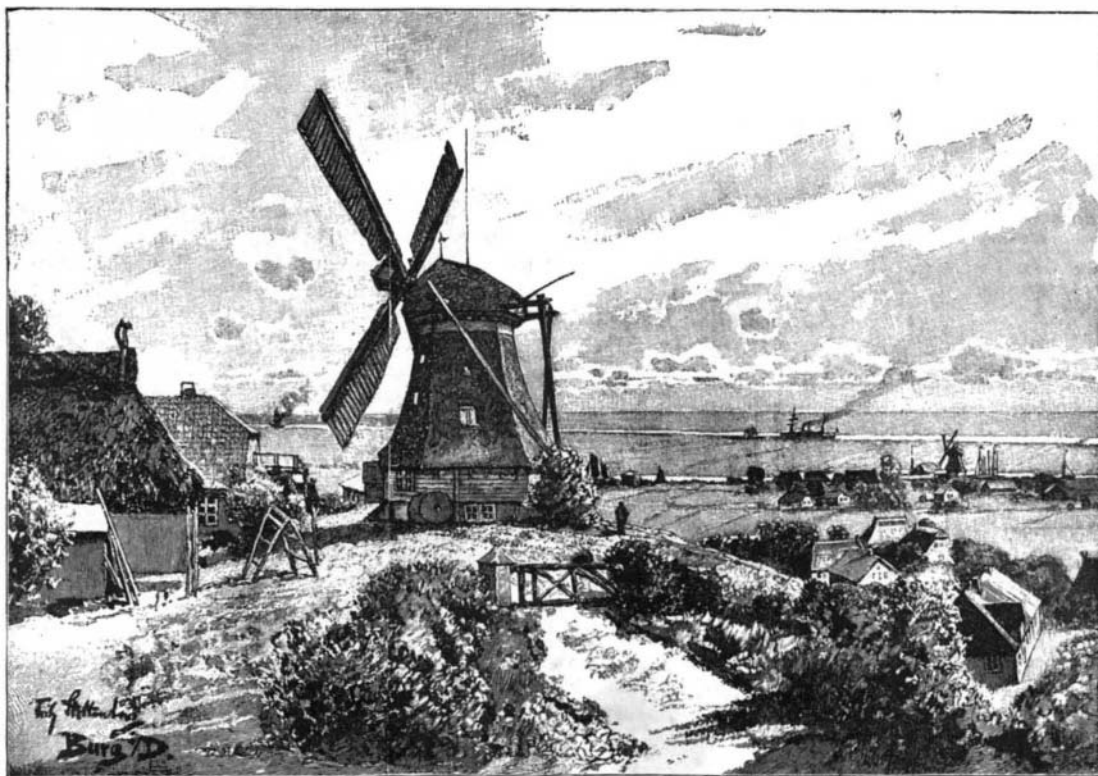
in those just discovered, which are of all ages. A shattered canoe of cedar wood, 7 feet long and 1½ feet wide, an arborvitæ mortar, and two earthenware vessels were found with the skeletons.

DR. CHADWICK thinks that bicycling is a most desirable form of recreation and exercise for women, and his purpose in bringing the subject up for discussion is to stimulate the inventive minds of its advocates to devise a saddle which shall not inflict local injury or discomfort upon women riders.



THE NORTH SEA CANAL—VIEW NEAR KNOOP.

use it even in making their pastoral visits, doctors in going their rounds. Its first cost paid, it requires no further expenditure except for occasional repairs. It does not have to be fed like a horse, and no one needs to be hired to take care of it. It extends greatly the region over which carpenters, masons, plumbers, or gardeners can make their work profitable, and to such it has become indispensable. They have all the advantages and none of the disadvantages involved in keeping a horse. They can make better time than the millionaire in his costly equipage. Accordingly, the assumption of horse dealers that bicycle riding is a mere fad, an ephemeral hobby, does not seem to be justified. Evidently the machine has come to stay. It may be that its use simply for sport and recreation will diminish hereafter, something else coming up to



THE NORTH SEA CANAL—VIEW NEAR BURG IN DITHMARSCHEN.

replace it in the popular fancy, but before that decline sets in, if it does occur, the passion for bicycle riding will doubtless increase and extend greatly. Multitudes of people yet remain to be affected by it; but as a machine for various use as a means of necessary transportation it must continue to be employed permanently by greater and greater numbers of people. Very many of them, it is true, have never been horse buyers, but the machine will enable thousands of people in all parts of the Union who have depended on horses to get along without them wholly or in part. Only

Washington Timber.

The Puget Sound Lumberman says: "Many estimates have been made of the amount of standing timber in the Pacific Northwest. In every case they were confined to the western portion of the State, leaving to the reader the task of 'guessing at the rest.' The estimates, too, were made in round numbers, leaving the impression that truth was lacking. The estimates that the Lumberman presents in this issue were carefully made. Of course, in a country so sparsely settled as the Pacific Northwest, it is impracticable to get at the actual number of feet, but the figures here given are as nearly correct as it is possible to get them. In gathering these figures, the Lumberman used three sources of information, viz., county surveyors, mill men and cruisers. The county surveyors, through intimate knowledge of their respective counties, were able to give the number of acres of timbered land; the mill men and cruisers, through their familiarity with the timber, were depended upon to give the number of feet to the acre. The surveyor also gave his estimate, and between the three it was possible to obtain an average. The figures given by the surveyors, mill men and cruisers were higher than those printed, and in rare cases an underestimate was made. Therefore, all things considered, the figures are very conservative and represent rather the minimum of the forest area than the maximum. The work represents the labor of three months' time. The result shows the immense wealth we have in our forests. At the present valuation of \$269,561,329, or 65 cents per 1,000 feet, for the State of Washington, what will our forests be worth when stumpage brings the Minnesota price of \$2.87?"

"They then give the figures of the forest area of Washington by counties, which amount in the aggregate to 23,588,512 acres. Number of feet standing, 410,333,335,000.

"The estimates are very conservative. Many mill men, loggers and persons who have cruised the timber in various counties, assert that it is entirely too conservative. We have aimed to make the figures rather too low than too high, believing that the above will give as correct an idea as possible of the amount of standing timber in the State that might be termed merchantable. While these figures may seem incredible to persons not accustomed to our timber, our own mill men will readily appreciate our efforts to be fair in these estimates. The Eastern mill man or timber land owner may find it hard to believe that the timber in Chehalis County will average clear through nearly

32,000 feet of merchantable timber per acre, but the writer knows personally of whole townships in that county that will cruise from 6,000,000 to 12,000,000 feet to the quarter section. On one occasion he stood and counted within a radius of about two hundred feet not less than sixty-four trees, not one of which was less than four feet in diameter, and from two hundred to four hundred feet in height, besides as many more smaller ones that might be termed 'merchantable timber.' The Secretary of the Board of Trade of Anacortes writes that '16,000,000 feet of merchantable timber to the square mile in this county (Skagit) is not a high figure, when it is considered that there are many forty acre tracts that will cut from three to four million feet each.' All of which is perfectly true, as many loggers in that section can testify. A cedar tree from twelve to twenty feet in diameter and from one hundred and fifty to three hundred and fifty feet high, the first limb being nearly or quite one hundred feet from the ground, will cut a considerable number of feet of clear lumber, or quite enough shingles to fill several cars. While of course this is not average timber, it is not difficult to find such enormous trees, when occasion requires, in any of several of the counties of western Washington.

"It is evident from the above that the heaviest timber is in the counties in the northern portion of Western Washington and in those bordering on the Pacific Ocean. It is a singular fact that might be mentioned in this connection, that the best timber does not grow directly on the coast, but beginning about a mile back from the ocean, it gets larger and better for two or three miles, where it becomes large and fine, this condition prevailing for a number of miles eastward. Again it becomes very large and heavy at the base of the Cascade Mountains, diminishing again as the summit is reached and increasing yet again as the descent is made on the eastern side, until the foothills are reached, where the best timber of eastern Washington is found.

"It has been generally supposed that practically all the timber of Washington was in the western portion, and that perhaps two-thirds or three-fourths of that was in the Puget Sound region proper. It has been generally conceded that there was but little timber of value in any of the eastern counties except possibly Spokane, and that several counties were absolutely treeless. This is a mistake, as will be seen by the above. There are just two counties out of thirty-four in the entire State that are without any standing timber whatever. These are Adams and Franklin,

both in the eastern portion of the State, adjoining each other, exactly similar in topography, the two counties comprising an arid sage brush desert, unfit for agricultural purposes without irrigation, and with no means whatever as yet in sight for supplying the deficiency of rainfall, as all streams flow from them, affording no opportunities for easy irrigation.

"The following table will give an idea of the amount of timber, both east and west of the Cascades:

	No. Acres Timber.	No. Feet Standing.
East Washington.....	11,616,720	106,978,041,000
West Washington.....	11,974,792	303,355,294,000

"The kinds of timber in the State of Washington are yellow fir, red fir, white fir, cedar, spruce, Alaska pine, larch, yellow pine, bull pine, tamarack, alder, maple, oak, yew, cherry, cottonwood, Alaska cedar, curly maple, birch, madrone, willow, elm.

"The quality of the timber of Washington, taken as a whole, is better than that of any other State.

"Therefore, it is self-evident that Washington is the great lumber yard of the United States from which must come the supply for all parts of the country. In addition to this, China, Japan, Mexico, Australia, South America, and Europe must look to this State for much of their supply, and already the ships of all these countries are in our ports after cargoes. As from all quarters in ancient time did they go to Egypt for grain, so will they now from the four corners of the earth come to Washington for lumber. As did then Egypt prosper and grow rich, so will Washington now, and as did her seaport cities become great, so will those of Washington."

Naphtha for Cleaning Wool.

The employment of naphtha as a cleansing substance in the scouring of wool is a new method favorably commented upon by the scientific papers. By the use of a pump the naphtha is forced through and through the wool, extracting all the natural oil, it being also claimed that the naphtha does not injure the fiber of the wool, as does alkali cleansing, but leaves the fleece in an actually better condition than when cleansed by any other process. A further valuable feature mentioned of this method is that the grease that is extracted from the wool may be again extracted from the naphtha in a pure state, thereby becoming valuable as a medicinal agent or for a saponification into the purest of soaps. A plant following this method is said to have scoured 500,000 pounds of wool, and had saved a product of 80,000 pounds in pure wool oil.

RECENTLY PATENTED INVENTIONS.**Railway Appliances.**

CAR COUPLING.—Edward R. Brown, Tallahassee, Fla. This is an automatic coupling employing a ball link and gravity pin, the uncoupling being effected from the top or side of the car. The drawhead is spring-cushioned and arranged to receive a limited vertical rocking movement, the link also rocking slightly in the drawhead chamber, thus facilitating the ready coupling of cars of varying heights. The drawhead and all parts of the coupling are readily disconnected from the car, thus rendering it easy to make repairs.

SWITCH LOCK.—Samuel E. Barlet, Red Bank, N. J. This is an improvement on a patent formerly granted to the same inventor for interlocking railway switch systems, and provides a simple and durable lock which positively prevents the operator in charge of the tower from wrongly setting the switch or signal. The mechanism is so arranged that the operator or leverman cannot manipulate the lock lever and connected mechanisms to display the necessary signal unless the switch is in proper position, as the lock controls the signal.

AIR CUSHIONS FOR CARS.—Linford E. Ruth, Connelville, Pa. This invention relates to filling mattresses or cushions of sleeping and parlor cars with compressed air without any permanent or organized connection of pipes. It provides for either permanent or detachable cushions with socket-shaped outlets and air reservoirs which can be cut off from the air brake pipes, in combination with a detachable hose having a special form of nozzle at each end fitting in the socket-shaped outlets, whereby the cushions may be readily inflated and the hose removed.

Electrical.

SIGNALING.—Douglas L. V. Browne, Denver, Col. For signaling from the moving buckets or cages of mining shafts or from elevator cars, or other apparatus operated by a movable rope, electrical conductors are, according to this invention, concealed within a rope or cable, the operation of the cable in winding and unwinding not being interfered with, and the conductors being connected with circuit-closing mechanism and electrically-operated signals in such a way that the signals may be instantly operated without regard to the position of the rope or cable. The invention affords a simple and positive means of signaling designed to act surely and always make good electrical contact.

CONDUIT ELECTRIC RAILWAY.—Louis R. and Albert H. Lavalle, Holyoke, Mass. This invention provides a system in which a continuous supply wire is used, and the trolley arranged in a series of blocks supplied therefrom, but out of circuit except when the trolley is in contact with them. A positively working switch automatically cuts in the successive blocks and cuts them out as the trolley progresses. The trolley makes positive contact with the trolley wire and also operates the

switches. It is vertically extensible, to adapt itself to the varying load of the car, and is separable longitudinally, so that in case a car jumps the track the trolley parts and no great harm is done.

Mechanical.

SPLIT PULLEY.—Mablon B. Lorah, Reading, Pa. The rim and web of this pulley are made of wood, and especially adapted for electric motors. It has two pulley sections forming a continuous rim and an apertured web having projecting members at each side on which are clamp devices with clamp portions fitting the bushing. The sections are built up of disks of wood glued together, alternate layers having the grain in the same direction. The pulley may be quickly fixed in position and readily changed to fit different sized shafts.

METALLIC PACKING.—Edward L. Raynsford, Susquehanna, Pa. This packing has an inner sectional ring, each section with a groove having beveled sides in its periphery, there being a tongue at one end and a recess at the other, while in the outer sectional ring each section has lugs projecting from its periphery, there being a tongue at one end and a rabbet at the other. The joints between the sections of the inner and outer rings are made to break joints, forming at all times a secure packing without the use of springs.

TREATING SHEET METAL PLATES.—John D. Grey, Baltimore, Md. For treating iron and steel plates for tin, terne, and galvanized work, instead of the costly process of black annealing, this inventor provides, in combination with the pickling apparatus and cold rolls, a series of racks to support the plates in the pickling and washing baths, carriages to receive the racks, an intermediate drying oven with open ends and tracks on which the carriages run, driven by an endless chain and driving mechanism.

BOLTING CLOTH BRUSH.—Harry K. Mowson and Roswell F. Corey, Scottsville, N. Y. The under side of the bolting cloth, according to this invention, is engaged by a traveling revolving brush, which has a backward and forward movement, the brush being in constant contact with the under side of the cloth, and keeping its meshes perfectly free at all times, so that it will work to the greatest advantage in producing very fine flour.

WINDMILL.—Edward S. Crawford, Milford, Ill. This is a simple and strong machine, designed to run easily, readily thrown into and out of gear, and which may be regulated to run with the utmost smoothness and nicety. The head has a laterally extending hollow spindle on which turns the boss of a wheel having pivoted fans provided with crank shafts connected to their pivots, there being a slide shaft in the hollow spindle and a cross arm on the outer end of the shaft. There is a spring between the arm and the end of the spindle, and a spring connected to the outer end of the shaft is adapted to bear on the outer face of the cross arm, while rods connect the ends of the cross arm to the cranks of the pivoted fans.

Miscellaneous.**MATTE AND SLAG SEPARATING WELL.**

—John D. Davies, Butte, Montana. This well has two compartments, both preferably lined with firebrick, the larger and higher compartment receiving the molten metal from the furnace, having in its top edge at the rear a notch forming an outlet for the slag, and next to the notch a vertical slot to be closed by a plate held in brackets. In the partition between the compartments is an opening near the bottom to conduct the matte from the larger to the smaller compartment, which has on its top edge a matte discharge notch leading to a suitable spout at a lower level than the slag discharge spout. In the outer end of the smaller compartment is a tap hole opposite the tap hole leading from the larger to the smaller compartment.

DUMPING SCOW.—John Russell, New York City. The hull of this vessel has transverse watertight compartments with inclined outer surfaces adjacent to inclined stern and bow sheathings, longitudinal watertight compartments between the transverse compartments, vertical bulkheads, and over the compartments are airtight tanks held in place by the deck. There is a central well whose bottom is formed of hinged trap doors, readily opened for dumping the garbage or load of the scow, which is not liable to founder in any case, and is designed to carry a greater load and be managed by fewer men than heretofore. The scow may also be employed for transporting lumber, stone, etc.

BICYCLE CASE.—Norman W. Mumford, Jaffery, Fla. To obviate the necessity of taking a wheel into or out of the house, this inventor has devised a cheap and simple case in the form of a closed structure adapted to hold the bicycle upright, readily handled and transported, practically burglar and weather proof, and which may be conveniently locked to a building or fixture. It has an end door and interior parallel guides to receive and guide the wheel, and within the case at the top and sides are straps for securely holding the machine in place.

PEDOMETER.—Anton Reinisch and Lorenz Kratochwil, Vienna, Austria-Hungary. This is a device to be attached to boots or shoes, and adapted to receive an impulse each time the foot is set down, a suitable counting mechanism registering the number of steps made. The device may also be attached to the hoofs of horses or other animals for ascertaining the number of steps made.

BANJO.—William F. Libby, Gorham, Me. In this instrument an improved construction of the frame of the head is provided for, designed to afford increased volume and sweetness of tone, and in the right hand edge of the neck is a longitudinal groove adapted to receive the fifth string, which is carried in engagement with a suitable guide to a key located between the keys receiving the other strings. All of the keys are thus grouped together, and the neck at both sides is free for the passage of the player's hand.

PENHOLDER.—Thomas C. Campbell, New York City. The hollow barrel of this holder has a

side opening, a spring tongue holding the pen in the barrel, and a slide connected with the tongue being capable of having one end dropped through the opening to disengage the tongue and pen. The pen is as firmly held as in the ordinary holder, but may be readily freed by the releasing device, which does not in the least interfere with the ordinary use of the holder.

BILL HOLDER.—William J. Whitwood, Wellsville, N. Y. This is a convenient device for retaining folded bills or other papers, permitting any or all of the papers to be readily removed. Combined with a holder plate and clamping piece are bow springs attached to the holder plate, a flexible strip being attached intermediately to the clamping piece and at its ends to the free ends of the springs.

DENTAL BRIDGEWORK.—Bernard B. Bray, Axtell, Texas. This invention provides an improved crown, cap or band for attaching the bridges to the natural teeth, the crown or band having a lug at each side of a split portion, the lugs facing one another and having inclined outer side faces. A pin or screw is adapted to enter the lugs and draw them together, forming substantially a dovetail tenon. The improvement is designed to dispense with the large quantity of gold usually required in this character of work, and make artificial teeth look much more natural.

MOP HOLDER AND WRINGER.—Albert M. Bien, Deer Lodge, Montana. This is a device for use with a mop of any size, to facilitate effectively wringing the mop without placing the hands on it. The mopstick has at its forward end a screw-threaded portion on which travels a head block with a wringing frame having a sliding movement, a locking device of the frame engaging the head block. A mop-holding device secured to the mop stick has diverging loops adapted to receive the forward member of the wringing frame.

NUT SHELLER.—Julien Prade, Waco, Texas. This is a simple machine especially adapted for shelling pecans, and which may be used on other nuts. It has an adjustable holder which adapts itself to various sizes of nuts, the holder having a number of radially yielding plates carrying knives and a plunger with radial blades engaging the plates. The plunger cuts the shell from the nut, and the machine cleans out the holder and knives, so that it works well every time.

WELL BUCKET.—William H. Tilford, Wartrace, Tenn. This bucket is arranged to fill itself automatically when lowered into the well and drawn out, and it may also be conveniently emptied. It has in its bottom a valve seat in which slides a tube open at the lower end and carrying at its upper end a fixed valve adapted to be seated on the upper face of the bucket bottom.

SHEEP SHEARS.—Leonard J. Lohlein, Lusk, Wyoming. These shears have a special form of handle adapted to receive and combine with a series of detachable cutting blades, which are quickly interchangeable. One handle may thus be used with a great number of blades, and the latter are more easily ground, the blades being made in a series of different sizes to