

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

better adapt them to the condition of the wool on different sheep.

NECK YOKE ATTACHMENT.—Benjamin J. Sykes, Troutville, Pa. Three straps are included in this attachment. A holdback strap extending from the collar to the neck yoke, another strap extending from the neck yoke to the belly band, and a third strap extending from intermediate position on the belly band strap to the upper end of the holdback strap. The improvement is adapted for use with a breast strap or with a collar.

ANAL BOUGIE.—Franklin P. Stucky, Lancaster, Ohio. This is a device for mechanically reducing the inflammation and swelling in the treatment of hemorrhoids.

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.

THE TELEPHONE SYSTEMS OF THE CONTINENT OF EUROPE. By A. R. Bennett. London and New York: Longmans, Green & Company, 1895. Pp. xiv, 436. 12mo, 169 illustrations. Price \$4.50.

A painstaking work which should be in the hands of all who are interested in telephony. It includes statistics of the telephone services in twenty-six countries. It gives such information as the history and present position of the telephone in the various countries, the services rendered to the public, the tariffs, the exchanges, the switching arrangements, the hours of service, subscribers' instruments, payment of workmen and operators. The details of the various telephone systems though brief are of value, as the author was thoroughly acquainted with practical telephony, having served several companies as chief engineer. The statistics regarding the financial position of the various companies and their tariffs are particularly interesting in view of the recent discussion regarding the high telephone rates in the United States. The illustrations consist of views of exchanges and instruments, diagrams of switch boards, cross arms, insulators, etc. Great stress is laid on telephone exchange towers and turrets; most of these supports for wires are ugly, but a notable exception is the handsome dome of iron erected over the central post office at Stuttgart. It is capable of carrying 14,000 wires, the whole surface of the dome being covered with insulators. The effect, though a little startling at first, is on the whole very pleasing.

SCIENTIFIC AMERICAN BUILDING EDITION.

JULY, 1895.—(No. 117.)

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- 1. An elegant plate in colors showing a residence at Bridgeport, Conn., recently erected for Christian M. Newman, Esq. Three perspective elevations and floor plans. Cost \$5,500 complete. Architect, Mr. Samuel D. P. Williams, Williamsburg, N. Y.
2. A handsome residence at Glenwood, N. Y., recently erected for Wm. R. Innis, Esq. Two perspective elevations and floor plans. An attractive design.
3. A modern cottage of attractive design recently erected at New Rochelle, N. Y. Perspective elevation and floor plans. Estimated cost \$3,000. Architect, C. B. J. Snyder, New York City. Design in the American order of architecture.
4. A summer cottage at Great Diamond Island, Me., recently erected for Edward L. Goding, Esq. Two perspective elevations and floor plans. Cost \$2,500 complete. A picturesque design. Mr. A. Dorticos, architect.
5. An attractive dwelling at Oakwood, Staten Island, recently erected for Mrs. Margaret Dutche. Cost \$3,800 complete. Two perspective elevations and floor plans. Architect, Mr. Herman Fritz, Jr., Passaic, N. J.
6. A Colonial dwelling at Springfield, Mass., erected for Messrs. J. D. and W. H. McKnight, at a cost of \$6,000 complete. Two perspective elevations and floor plans. A pleasing design. Architect, Mr. G. Wood Taylor, Boston, Mass.
7. Colonial house recently erected at Groton, Mass., in the style of Longfellow's home. Perspective elevation and floor plans. Architects, Messrs. Child & De Goll, New York.
8. View of the Hotel Majestic, New York. One of the finest hotels in the world. Architect, Mr. Jacob Rothschild.
9. A cottage in the Colonial style, recently erected for Margaret Deland at Kennebunkport, Me. A picturesque design. Perspective elevation and floor plans. Mr. Henry P. Clark, Boston, Mass., architect.
10. Suggestions in corner decorations.
11. Miscellaneous contents: Hoop poles.—How to drive rats away alive.—Dumbwaiters and elevators, illustrated.—Saws.—Translucent fabric.—Improved spring hinges, illustrated.—Ventilated school wardrobes, illustrated.—Hanger for storm sash and screens, illustrated.—The hygienic refrigerator, illustrated.—Improved door hangers, illustrated.—Improved steam heater, illustrated.—Concrete roofs.—A trackless sliding door hanger, illustrated.—A first class hot water heater, illustrated.

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Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information and not for publication. 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. Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same. Special Written Information on matters of personal rather than general interest cannot be expected without remuneration. Scientific American Supplements referred to may be had at the office. Price 10 cents each. Books referred to promptly supplied on receipt of price. Minerals sent for examination should be distinctly marked or labeled.

(6572) L. J. W. writes: 1. I would be pleased to know what is the cost of a horsepower, and what goes to constitute the cost? This I would require as a general average. Also what price is current in selling steam for horse power in engines at the usual conditions? A. The cost of steam power is very variable. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 423, on the cost of steam power. Prices vary from \$1 to \$1.50 per annum. 2. What is the relative value of an electrical horse power to boiler horse power? That is, I buy coal and I sell electricity, and I buy coal and sell horse power to an engine. A. The relative value of boiler horse power to electrical horse power varies with the economy of the engine, in which varies with the amount of steam required to produce a horse power, say from 30 pounds to 12 1/2 pounds, upon which about 80 per cent will be the electrical output of horse power. 3. What is the greatest amount of water evaporated per one square foot of heating surface in marine practice and under what draught? A. The evaporation in marine boilers varies somewhat, say 2 1/2 to 3 1/2 pounds per square foot of surface. Forced draught may increase the evaporation from 10 to 15 per cent. 4. What is the weight of iron per horse power in the usual run of marine boilers in racing craft and torpedo boats? A. There is a wide difference in the weight of the different types of boilers; as low as 40 pounds and all the way up to 200 pounds per indicated horsepower of the engines is noted. 5. What is the horse power required to generate and make 100 tons of ice per day, evaporating water and pumping it also, with a modern improved plant? A. About 4 horse power more or less according to the nature of the process. 6. Can steam from large condensing engines after going through a grease extractor be used for making ice? A. No. 7. Are there any boilers in America being built and run with water tube exactly vertical and short for large horse power? A. None. 8. Is a water tube grate bar successful and economical? A. Not successful heretofore. 9. How many electric horse power can a 100 horse power engine develop? A. About 80 per cent of the indicated horse power of engine.

(6573) P. C. C. writes: Suppose there is a double railroad track where all the trains uniformly travel on one track going north, while the trains all uniformly travel on the other track going south. In such cases it has been observed by experienced railroad men that on the track where the trains travel north, one of the rails (east or west) is always worn more than the other; while on the track where the train moves south, the opposite rail (east or west) is uniformly worn more than the other. In each case which rail is it that wears more (inside or outside) and why? A. North and south railway tracks in northern and mid latitudes are radial to the earth's axis, as shown by the meridian lines on a polar map or globe. As cars move to the south at great speed they meet an increasing speed of the earth's surface, which forces the track against the west side of the train and wears the west rail. When running north the train is constantly meeting a decreased speed of the earth's surface, and having left and partaken of the higher speed of the earth's surface at the south, are thrown against the eastern rail, causing wear. 2. Is it safe for a lightning rod to come in contact with any part (especially those parts exposed to the weather) of a wooden building? A. It is safer to attach a lightning rod to the building than to use insulators, provided the ground connection is perfect or in thorough connection with moist earth. 3. Can a cheap battery be made without using either of the following: Zinc, copper, bluestone (cupri sulphate), carbon, and bichromate of potash? If

so, how can I make it? A. There is no reliable battery made with cheaper material than you have stated.

(6574) A. S. De V. writes: Would you kindly inform a number of readers the theory of a cannon exploding while ramming home the load after it has once been shot. Also why holding the touch hole shut prevents an explosion, and also why the same is not necessary when loading a large pistol or muzzle-loading shot gun? A. Muzzle-loading cannon are loaded by pushing a powder cartridge or bag of powder to the breech, followed by the wad and ball. The bag, usually of flannel, is fired by the intense heat of the discharge and its rear end left in the gun. If air is allowed to reach any fragments of the bag that may not have been removed by swabbing, they may take fire and ignite the next cartridge. By closing the vent instantly after a discharge, air is prevented from entering the gun and the act of swabbing does not displace the product of combustion, mostly carbonic acid gas, which is a destroyer of combustion. The swabbing as a churn in the gas does not draw air in to set fire to any heated particles of combustible that might remain in the gun. In muzzle-loading shot guns and pistols the powder is poured in loose and is consumed and blown out at each discharge, so that there is nothing but the powder that could possibly remain, and the possibility of anything in the gun or pistol that would ignite a fresh charge is very small, yet premature explosions occasionally occur in quick firing of muzzle-loading arms.

(6575) W. T. B. writes: I am running a so-called 25 horse power engine, cylinder 10 inches diameter and 12 inches stroke, from a boiler of rated 15 horse power, 60 to 80 pounds pressure, nominal speed 150 revolutions per minute. I do not think that it uses steam economically. Would I get better results or more power by putting on a larger drum (present one is 36 inches diameter) and reducing speed to 130 or 100 revolutions per minute? A. The drum appears to be large enough. There is no economy in reducing the speed of the engine. The boiler appears to be too small for the economical generation of steam for the apparent power from the engine, and you may be wasting heat by the chimney from an overstrung fire and small boiler capacity. The throttle valve and cut-off plays an important part in the economy of running an engine. To be economical requires as full pressure at the steamchest as possible and the valve set to cut off at a point to give the power required. The governor should govern the speed, and the throttle valve should only be used as a contingency to over-pressure or extreme release of load. Without further facts as to the cut-off, kind and amount of work and the kind of boiler, we can only suggest that a larger and horizontal boiler be used, and an automatic governor operating the slide valve be adopted.

(6576) W. S. asks: 1. What size plate and how many of them would I have to use in a 60 cell storage battery to light three 110 volt 16 candle power lamps? The cells built like the Faure battery described in your June 21, 1891, issue. A. For the best results the plates should not be less than 7x10 inches, 13 or 15 plates per cell. To secure the 110 volts, the battery having two volts per cell, you will need 55 cells for 1 lamp or any number up to the capacity of the battery. 2. Is the induced current in a transformer, using an alternating current in the primary, an alternating or direct current? A. Alternating current. 3. I cannot understand how Tesla produces a current alternating 100,000 times a second by the multipolar generator described in the "Life and Works of Tesla." Please explain. A. We cannot give a detailed description of Tesla's experiments. It is conceivable that 100,000 alternations per second could be secured by properly proportioning the number of elements in the machine and the number of revolutions.

(6577) M. McG. says: I see in your SUPPLEMENT, No. 397, August 11, 1893, on the subject of military ballooning, that a very light hydrogen gas was produced by passing steam over red hot iron, but it does not explain just how they did it. Can you give me the information? A. See the SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 823, 849.

(6578) C. R. W. asks how the bottoms of trousers are cemented. A. Use thin sheet gutta percha, which can be purchased of the manufacturers especially for tailors' use. Place a piece of the tissue between the layers of cloth to be cemented and press with a hot iron. This causes the cloth to firmly adhere on account of the melting of the gutta percha.

(6579) H. A. McE. says: Can you give me some information regarding the beverage "perry"? A. A fermented liquid, prepared from pears in the same way as cider is from apples. The reduced pulp must not be allowed to remain long without being pressed. In the case, perry does not bear changes of temperature so well as cider. It is therefore advisable, if at the end of the succeeding summer it be in sound condition, to bottle it, when it will keep perfectly well. The red, rough-tasted sorts of pears are principally used for making perry. They should be quite ripe, without, however, approaching to mellowness or decay. The best perry contains about 9 per cent of absolute alcohol; ordinary perry from 5 per cent to 7 per cent. Perry is a very pleasant-tasting and wholesome liquid. When bottled champagne fashion, it is said to frequently pass for champagne without the fraud being suspected.

(6580) A. D. asks how to make buff wheels. A. Turn up the wooden disk to form the wheel on the mandrel on which it is to run. Cover the periphery of the wheel with good glue, prepared as for gluing wood, stretch the leather around and confine it with shoe pegs driven in about 2 inches apart. When dry turn off true with a sharp chisel. Give the leather a coat of glue and roll it in the emery, so as to make it retain it by being embedded in the glue. Let the wheel dry, until the glue is hard and it is ready for use.

(6581) W. P. P. asks for a formula for carton pierre ornaments. A. The following is a formula for such a composition: Glue, previously dissolved in water, 13 parts; pulverized litharge, 4 parts; white lead, 8 parts; plaster of Paris, 1 part; very fine sawdust, 10 parts. Oil the moulds in which it is cast to prevent adhesion.

TO INVENTORS.

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INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

July 9, 1895,

AND EACH BEARING THAT DATE.

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

Table listing various inventions and their patent numbers. Includes items like Alarm, Alarm clock, Alkaline sulphates, Animal shears, Animal trap, Arc light, Axle, Bag, Balling press, Bath apparatus, Battery, Bearing, Bed, Beer drawing apparatus, Belt, Bevel, Bewick machine, Bicycle attachment, Bicycle bearing, Bicycle clutch mechanism, Bicycle lock, Bilge water pump, Bit stock, Blower, Board, Boiler, Boiler furnace, Bookcase, Book holder, Book, Boom, Bottle safety case, Bracket, Brake, Bread knife, Bridge flooring, Bridle binder, Budding tool, Buildings, Bung attachment, Burglar alarm, Burning petroleum, Butter making apparatus, Cable grip, Calendar, Camera, Camp chair, Can crimping machine, Can labeling machine, Car coupling, Car coupling, Car fender, Car guard, Car loading mechanism, Car seat, Car seat, Car seat, Car track, Car wheel, Cars, Cars, Carding engine, Carding machine, Carriage, Case, Ceiling, Celluloid articles, Chain, Chair, Cigar tip cutter, Cigarette and cigar machine, Clamp, Clothes drier, Coal elevating apparatus, Cock and warning signal, Cock, Coffin, Collar, Collapsible boat, Coloring matter, Copying machine, Cornice, Corrugating and cutting tool, Coupling, Cultivator, Cultivator, Culvert, Curling iron, Cutter, Cycle saddle, Denture, Detergent compound, Digger, Dish cleaner, Disinfecting apparatus, Display stand, Door hanger, Draught equalizer, Draughting instrument, Drill, Drinking cup holder, Electric battery, Electric brake, Electric lighting system, Electric meter, Electrically controlled motor, Elevator, Elevator cut-out valve attachment, Elevator safe, Engine, Engine, Engine attachment, Envelope machine, Excavating machine, Extractor, Feedwater heater and purifier, Fence and method of plashing, Fence, Fence post, Fence post.