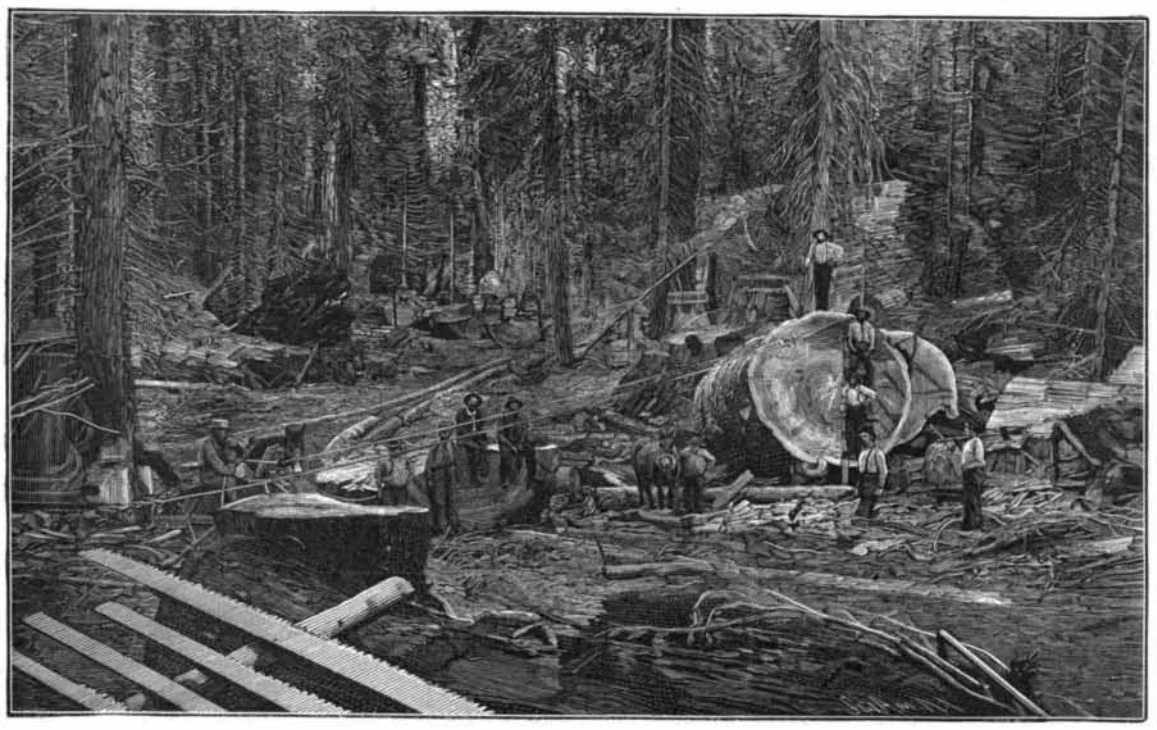
LOGGING IN THE SIERRA NEVADA MOUNTAINS, CALIFORNIA.

Notable among the many natural wonders of western America are the forests of giant trees which cover the lower slopes of the Rocky, the Sierra Nevada and the Cascade Mountains. To an eastern traveler there is no feature of the country lying between the Pacific Ocean and the first named range which creates so strong an impression of novelty as the size and character of the forest timber. The oak, the maple, the elm and a dozen other varieties which are familiar to residents in the country east of the Alleghanies cease to form a feature of the landscape; and as the train climbs the eastern slopes of the Great Divide, he catches his first glimpse of the giant trees of the West, the rounded outline and dense foliage of the eastern trees giving place to the tall, tapering, sentinel-like forms of the redwood of California and the pine and fir of Oregon and Washington. The finest specimens are to be found in the large groves, where the trees are massed in close array, their huge trunks from 10 to 25 and 30 feet thick at the butt, rising perfectly plumb, and without a limb, for from 175 to 250 feet, to the first branches, many of which are thick enough to form a massive tree in themselves. The largest specimens of the California trees are found in the famous groves of Mariposa and Calaveras, where specimens of the Sequoia gigantea, with a diameter of 30 feet at the butt, were not uncommon when the grove was first discovered, and the heights were estimated at from 275 to 400 feet.

The accompanying views were taken at the logging camp of the Sanger Lumber Company, situated on the western slope of the Sierra Nevada Mountains, in Fresno County, California. The two mills are situated at an elevation of 5,000 feet above sea level, and the busy whirr of the band saw, which is used in preference to two circular saws cutting from above and from below, is heard day and night continuously, the night work being carried on by electric light. The mills cut about 225,000 feet in 23 hours. After the lumber is cut it is carried down to the valley, a distance of 54 miles, by gravity. For this purpose a V-shaped flume is constructed, into which a stream of water is directed at the mills, the lumber being swept down by the water at a great velocity. When the timber had all been cut off in the vicinity of the mills, it was necessary to go up to a higher belt—for which purpose some nine miles of mountain railroad were built. After skirting the base of the higher range for five miles, the road is carried up the side of the mountains on a grade of 30 per cent, or 1,584 feet to the mile. A powerful hoisting plant is situated at the top of this grade, and trains of three cars are drawn up at a time with a 1½ inch wire cable.



LOGGING IN THE SIERRA NEVADAS—GENERAL VIEW OF CAMP.

After communication with a belt of timber has been established, these noble trees, many of which have been standing over a thousand years, begin to fall beneath the ax and the cross-cut saw. A deep cut is made on the side of the tree toward which it is to fall (as can be seen to the left in the accompanying cut showing the donkey engine), and the tree is then sawn through from the opposite side. The "falling" of a 250 foot tree is a thrilling sight, never to be forgotten. The first warning is given by the cracking of the fibers, as the saw cuts away the small remaining wood that holds the tree up. The top of the tree is seen to move slowly across the clouds, and the giant bends slowly to its fall. With an angry "swish" and an increasing momentum it describes a giant quarter circle to the ground, its two or three hundred tons of weight making the earth tremble as from an earthquake shock. The logs, as will be seen from the illustration, are of unusual size, the majority of them running from 5 to 16 feet in diameter. For convenience of handling, all of the logs over 8 feet in diameter are blasted into sections with powder, before they are shipped down to the mills. The logs are hauled to the railroad by means of a portable donkey engine, which is bolted to a sled. When it is desired to move the sled the wire cable is run through a pulley, which is attached to a convenient tree or stump, and brought back and fastened to the sled. By winding in the cable the engine is drawn into the desired position.

When the logs are to be moved the sled is chained to a tree, as shown, and the hauling is accomplished by running the steel rope through as many steel pulleys as may be required. The logs are hauled to the railroad over chutes formed of two parallel lines of logs or poles, half sunk in the ground, and freely greased with tallow. The hauling on the steel railroad is done by the curious type of locomotive shown in the illustration, which has been designed to give a maximum adhesion for climbing heavy grades. The cylinders, of which there are three, are arranged vertically on one side of the boiler. The crank shaft extends the full length of the locomotive, and drives the four wheels of the truck by means of bevel gears. To provide for the vertical and lateral movement of the trucks, the shafting is provided with universal joints, which are located between the cranks and the trucks. The whole of the weight of the engine is thus on the drivers, and by gearing down a large tractive effort is secured with a comparatively small locomotive.

LOGGING IN THE SIERRA NEVADAS—PORTABLE DONKEY ENGINE HAULING LOGS.

LOGGING IN THE SIERRA NEVADAS—A TWELVE FOOT LOG.

Japan's Merchant Marine.

The annual report of the Japanese Bureau of Merchant Marine, which has just been received here, shows a condition of affairs with respect to the marine of that nation compared with that of the United States which is not flattering to this country. The report shows that Japan has registered for foreign trade 109 iron and steel steamships of 231,139 gross tons. The United States has registered for foreign trade 103 vessels of the same kind, of 226,503 gross tons. The Japanese merchant fleet includes 114 vessels of over 1,000 tons, chiefly steamers of British or German build. The American merchant fleet in the Pacific numbers 119 vessels of this size. The Tosa, the largest of Japanese merchant steel steamships, measures 5,789 gross tons, and was built in England in 1892. The largest American steamship on the Pacific, the City of Peking, measures 5,080 gross tons and was built in 1874 on the Delaware. The largest steel steamship built in Japan is the Suma, of 1,502 tons, built at Nagasaki in 1895.

The Nippon Yusen Kaisha, the chief Japanese steamship line, which has recently made Seattle one of its terminal ports, owns fifty-one steamers of 94,000 tons. The Pacific Mail Line employs fifteen steamers of 43,000 tons on the Pacific. Since 1890 twenty shipyards have been established in Japan and forty were established in the previous decade. Of the ten remaining yards the oldest dates back to 1659. The stone drydock at Nagasaki is 438 feet long and 26 feet draught. The Newport News drydock is 609 feet long and 26 feet draught. The Cramp basin dock is 428 feet long and 21 feet draught.

The Japanese subsidy law, which went into effect in October, gives to shipbuilders a bounty of $10 per gross ton on steel vessels over 1,000 tons, and $2.50 per horse power.

Prize Monographs on Kites.

It is announced that in view of the fact that a number of monographs on kites have been received in competition for the Chanute prize of $100 offered through the Boston Aeronautical Society, since a circular announcing the postponement of the award was issued, the society has decided to limit the time for receiving monographs to January 1, 1897. The award will be made as soon after that as possible.

Surgery Without Anæsthetics.

One of the most interesting papers read at the recent celebration in Boston of the fiftieth anniversary of the first administration of ether in a surgical operation was that by Dr. John Ashhurst, of Philadelphia, on "Surgery Before the Days of Anæsthetics." It vividly recalls the horrors of those days when the surgeon's knife was an object of far greater terror than now, and inflicted untold tortures upon the conscious patient

"A study of the condition of surgery before the days of anæsthesia," said Dr. Ashhurst, "reveals on the one hand a picture of heroic boldness and masterly self-control on the part of the surgeon, and on the other a ghastly panorama, sometimes of stoic fortitude and endurance, sometimes of abject terror and humiliation—but always of agonizing wretchedness and pain—on the part of the unhappy victim who required the surgeon's aid.

"The 'pitilessness' which Celcus urged as an essential trait in the operative surgeon was, before the days of anæsthesia, a feature in the surgeon's career which impressed very strongly the public generally as well as those immediately connected with the operation. It is interesting to recall that Sir James Simpson, of Edinburgh, shortly after beginning his professional studies, was so affected by 'seeing the terrible agony of a poor Highland woman under amputation of the breast,' that he resolved to abandon a medical career and seek other occupation; happily his intention was reconsidered, and he returned to his studies, asking himself 'Can anything be done to make operations less painful?' and, as every one knows, in less than twenty years became a high priest of anæsthesia, and the introducer into surgical and obstetrical practice of ether's great rival, chloroform.

"No braver or more gallant gentleman ever lived than Admiral Viscount Nelson, and after his right elbow had been shattered by a French bullet in the assault at Teneriffe he manifested the utmost courage, refusing to be taken to the nearest ship lest the sight of his injury should alarm the wife of a fellow officer whose own fate was uncertain, and when his own ship was reached he climbed up its side without assistance, saying: 'Tell the surgeon to make haste and get his instruments. I know I must lose my right arm, so the sooner it is off the better.' 'He underwent the amputation,' we learn from a private letter of one of his midshipmen, 'with the same firmness and courage that have always marked his character.' And yet so painfully was he affected by the coldness of the operator's knife that when next going into action at the famous battle of the Nile he gave standing orders to his surgeons that hot water should always be kept in readiness during an engagement, so that if another operation should be required he might at least have the poor comfort of being cut with warm instruments.

"On the side of the surgeon we find throughout the ages a constant effort to diminish the terrors of operations and a continuous reprobation of the distressful, not to say cruel, modes of practice adopted by preceding generations. And yet the time is not very far distant from ours when they lopped off a limb by striking it violently with a heavy knife; that time when they knew neither how to stop nor how to prevent hemorrhage but by burning the part whence the blood jetted with boiling oil or the red hot iron; that time when surgeons armed themselves at every moment with pincers, with burning cauteries and with instruments, the representations even of which cause terror.

"The belief that operations might be rendered painless appears to have been present in the minds of surgeons from the earliest periods. Witness the accounts of the Memphis stone, described by Dioscorides and Pliny, which by steeping in vinegar was made to give forth the fumes of carbonic acid; and of the mandragora, employed, according to Theodoric, when mixed with other narcotics, by inhalation, and causing a sleep from which the patient could only be aroused by the fumes of vinegar. So profound was the stupor induced by this drug that Bodin assures us that under its influence a man submitted without consciousness to a painful operation and continued to sleep for several days thereafter.

"Vigo speaks of the whole body being 'brought asleep by the smelling of a sponge wherein opium is,' but warns his readers that the practice is dangerous, because the use of opium is sometmes followed by gangrene. In his work on 'Natural Magic,' Baptista Porta speaks of a volatile drug kept in leaden vessels, which produced sleep when applied to the nostrils, and Perrin suggested that this may actually have been ether or some other of our modern anæsthetic agents.

"Mental preoccupation was sometimes sought as a means of preventing pain. Richard Wiseman found that soldiers dreaded the loss of a limb much less if it were removed immediately, while they were 'in the heat of the fight,' than if the operation were postponed until the next day; 'wherefore,' he says, 'cut it off quickly, while the soldier is heated and in mettle;' and Renauldin recalls the case of the amiable Dolomieu, who, exposed to the pangs of starvation in a Neapolitan dungeon, measurably alleviated his own distress by engaging in the composition of a treatise on mineralogy; while his unfortunate servant and fellow prisoner, who had not the same intellectual resources, was hungry enough for both.

"But the presence of pain was not the only evil dreaded by our predecessors in attempting important operations; the great risk of fatal accident from some involuntary movement of the patient was constantly present to the mind of the conscientious surgeon. 'How often,' says Dr. Valentine Mott, 'when operating in some deep, dark wound, along the course of some great vein, with thin walls alternately distended and flaccid with vital current—how often have I dreaded that some unfortunate struggle of the patient would deviate the knife a little from its proper course, and that I, who fain would be the deliverer, should involuntarily become the executioner, seeing my patient perish in my hands by the most appalling form of death! Had he been insensible I should have felt no alarm.'

"Coming down to the days more immediately preceding the date of the great discovery, we find that opium and alcohol were the only agents which continued to be regarded as of practical value in diminishing the pain of operations, though the attendant disadvantages of their employment were, of course, recognized. Meanwhile, facts were accumulating, the significance of which we now plainly recognize, but which excited no attention.

"Sir Humphry Davy, in the early days of the nineteenth century, suggested the use of nitrous oxide gas as an anæsthetic in minor operations, and it was the custom of some of our medical schools—at the University of Pennsylvania, for one—for students to breathe 'laughing gas,' as it was then called, for diversion. But yet—and yet—surgeons went on, in every country, cutting and burning, and patients went on writhing and screaming, until the 16th day of October, in the year 1846, in the Massachusetts General Hospital, Dr. John C. Warren painlessly removed a tumor from a man who had been previously etherized by Dr. William T. G. Morton, and surgical anæsthesia became the priceless heritage of the civilized world."

LOGGING IN THE SIERRA NEVADAS—A THREE CYLINDERED MOUNTAIN LOCOMOTIVE.

Captain Deasy's Expedition to Thibet.

Captain H. H. P. Deasy, of the Sixteenth Queen's Lancers, left England some time ago for a journey across Thibet from west to east, says the London Times. He intends on the way to throw soldered-up tins containing parchment notices in English and French into the tributaries of the Tsanpo and into the other large rivers which he may meet with, in the hope that some of them may be picked up far down stream, possibly in the Brahmaputra, Salween, and Mekong, and thus help to solve the vexed problem of the origin and connections of these rivers. The notices will be consecutively numbered, and the tins in which they will be inclosed will have a brass label soldered on the outside, bearing the words "Please open this" in English and French, and Captain Deasy's name. The parchment inside bears the request that it be forwarded without delay to the Royal Geographical Society, London, with as accurate a statement as possible as to where it was picked up. Captain Deasy is trying to render an important service to geographical knowledge, and it is hoped that the officials, English and French, in the neighborhood of the rivers alluded to may be able to arrange for a lookout, so that the tins may be secured and the parchment delivered to the proper quarter.

Power in Woodworking.

Prof. O. G. Dodge recently made a series of tests in the Navy Yard at Washington to determine the power required by wood working machinery. The work done is the heaviest that will be required of these particular machines:

Circular ripsaw, 28 inches diameter; speed, 1,200 revolutions per minute, or 8,800 lineal feet per minute. Arbor pulley 5¼ inches diameter by 8½ inch face; hand feed; motor belted to saw shaft: Motor and saw, idle, 3·4 e. h. p.; ripping seasoned heart oak, 7⅝ inches thick, feed 10 feet per minute, 19·3 e. h. p.

Circular ripsaw, 24 inches diameter; speed, 1,500 revolutions per minute, or 9,429 lineal feet per minute; hand feed; motor belted direct to 7 inch pulley on saw shaft: Motor driving saw, idle, 3·2 e. h. p.; ripping seasoned heart oak, 6 inches thick, 10 feet per minute, 12·8 e. h. p.; ripping seasoned white pine, 6½ inches thick, 15 feet per minute, 9·4 e. h. p.; ripping seasoned yellow pine, 2 inches thick, 45 feet per minute, 10·7 e. h. p.

Circular ripsaw, 14 inches diameter; speed, 2,200 revolutions per minute, or 8,067 lineal feet per minute; arbor pulley, 3 inches diameter, 5 inch face; hand feed; motor belted to saw shaft: Motor, idle, 0·96 e. h. p.; motor and saw, idle, 2·7 e. h. p.; ripping seasoned heart oak, 3½ inches thick, 12 feet per minute, 6·3 e. h. p.

Circular ripsaw, 12 inches diameter; speed, 2,200 revolutions per minute, or 6,914 lineal feet per minute; hand feed; belt pulley 3½ inches diameter and 3 inch face; motor belted direct to 3½ inch pulley on saw shaft; saw set to wabble for cutting grooves: Motor, idle, 0·96 e. h. p.; driving saw idle, 2·2 e. h. p.; cutting groove in seasoned walnut, ⅜×⅜ inch, 12 feet per minute, 3·6 e. h. p.

Bandsaw, pulleys 72 inches diameter; speed, 160 revolutions per minute, or 3,017 lineal feet per minute; belt pulley 30 inches diameter, 8 inch face; power feed; motor belted to saw shaft: Motor and saw, idle, 12·1 e. h. p.; ripping seasoned ash 10¾ inches thick, feed 6 feet per minute, 16·1 e. h. p.; ripping seasoned white pine, 16½ inches thick, feed 10 feet per minute, 16·1 e. h. p.; ripping yellow pine, 12 inches thick, 20 feet per minute, 18·8 e. h. p.

Bandsaw, pulleys 42 inches diameter; speed, 350 revolutions per minute, or 3,850 lineal feet per minute; belt pulley 16 inches diameter, 5 inch face; hand feed; motor belted to saw shaft: Motor, idle, 0·96 e. h. p.; motor and saw, idle, 2·9 e. h. p.; ripping seasoned oak, 12 inches thick, feed 3 feet per minute, 5·7 e. h. p.; cross cutting seasoned oak, 8 inches thick, feed 5 feet per minute, 5·7 e. h. p.; ripping live oak, 10 inches thick, feed 3·2 feet per minute, 5·7 e. h. p.

Bandsaw, pulleys 28 inches diameter; speed, 480 revolutions per minute, or 3,520 lineal feet per minute; belt pulley 12 inches diameter, 3½ inch face; hand feed; motor belted to saw shaft: Motor, idle, 0·96 e. h. p.; motor and saw, idle, 1·7 e. h. p.; ripping seasoned oak, 3 inches thick, feed 2½ feet per minute, 2·3 e. h. p.; ripping seasoned pine, 3 inches thick, feed 4 feet per minute, 2·3 e. h. p.; cross cut seasoned oak, 3¼ inches thick, feed 4 feet per minute, 2·3 e. h. p.

Daniel's planer, machine bed 2 feet 5 inches by 21 feet 6 inches; belt pulley, 13 inches diameter by 5¼ inch face; speed, 350 revolutions per minute; speed of cutting edges of tool, 10,400 feet per minute; power feed, 12 feet per minute; motor belted to countershaft: Motor, idle, 0·96 e. h. p.; driving machine, idle, 3·9 e. h. p.; planing seasoned oak, cut $\frac{3}{16}$ inch deep by 20 inches wide, 12 feet per minute, 6·2 e. h. p.

Hand cylinder planer or jointer, size of machine, 24 inches; belt pulley, 4 inches diameter, 5 inch face; speed, 3,200 revolutions per minute; speed of cutting edge of tool, 4,000 feet per minute; hand feed; motor belted to shaft of tool: Motor, idle, 0·96 e. h. p.; driving machine, idle, 2·40 e. h. p.; planing white pine, cut 0·11 inch deep by 18 inches wide, 25 feet per minute, 4·80 e. h. p.

Cylinder planer, size of machine, 24 inches; belt pulley, 5 inches diameter, 5 inch face; 2,250 revolutions per minute; speed of cutting edges of tool, 3,105 feet per minute; power feed; motor belted to shaft of tool: Motor, idle, 0·96 e. h. p.; driving machine, idle, 2·40 e. h. p.; planing pine, cut $\frac{1}{16}$ inch deep, 18 inches wide, 11 feet per minute, 3·6 e. h. p.; planing oak, cut $\frac{1}{16}$ inch deep, 6½ inches wide, 11 feet per minute, 3·6 e. h. p.

Boring machine, speed of bit, 375 revolutions per minute; hand feed; motor belted to bit shaft; Motor, idle, 0·96 e. h. p.; driving machine, idle, 1·7 e. h. p.; boring 4 inch hole in seasoned oak, 9⅜ feet per minute, 2·3 e. h. p.

Boring machine, belt pulley 8 inches diameter, 3 inch face; speed, 750 revolutions per minute; hand feed; motor belted to machine shaft: Motor, idle, 0·96 e. h. p.; driving machine, idle, 1·9 e. h. p.; boring 1 inch hole in oak, feed 3¾ inches in 5 seconds, 2·2 e. h. p.; boring 1⅝ inch hole in oak, feed 1 inch in 7 seconds, 2·2 e. h. p.

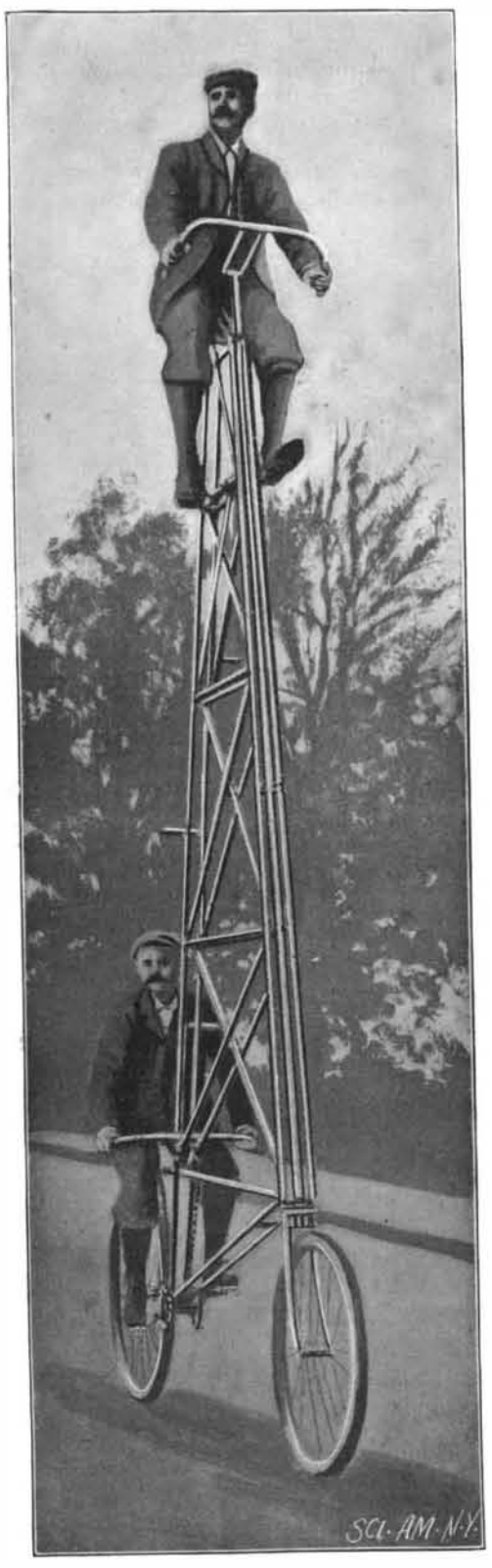
Pattern maker's lathe, speed 888 revolutions per minute; motor belted direct to lathe: Motor, idle, 0·96 e. h. p.; driving lathe, idle, 2 e. h. p.; turning seasoned poplar, 12 inches diameter, ½ inch cut, 3·2 e. h. p.

Carver and moulder, speed of tool, 5,236 revolutions per minute; motor belted direct to tool shaft: Motor, idle, 0·96 e. h. p.; driving tool, idle, 2·8 e. h. p.; cutting groove, circular sector, 2 inches wide, ¾ inch deep, 3½ feet per minute, in white pine, 3·9 e. h. p.—American Woodworker.

THE EIFFEL TANDEM.

Besides the bicycles, tricycles, etc., which are intended purely for sport, there are several noteworthy machines that make a practical application of the chief advantage of the cycle—its speed. These machines now serve various purposes in practical life, among which might be mentioned those used in the army, the quadricycle of the fire department, etc., the usefulness of which has been proved.

Now a new construction in the form of a tandem makes its appearance in America. It is called the Eiffel tandem and is a real curiosity. As will be seen in the accompanying engraving, the lower part of this gro-



THE EIFFEL TANDEM.

tesque vehicle—the oddity of which cannot be fully appreciated from the cut—consists of a strong bicycle, on which is built a frame of hollow iron rods that is about 20 feet high. On the top of this frame is a saddle with handle bars and treadles, the motion of which is transmitted by chains to the corresponding lower parts of the bicycle. The chief difficulty with which the riders have to contend is to keep the machine balanced, as will be easily understood from a glance at the illustration, but it must also be very difficult for the upper rider to reach his seat, which cannot be a very safe one. It is not easy to guess the use for which this strange machine is intended, but it would seem that the rider must be placed in this elevated position to enable him to reconnoiter the ground. We are indebted to Der Stein der Weisen for the above particulars.

IN the Pabst brewery, at Milwaukee, is a machine which corks, wires and caps 16,000 bottles per day automatically.

Science Notes.

Dr. Nansen is to deliver an address at the meeting of the Royal Geographical Society on February 8 next, and as he is already a gold medalist of the society, a special medal will be presented to him, an honor which was also conferred on Mr. H. M. Stanley, M.P.

Turin is going to hold an Italian exhibition in 1898. It will include the work of Italians abroad and of the Catholic missions. There will also be an international exhibition of electric appliances and of machinery. Among the special features will be athletic games and a review of comic art.

The Pharmaceutische Zeitung publishes analyses of the principal commercial brands of saccharin, says the Pharmaceutical Era:

100 parts of saccharin.	v. Heyden.	Fahlberg.	Bayer.	Monnet.
Moisture.....	0·28	0·26	0·19	0·05
Ash.....	0·098	0·06	1·63	0·04
Para compound.....	0·00	0·87	0·00	0·00
Saccharin (true).....	99·82	99·31	98·18	99·91

Another small planet has been detected on a photographic plate taken by Herr G. Witt, of the Urania Observatory, Berlin, October 8. It was observed the following evening with the 12 inch refractor, and, if all the recent discoveries are verified, will reckon as No. 424. The small planet, No. 324, discovered by Dr. J. Palisa on February 25, 1892, has been named Bamberga, to commemorate the meeting of the German Astronomical Society at Bamberg.

M. E. Villari recently contributed to the Paris Academy of Sciences some observations on the property of discharging electrified conductors, produced in gases by the X rays and by electric sparks. It was shown that a gas confined in a tube, and exposed to the X rays acquires rapidly the power of discharging an electrified disk, and keeps this property for some time. The passage of a series of sparks from a coil strengthened by a condenser confers the same property on a gas, says Nature.

Prof. D. G. Elliot, the leader of the Field Columbian Museum of Chicago Expedition, has arrived home. Speaking of the results of his expedition into Somaliland, Prof. Elliot said: "I have obtained a very extensive collection, chiefly of the large mammals—probably the most complete ever brought out of any country by one party. No fewer than fifty-eight cases and barrels were shipped direct from Aden to Chicago. I obtained, moreover, over 300 specimens of birds, fish, insects and reptiles."

C. E. Stromeyer describes in Nature a method by which he was able to make mercury float on water. A few drops of mercury, half an ounce of water and a pinch of red lead, red oxide, vermilion or other red powder were shaken together in a small cylindrical bottle. A few small globules of mercury were then found floating together at the center of the water surface. By repeated shaking a small dish—about three-eighths inch in diameter and one-sixteenth inch deep—was formed, consisting of a large number of mercury globules, and this floated on the water in the same position. The dish did not disappear if allowed to rest, and always reformed after shaking the bottle.

Almer the Swiss mountain guide's seventieth birthday has just been celebrated at Grindelwald. He is the hero of over two hundred first ascents, including the Wetterhorn, the Schreckhorn, the Eiger and the Moench on the Wengern Alp. It is said that he is the only man that ever came down alive from the last peak. He has repeatedly climbed the Jungfrau, and all the peaks of the Oberland, the Valais, the Grisons, and of Savoy. The tops of some of the Aiguilles of Mont Blanc and of the dolomites of Dauphine he alone has reached. He has five sons, all well-known guides, who have been employed in climbs in the Caucasus and the Himalayas. His career ended ten years ago, when he lost all his toes during an ascent of the Jungfrau, in January.

Herr Friedrich Benesch contributes to the Mittheilungen der K. K. Geographischen Gesellschaft in Wien, says Nature, a short description of Pauliny's new method of drawing relief maps, which he says is a great advance on any method now in use, both in respect of accuracy and of ease in execution. The map is in effect a closely contoured map, printed on silver gray paper, the contour lines being white where illuminated by a source of light supposed to be 45° above the western horizon, and black elsewhere. Level plateaus and slightly sloping areas are thus represented by the natural gray color of the paper; steep declivities toward the west are lightened by the closely drawn white lines, and toward the east correspondingly darkened by the black lines, the departure from the normal gray being greater the closer the lines, i. e., the steeper the slope. The method has the merit of giving a clear idea of steepness derived from the contour lines themselves; and while it does not demand the high standard of skill necessary in Lehmann's method of hatching, the confusion produced by the shadows in some modern maps, where the illumination is supposed to come from the horizon, is avoided. Maps illustrating Herr Pauliny's method are to be published in Vienna in the course of the summer.