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, ⅜×⅞ 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 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 1/16 inch deep, 18 inches wide, 11 feet per minute, 3·6 e. h. p.; planing oak, cut 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.

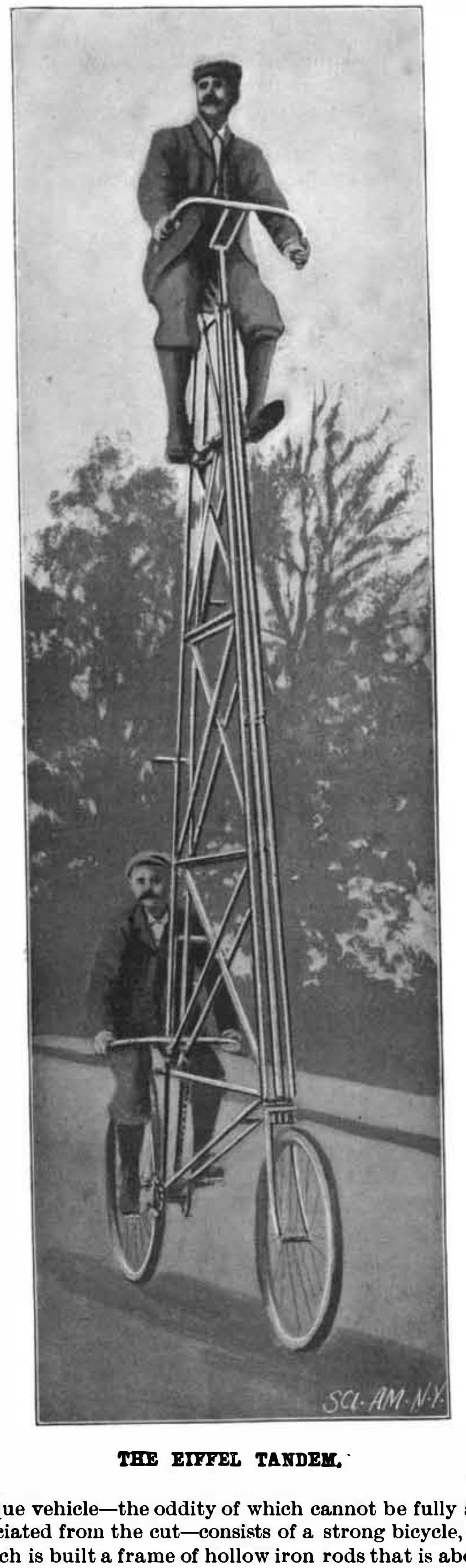
Pattern maker's lathe, speed 888 revolutions per minute; motor belted direct to lathe: Motor, idle, 0·96 e. h. p.; driving lathe, idle, 2 e. h. p.; turning seasoned poplar, 12 inches diameter, ½ inch cut, 3·2 e. h. p.

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 grotesque 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.



THE EIFFEL TANDEM.

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.......... ...	0·98	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.

The Value of India Rubber.

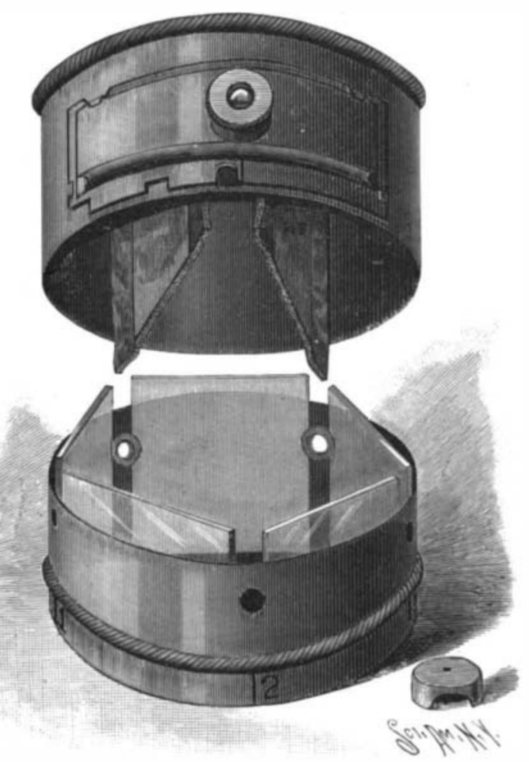
India rubber is in a fair way to become one of the prime necessities of civilization. Numberless human beings, in the class which could not afford wet nurses, owe their lives to the feeding bottle. Everybody knows that in the last five years the use of pneumatic tires for cycles and solid rubber tires for horse vehicles has enormously increased our consumption of this article; but, quite apart from that more obvious fact, India rubber is daily being introduced more and more into all sorts of machinery. Highly competent judges say that if the output could be doubled within a year, so many new applications of the material would instantly arise, that the price would not fall appreciably. As a matter of fact, the export of Para rubber has increased within the last twenty-five years from 5,600 tons to 20,000 tons; and the price fetched by the best quality has risen from 2s. to 3s. a pound. It is the one jungle product which society finds indispensable. Hundreds of men have racked their brains to produce a substitute, but none has in the least degree succeeded; and such attempts must be permanently discouraged by the knowledge that India rubber exists in limitless profusion upon known spots of the world's surface which may at any time be made accessible. In any of the swampy equatorial regions, where vegetation grows rank and sappy, so that a knife will slash through branches as if they were made of cheese, there is pretty certain to occur some one or two of the score of trees which produce rubber. Whole forests of them are known to exist in Central Africa, only waiting to be tapped. But the regions which produce them are precisely the regions most deadly to the white man; and when the rubber is made it has to come to the coast on the heads of negroes, and will not pay the cost of transport. When an accessible forest is discovered it pays like a gold mine. A tree was discovered near Lagos which was believed to produce rubber; specimens of bark and foliage went home to Kew, and the authorities pronounced it the right thing. In 1895 the export began, and amounted in the year to 2,263 tons, with a value of £270,000 in round figures.

India rubber would seem to be the one certain source of wealth now locked up in Central Africa, and perhaps the most valuable thing that the region produces or can produce. Ivory is only a fancy article, and palm oil has many substitutes. Gold no doubt exists there, but, in the first place, it is doubtful whether the pure negro can be made into a miner; and in the second, gold is to be got in regions where white men can live. It seems, therefore, as if the special function of the tropics just now was to produce India rubber, which is wanted everywhere and cannot be grown elsewhere. No cultivation is needed; Nature requires of man very little skill, scarcely any exertion, and only a reasonable avoidance of waste. Yet this is asking more than the African negro is at present able to give. The great rubber producing region of the world is the basin of the Amazon, which yields about two-thirds of the entire annual output. The quality of this rubber is immensely superior to all others; the best Para will fetch in England as much as 3s. 6d. a pound; the worst African goes for under a shilling. Brazil has, of course, an immense advantage in its great waterway; ocean going steamers run twelve hundred miles up the Amazon, whereas every African river, except the Congo, has a bar at its mouth, and cataracts not far distant from the coast line. On the other hand, the forests in Brazil seem even more impenetrable than in Africa. Not even such roadways as the African man paths can be maintained against the encroachment of the jungle. But the native Brazilian race is incomparably more intelligent than the negro. Their caoutchouc is better prepared, and, what is far more important, they farm the trees as carefully as the Red Indians used to farm the beaver. In Africa the rubber is generally produced, not from a forest tree, as in Brazil, but from the landolphia, which is a climbing shrub. The supply of rubber producing plants in Central Africa is practically inexhaustible, but the number of places where they exist within easy distance of some export station is small, so far as our present knowledge goes. Yet for the present, speculators will probably hasten to be rich, and if they hit upon a forest, will treat it like a mine, anxious simply to take out the maximum at the minimum of cost.

Whether our state, or any other, will ever make this a great branch of its tropical forestry remains to be seen. The Germans, with their usual thoroughness, have a strong scientific staff at the Cameroons. The English, in their usual makeshift way, content themselves with sending home to Kew for suggestions. But the government of India have at least tried an experiment upon the great scale. No private firm, however wealthy, would embark upon the cultivation of India rubber; the trees take a matter of twenty years before they can produce a pennyworth. In addition to that, cultivation must occupy a huge extent of ground of such a nature that no European can enter it during the rainy season, and where the growth is so thick that twenty men might be tapping trees within a mile of the ranger, and he none the wiser. Nevertheless, the Indian government have a nursery of Para rubber trees in Assam, extending over two hundred square miles, which will in time begin to yield; and if any department can control such a farm, the Indian woods and forests will.—Spectator (London).

A NOVEL CAMERA.

The variety in shape and form of miniature cameras that has taken place in the past two or three years is something remarkable. The simple small camera which is the subject of our illustrations, made in the



MINIATURE HAND CAMERA—TAKEN APART FOR LOADING.

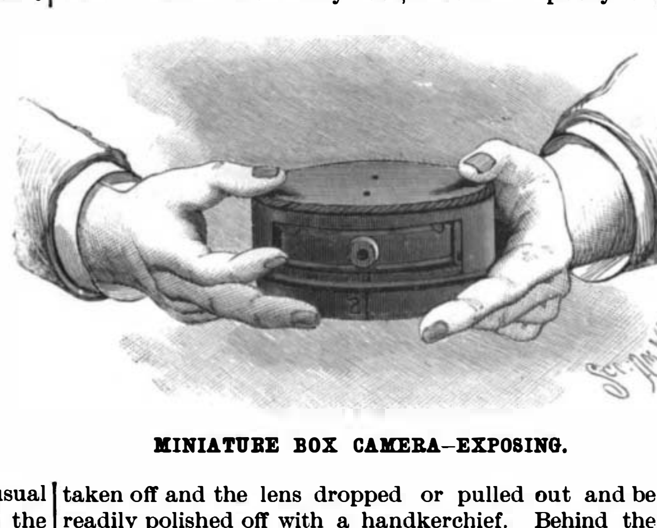
shape of a circular box somewhat smaller than a collar box, is one of the newest forms recently introduced. It is called the "Photake" and is very inexpensive for the amount of work it will do. The camera, as will be seen from the larger engraving, consists of two metal boxes, the upper one sliding over the lower part telescopically.

The lower part is provided with round metal eyes on the interior having lateral annular projecting flanges, between which the plates (two inches square) are inserted. The hole at the center of the eyes allows the light from the lens to pass through between two plates to the rear plate. The plates (five oft hem) are readily inserted and removed in the dark room. At the bottom of the lower half are numbers and vertical marks stamped on the periphery to note the position of the plate.

Underneath the lens aperture in the upper portion is a slight mark under which the figures and mark on the lower half coincide when the lower half is rotated to change the position of a plate.

The upper part contains two diverging light-separating metal divisions having flexible material on the ends which rub slightly against a plate when the lower magazine portion is revolved. On the outside is a miniature lens held in a short tube by an annular screw cap.

To clean the lens at any time, the screw cap may be



MINIATURE BOX CAMERA—EXPOSING.

taken off and the lens dropped or pulled out and be readily polished off with a handkerchief. Behind the lens is a simple spring sliding shutter, following the circle of the box, the release projection will be seen directly under the lens. To set the shutter the finger is placed over the lens, then the release is pushed from the center to the left and slides upward into the notch at the extreme left hand end. The exposure is made as shown in the lower engraving by a slight pressure downward with the index finger of the right hand on the projection. When released, the spring pulls the shutter quickly to the right. To make a time exposure the release projection is pushed upward into the middle notch and the finger removed from the lens. For such exposures it is necessary to use a diaphragm in front of the lens; such a diaphragm cap will be noticed at the right hand corner of the larger engraving. Having quickly loaded the lower magazine portion, and placed over it the upper part, the camera as shown in the smaller picture is ready for operation. An exposure is made, the lower part is next revolved until No. 2 comes in position under the lens, and the process repeated until the five plates have been exposed.

The simplicity of the camera, its compactness, the thorough protection of its working parts, and the facility and certainty with which it may be operated make it especially useful for beginners, or those who know little or nothing about photography.

The Care of Lamps.

In a certain household that I know, says a writer in the Boston Journal of Commerce, the lamps are a source of the greatest delight and comfort, for they are always spotlessly clean and they give a light that could not possibly be better or brighter. The reason for this is that the mistress, instead of depending upon any of her several servants to care for the lamps and clean them, herself bestows upon them the necessary attention. When these receive a thorough cleaning—once every six weeks—the reservoirs and burners are boiled in soda and water and dried before the fire, not on cloths, as these might have lint. The cloths that are used for the daily trimming and dusting are frequently boiled to remove the oil. The shades are polished and the lamps filled every day.

The wicks of lamps will absorb more oil if they are thoroughly dried before putting them in the burners. To prevent the lamp from smoking, soak the wick in vinegar and then dry thoroughly. Occasionally washing and boiling the wicks in soap and water, rinsing and drying thoroughly, is also a good plan. Every day the charred portion should be rubbed off with a piece of paper or cloth, and once a week the edge of the wick should be trimmed with a sharp pair of scissors. The wick will burn with an even flame if it be cut straight across and slightly rounded at the sides. The reservoir of a lamp should be kept well filled, but when not in use the wick should be turned down to keep the oil from oozing up between burner and collar, greasing the outside and causing a disagreeable odor. When a lamp is lighted, however, it is best to keep the wick turned up to its full extent to prevent smoking.

To render lamp chimneys less likely to crack they should be put in cold water, which must be brought to the boiling point, after which they should be allowed to cool slowly without removing from the water. Wash the chimneys in ammonia water and wipe dry on soft towels that are free from lint; polish with tissue or newspaper. Rub brown spots with salt or whiting.

Kerosene has always an unpleasant odor, therefore it is better to use the best astral oil for dining room and parlor lamps. Some housekeepers perfume these oils, but this is altogether unnecessary. Never mix two kinds of oil, for the light from such is bad. To make a lamp burn brightly drop in the reservoir a pinch of salt or camphor.

The Lean Meat Diet for Dyspeptics.

The truth seems to be that a person subsisting upon a lean meat diet, while he may manifest a greater amount of strength than upon more natural dietary, and may be unconscious of any abnormal condition, is like a person in a powder magazine—he is in constant danger of vital catastrophe, says Medical Progress. The poison destroying functions of his liver and the poison eliminating capacity of his kidneys are taxed to their utmost to keep the proportion of ptomaines and leucomaines in the tissues down to a point which permits of the performance of the vital functions. The margin of safety, which nature has wisely made very large in order to provide for emergencies, is reduced to the narrowest possible limit, so that anything which temporarily interferes with the functions of the liver or the kidneys, or which imposes additional work upon them, may be sufficient to obliterate the safety margin and produce an attack of grave or fatal disease. Invasion of the body by ptomaine producing microbes, such as the typhoid bacillus, the bacillus of diphtheria, the pneumococcus of Friedlander, the shocks resulting from accident, and even the depression of a severe cold may be sufficient to consume the meager emergency capital, and the result is acute inflammation of the kidneys, or death under chloroform, or from shock following an operation under anæsthesia.

THE first street tunnel in Germany has been recently opened to traffic at Stuttgart, Wurtemberg. It has a length of 125 meters (410 feet), and the remarkable width of 20½ meters (67 feet). By making the ends of the tunnel funnel-shaped, the necessity of lighting it during the day has been avoided. At night the tunnel is lighted by electricity. The cost was $65,000.—Uhland's Wochenschrift.