Honing a Razor.

"The first requisite," says our correspondent G. W. D., "is to have a well shaped, well tempered and well (water) ground razor; unless very truly ground, it will be impossible to hone it properly. Take an Italian hone, of not too fine grit, face it perfectly with fine emery paper glued on a board; dust it off, and drop 6 or 8 drops of sperm oil on its face. Hold the razor perfectly flat on the stone, draw firmly but lightly from heel to point (from the further right hand corner to the lower left hand corner), against the edge; if a wire edge be produced, run the edge lightly across the thumbnail, and a few strokes on the hone will remove all trouble on that score. If you will examine the edge of the razor now, by aid of a magnifier, you will find that the fine grooves or teeth incline towards the heel.

I would here say that the hone must be kept perfectly clean, as, after using a few times and then neglecting it, the pores will get filled with steel, and in that case it will not be possible to get a keen edge on the razor. I have had a hono in use for forty years, for my own and friends' razors. I have kept it perfectly true, and yet there has been no perceptible wear.

I make my own straps as follows: I select a piece of satin. maple, or rose wood, 12 inches long, 1¼ inches wide, and ⅛ inch thick; I allow 3½ inches for length of handle. Half an inch from where the handle begins, I notch out the thickness of the leather so as to make it flush towards the end. I taper also the thickness of the leather; this precaution prevents the case from tearing up the leather in putting the strap in. I then round the wood very slightly, just enough (say $\frac{1}{16}$ of an inch) to keep from cutting by the razor in strapping and turning over the same. I now select a proper sized piece of fine French bookbinder's calfskin, cover with good wheat or rye paste, then lay the edge in the notch, and secure it in place with a small vise, proceed to rub it down firmly and as solid as possible with a tooth brush handle (always at hand or should be), and, after the whole is thoroughly dry, trim it neatly and make the case.

Use cold water for lather, as it softens beard and hardens the cuticle; hot water softens both and makes the face tender. Always dip the razor in hot water before using, and also after use, as it will dry it and prevent rusting."

RED DEER.

The deer family, species of which are indigenous to all countries in the world except Australia, are everywhere renowned for their graceful and elegant form and their timidity, their remarkable fleetness of foot enabling them, in open country, to keep away from the haunts of man. The race includes genera of all sizes from the little muntjac to the moose, and the chief peculiarities of the species, the horns, the hairy skin, the habit of rumination, and the feet, each with two principal and two rudimentary toes, are to be found in all of them. The American deer (*cervus Virginianus*) has a long head with a sharp muzzle, with large eyes; and the legs are long and slender. It is easily domesticated but requires a spacious range to keep it in health. The hind produces two or three young at a birth, but no *accouchement* takes place till she is two years old; she conceals her young carefully, visiting them only three times a day.

The subjects of our illustration are the red deer, formerly found in all parts of Great Britain, but now seen only in the mountains of Scotland and on one or two extensive moors. The red deer are so exclusive in their habits that they will not feed with inferior animals; they have an especial abhorrence for sheep, leaving the place at once if there are foot prints of sheep on the herbage.

The kind usually kept in parks in England is the fallow deer, a native of Africa originally; but it has been domesticated in England for some centuries. It is humbler in its tastes, and accommodates itself well to a small park or paddock. Like all its tribe, it sheds its horns annually, retiring as if in shame till the new growth appears.

Chemistry of Milk.

C. A. Cameron, M. D., states that the opacity and whiteness of milk are due, not to the liquid being an emulsion of fats, but to the reflection and refraction of light by solid caseous matter suspended in it.

COW'S MILK.—Forty analyses of pure milk from Dublin dairy cows gave the following average results: Water, 87·00, fats, 4·00, albumenoids, 4·10, sugar, 4·28, mineral matter, 0·62.

MARE'S MILK.—The average of the fourteen specimens gave: Water, 90·310, fats, 1·055, albumenoids 1·953, sugar, 6·285, mineral matter, 0·397. Mare's milk is bluish white; specific gravity about 1·031; reaction neutral, or faintly alkaline.

SOW'S MILK.—The sow parts with its milk (except to its young) with great reluctance. Its specific gravity is 1·041; its reaction faintly alkaline, and color yellowish white: 100 parts contain (mean of two analyses): Water 81·760, fats, 5·830, albumenoids, 6·180, sugar, 5·335, mineral matter, 0·895. These results show this species of milk to be very rich. It is remarkable that in the lactometer it shows up no cream. Drying on the water bath, it exhales the odor of roast pork, and on putrefying that of putrid bacon.

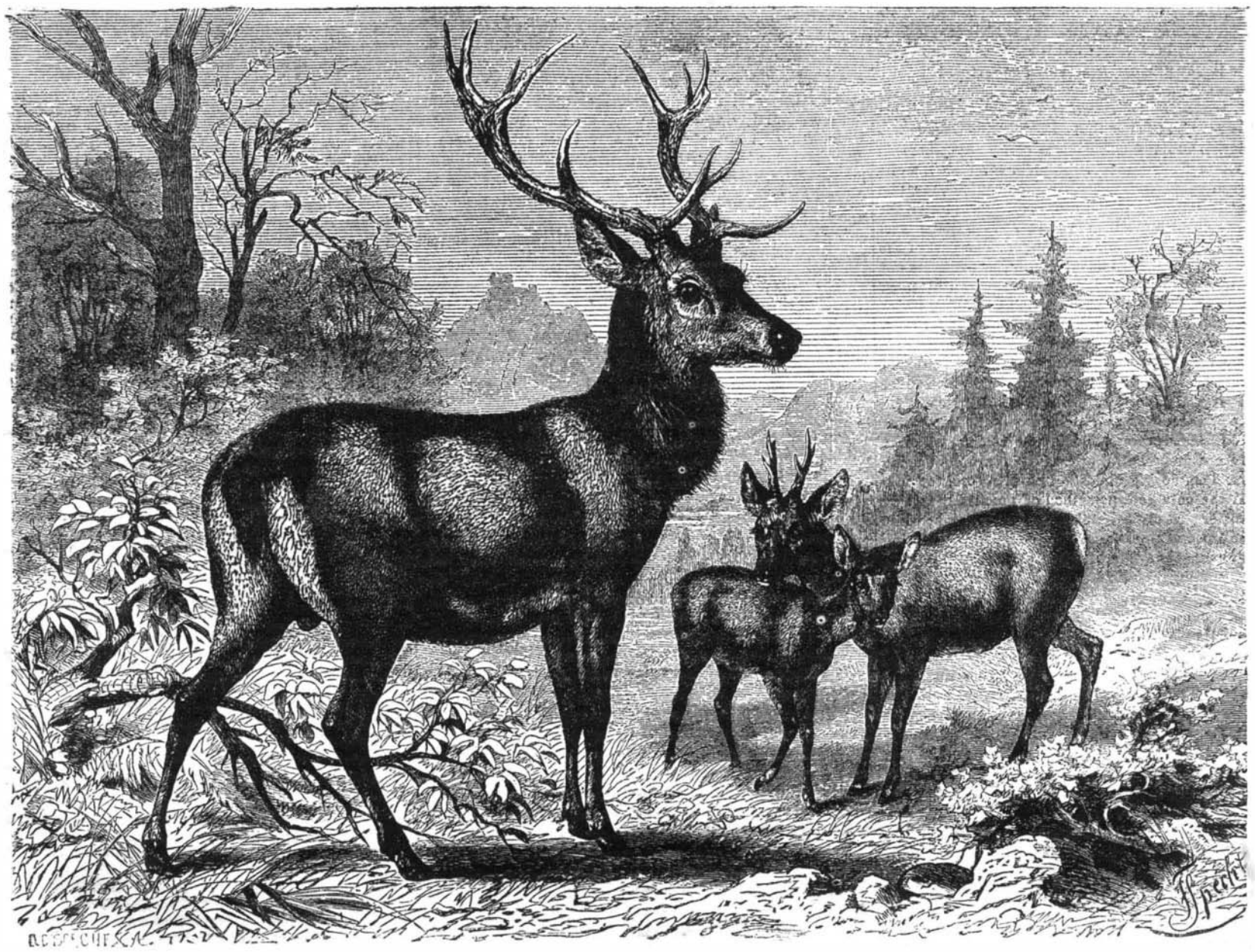
Salting, Packing, and Selling Butter.

Blanchard's *Butter Manual* recommends one ounce of salt to a pound of butter as sufficient for keeping it; but the better paying class of customers, who are a little more fastidious about the quality, prefer about one half as much; and this is found sufficient, if the casein has been properly removed. Butter makers in the vicinity of large towns should seek out regular customers for their produce, in which cases it may be put up in balls or any other form adapted to the demand. "Philadelphia prints," which have acquired a worldwide reputation, are pound balls, with a small figure upon the top They are usually enclosed in a white linen napkin, and packed in a cedar, zinc-lined chest, with apartments at each end for ice, to keep it hard while being transported to market For the great mass of butter makers, the wooden tub, holding from fifteen to one hundred pounds, must ever be the most economical form of package. In the vicinity of New York city, heavy return pails, of the best white oak, with thick covers, having the owner's name branded on them, are used and re-used year after year. In some parts of the West, miserably poor oaken tubs are employed, which affect the butter very injuriously. In other localities, ashen tubs are favorites, while in Northern Vermont the most approved tubs are spruce. Spruce is unquestionably the least liable of all timber to affect the flavor of butter injuriously; while it is generally believed that, for long keeping and much exposure, good white oak is preferable. Stone jars and crocks are sometimes used, but we do not recommend them. Much depends upon the purity of the salt—it must be perfectly white, and completely soluble in water. The office of salt is, first, to remove the buttermilk from the pores of the butter, and, secondly, to render harmless what cannot be removed.

A New Utilization of Refuse Materials.

A very important discovery has recently been made by MM. Croissant and Bretonniere, of Mulhouse, France, which consists in producing dyes of a large variety of brown hues from substances not merely refuse but in themselves colorless. The pigments are obtained by the reaction of alkaline sulphides upon ordinary wood sawdust, humus, horn, feathers, linen, silk, cotton, and paper waste, gluten, blood, and a number of other materials. In certain cases, when treated with the sulphides or polysulphides, the sulphur directly combines with the organic body; in others sulphuretted hydrogen becomes substituted for the hydrogen atoms eliminated.

The same body gives different shades, according to the degree of temperature, the duration of the operation, and the proportion of sulphide employed. The longer the heating and the higher the degree, the nearer the dye approaches to black. Humus gives a fine bistre shade, which does not fade and is unalterable by organic or mineral acids, caustic lyes, soap, oxalate of potassa, etc. With bran, a color is produced which subsequently, with bichromate, yields a fine brownish yellow or rosin color, which can be changed to gray by the addition of carbonate of soda. Sawdust, preferably of oak, chesnut, and other non-resinous woods, gives a soluble dye of a brownish black, which appears upon the fabric of a greenish hue. It is possessed of high coloring properties and is very permanent.



A FAMILY OF RED DEER.

Phosphorus Steel Making.

M. F. Gautier, engineer of mines, France, gives the following useful sketch of the various methods for producing phosphorus steel, or, to use a more correct definition, phosphorus cast metal. This metal, says M. Gautier, cannot be employed in industry except on condition that it is nearly deprived of carbon, consequently every process which will yield extra soft steel will, with inferior materials, produce phosphorus cast metal.

I. THE BESSEMER PROCESS.—1. *The ferro-manganese process practised at Terre Noire.*—The silicious pig iron used contains but little manganese; the first stage, that which precedes the appearance of the yellow ray in the spectroscope, lasts about a quarter of an hour, according to the richness of the pig iron in silicon. There is no explosion, the flame is pure, without smoke; the completion of the operation is positively marked by the disappearance of all the rays of the spectroscope with the single exception of the yellow sodium ray. For the production of extra soft metal, the refining is prolonged for about twenty seconds, the blast is stopped, and the converter is laid on its side. Manganese iron, previously heated to redness, is then thrown in by means of shovels, taking care that the pieces pass through the scoria and enter the metal. The manganese iron used is an alloy containing a little carbon; the manganese in it reduces the oxide of iron in the converter, and the greater part of the carbon is converted into oxide of carbon in the form of brilliant flames. When the agitation ceases, the charge is drawn. The metal is even and quiet, without bubbles or other irregularities; and, which is of essential importance, the product is always equal and regular in practice. This is the method also which is adopted at the Seraing works, with the same manganese iron.

2. *Swedish method, with highly manganiferous pig iron.*—The pig iron used is without silicon, but rich in manganese, the proportion running from 4 to 5 per cent. The character of the operation is such that there is not what is called a first period; the yellow ray appears at once. There are abundant explosive projections, which would render the process ruinous if care were not taken to have enormous converters relative to the quantity of metal treated. The flame is veiled by smoke and gases, the principal of which is oxide of manganese. It is difficult to control the operation; for if the temperature be reduced by additions of small quantities of steel and iron, the object is not attained, for the heat must be retained in order to keep the metal in such extreme fluidity as will permit the oxide of iron to separate itself and arrive at the surface, for no addition is made of spiegel. The work is carried on blindfolded, for the intermittent flashes of flame are blinding; the heat caused by the explosions is annoying, and the spectroscope is misleading. From time to time samples of the scoria have to be drawn to find how matters are proceeding; after a certain amount of experience, the state of the metal is ascertained by the behavior of metallic globules under the hammer, and from the color of the scoria. But the results are uncertain, and have to be classified. The ingots, moreover, are liable to shrink and to become flawed. This mode is adopted at Fagersta, in Sweden; at Zwickau, in Saxony; and Maxhütte, in Bavaria; but it requires all the value that attaches to the production of extra soft steel to induce any one to continue a method so uncertain.

3. *English method, that of spiegeleisen by explosion.*—In this process, silicious pig, such as that of Cumberland, for example, is employed, and the operation is carried considerably beyond complete decarburation. In order to succeed, a certain quantity of oxide of iron, neither more nor less, must be produced in the bath, and which carries off by explosion the carbon of the spiegeleisen which is added. This instantaneous production of oxide of carbon is dangerous, a part of the metal, and sometimes the whole charge, being projected out of the converter, and endangering the operator and his men. Generally the product is soft, but it is liable to flaws, which are not much felt in sheet iron, but which unfit it for rails. Steel makers will choose whichever of these three methods appears to them the most advantageous for the production of phosphorus steel with pig iron of second quality. M. Gautier adds: The Bessemer process is destined to lose much of its importance in presence of the certain and unlimited extension of the Martin-Siemens process, which, he considers, will take the lead in future, and regulate prices. It is capable of using up old iron, and employing almost all kinds of ore, for puddling is still the only known method of practically getting rid of the greater part of the sulphur and phosphorus; while the Bessemer process, requiring silicious pig iron containing little sulphur, must always be of a limited application. The true mode of making phosphorus steel is then in the sole furnace.

II. THE MARTIN-SIEMENS PROCESS.—In this method the matter is more simple. In order to produce extra soft metal there is but one way, that is to say, to act chemically upon the oxide of iron in the bath. Manganese iron must be resorted to, as spiegel always gives hard products; the proportion is the same as in the Bessemer process, namely, 1 per cent of the whole, or about 2 per cent of manganese iron to 40 or 50 per cent of useful metal. When a sample is procured which bends perfectly when cold, the manganese alloy heated to redness is added, the bath is stirred slightly, and the charge run off.

An account, by M. Grüner, of the process followed at Zwickau and Maxhütte, supplies a striking confirmation of the fundamental properties of phosphorus steel; you may introduce phosphorus into cast steel on condition of eliminating the carbon, and the less the amount of the latter the greater may be that of the former. Practically, by the German method, which is really but that of Fagersta applied to ess pure materials, metal is produced which may almost be said to be without carbon, and, as no spiegel is introduced, there is no element of recarburation. It is not, then, astonishing that the metal thus obtained should be perfectly malleable and yet contain a notable proportion of phosphorus, that is to say, half the quantity which may be tolerated in a truly soft steel, when produced in a Martins-Siemens furnace with manganese iron

Having a Hobby.

The question "is there money in it?" is said by some men to be the test by which everything is to be received or rejected. And those who offer this very mercenary gage claim to be the only "practical" men, and the true prophets for these times, and indeed for all times. The science of getting, the art of keeping, and the process of increasing are deemed by them to include all that is useful in the circle of sciences, the field of art, and the aims of thought. Most people concede in the abstract these pretensions of the mercenary philosophers, though the great majority in practice are better than their theory.

The maxim, roughly expressed, that "everybody should have a hobby," is a good one, provided that the "hobby" one rides should be a mental rather than a sensual one. It should carry the rider over the route of mental improvement to the development of his reasoning and analytical powers, and thus promote the growth of the attributes which distinguish him from the brutal and ally him to the divine. To go back to the question alluded to above, in regard to education, the first question asked may very well be: "Is there money in it?" But if this be the last question as well as the first, and the sole object of learning be mercenary, the seeker will find relief in bodily excesses, from his mental discipline. Or, classing drudgery of the mind with drudgery of the body, he will look for enjoyment where the intellect may be laid aside, like the tool of the artisan or the ledger of the merchant.

It was well said in a recent address to young men, in the evening classes of the City of London College, that "they must extend their mental horizon by raising the level of their sight; that they had to adorn their lives as well as to sustain them; and that they had not only to be tradesmen but men." The speaker told them that they must not only pursue their technical studies, but, as a relief and recreation, follow themes calculated to raise the tone of their minds and carry them beyond the routine of their daily lives. He said that they had not only to live but to enjoy their lives. He recommended them to take up one subject, "to which they could devote themselves with such enthusiasm that it would become a pleasure and a relaxation." To a man immersed in any business pursuit, it is highly desirable that he should change the current of his thoughts and prevent his whole existence from being confined to one routine, which, without such relief, must inevitably dwarf his intellect and weary his body.—*Philadelphia Ledger.*

Steam Hill Climber.

A new locomotive for use on Ithaca Hill, N. Y., has made its appearance. The incline has five tracks, of which the two outer are of the usual width, used in the ordinary manner. When the engine starts up the hill, it rests upon a pair of rails just within the usual track and upon a set of double flanged small driving wheels which are upon the same axles with the big drivers—they being only about thirty inches in diameter; this inside track is raised about fifteen to eighteen inches above the outer one, and high enough so that the big drivers do not touch the track at all; the engine rests now upon the small drivers, and is independent of the outer ones; then in the center of the track is placed a wide cogged rail, which exactly meshes into the cog wheel which is between these small drivers, directly under the center of the locomotive. Thus it will be seen that, by applying power to the big drivers, in the ordinary way, the power is applied to the cogged wheel, which does the climbing. The cogs are about three inches from tip to tip, and the wheel is eight inches wide.

Bright Deep Blue on Wool.

The following is said to yield a tolerably fast color, of desirable luster, similar to that of dark vat blue: The wool or cloth is prepared by boiling for an hour in a hot kettle, with 2½ lbs. alum, ¼ lb. chromate of potash, 1½ lbs. sulphuric acid, and 2 ozs. tin salt in solution, for 40 lbs. of material. It is then opened out and well cooled, and allowed to lie for 12 hours. The day after, 8 lbs. of logwood are boiled in a fresh bath, and then 3 ozs. of aniline violet (the bluish, soluble in water) are added, and, as soon as it is dissolved, an other ½ lb. of sulphuric acid. The prepared articles, after being washed or rinsed, are placed in the bath at 122°, and, after half an hour, are worked at a boil for an hour. More aniline violet affords a stronger blue, more logwood a deeper blue. The color can easily be cleaned in cold water.

PRODUCTION OF OZONE.—Ozone may be easily and abundantly generated in any apartment by means of an aqueous solution of permanganate of potash and oxalic acid. A very small quantity of these salts, placed in an open porcelain dish, is all that is necessary, the water being renewed occasionally as it evaporates. Metallic vessels should not be used.

AT the Edinburgh Literary Institute, Professor Geikie stated it to be his opinion that his colleague, McCroall, had pitched upon the precise epoch in which the glacial era had taken place, and attributed it to a period of great eccentricity of the earth's orbit, which took place about 240,000 years ago and lasted about 160,000 years.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]
From February 2 to February 25, 1875, inclusive.

AXLE.—S. L. Harrison, San Francisco, Cal.
BALANCED SLIDE VALVE.—E. T. Smythe, New York city.
BEVEL, SQUARE, RULE, ETC.—W. Ascough, Buffalo, N. Y.
BOILER FURNACE.—H. A. Studwell, Brooklyn, N. Y.
BUSTLE, ETC.—A. W. Thomas, Philadelphia, Pa.
CAR SPRING.—G. Godley, New York city.
FERTILIZER.—B. Ackerman, New York city.
FILLING BOTTLES, ETC.—J. B. Bradford, Boston, Mass., *et al.*
FILTER.—J. Outerson *et al.*, Windsor Locks, Conn.
FREEZING, CHURNING, ETC.—W. Redheffer, St. Louis, Mo.
FURNACE GRATE.—J. B. Larkin, Pittsburgh, Pa.
HARVESTER.—D. M. Osborne, Auburn, N. Y.
HORSE SHOE NAIL.—J. R. Heard, Boston, Mass.
IMITATION LEATHER, ETC.—C. H. Knelles, New York city.
LOOM HEALD.—H. O. Whipple, New York city.
MOTIVE POWER ENGINE.—G. Westinghouse, Jr., Pittsburgh, Pa.
MULTIPLEX TELEGRAPH, ETC.—T. A. Edison, Newark, N. J.
NEEDLE.—W. Trabue, Louisville, Ky.
ORDNANCE.—G. H. Felt, New York city.
OVERALLS.—H. F. Woodward, New York city.
PATCHING BULLETS.—H. Borchardt, New Haven, Conn.
PORTABLE LATHE.—F. Scott, Bennington, Vt.
PRISM.—J. W. Queen & Co., New York city.
ROCK DRILL.—E. S. Winchester, Boston, Mass., *et al.*
RUBBER BOOT AND LAST.—I. F. Williams, Bristol, R. I.
SCREW PROPELLER.—A. C. Fletcher, New York city.
SHEARING SHEEP, ETC.—E. Chaquette, San Francisco, Cal.
STEAM ENGINE.—A. S. Cameron (of New York city), London, England.
STEP SURFACE.—G. A. Keene, Lynn, Mass., *et al.*
TREADLE APPARATUS.—G. D. Bows, Boston, Mass.

Recent American and Foreign Patents.

Improved Washing Machine.

Silas W. Holbrook, Catskill, N. Y.—The invention relates to an arrangement of yielding plates forming the continuous inner wall of the suds box, and being free to move at each end between parallel guide blocks. The clothes are put into the space between the ribbed spring plates and a ribbed cylinder, and are carried around through said space by the revolution of the said cylinder, and are washed clean by being rubbed against said plates, and by being carried around through the water.

Improved Seat for Extension Carriages.

James V. Randall, Newtown, Pa.—The rear seat is made adjustable toward or from the front of the carriage, and the elastic front seat is pivoted and supported, so that the weight of the person or persons sitting upon it will spring its center down slightly, which tends to throw the lower ends of the standards outward, and thus holds the gudgeons securely in their sockets.

Improved Lamp Burner.

Walter McKinley, Tremont, Ohio.—The object of this invention is to provide a lamp burner of improved construction, which shall be simple and detachable in all its parts, and, in consequence of the same, more convenient to clean and easy to keep in repair. It consists in a burner cap provided with a groove, in combination with a detachable wick tube, a detachable set of spur wheels for adjusting the wick, and a detachable shaft for operating said wheels. It also consists in the peculiar construction of the spur wheels, and in the manner of fastening the devices together.

Improved Ditching Machine.

Senator Theodore F. Randolph, Morristown, N. J.—Ex-Governor Randolph has for some time past been engaged in developing the novel form of ditching machine which forms the subject of this patent. The device now completed presents many excellent points of merit, and, in the opinion of the inventor and many of his friends, is the most practical and efficient of the many machines for ditching purposes now before the public. Its construction is such that it will work equally well in clayey or sticky soils and in sandy or loose soils. It may be readily adjusted and controlled, so as to sink a vertical ditch upon inclined or uneven ground, and the ditching wheel may be readily fed down as the ditch increases in depth. There is a novel combination of parts for adjusting the angle and hight of the shoe with relation to the ditching wheel. By suitable construction, the wheel and frame can be raised and lowered without affecting the axle, and the axle can take any inclination the surface of the ground may require without affecting the ditching wheel and its frame. The rear axle may be inclined in either direction to accommodate it to the surface of the ground. The edges of the flanges of the ditching wheel are made sharp, so that they may be sunk into the soil at the bottom of the ditch by the weight of the wheel and frame, so as to separate the sides of the slice of soil to be raised from the sides of the ditch. As the soil passes over the top of the wheel it is delivered into a chute, by which it is discharged upon the side of the ditch, and which is provided with a tongue, which enters the channel of the wheel and serves as a scraper to disengage the soil from said channel. The frame and ditching wheel may be held in a vertical position, while the axle is inclined in either direction by its wheels in passing over uneven or inclined ground. By this construction, all the necessary adjustments can be made without stopping the machine. Knives shave off the sides of the last previous cut to widen the ditch, and enable the ditching wheel to work freely and without binding.

Improved Sheep Holder for Shearing.

Joseph R. Virgo, Texas, Mich.—This consists in an adjustable shearing table, having an adjustable stand and plates for holding the legs of the sheep. When a sheep is fastened on the table, it is in an easy position and convenient for the shearer, and can be turned by turning the table to the right or left, as may be required.

Improved Fifth Wheel for Vehicles.

George F. Putman, Fonda, N. Y.—The head block or axle is provided with guard plates at both sides and opposite points of the fifth wheel, for protecting king bolt and wheel.

Improved Parlor Fountain.

Herman Wenzel, New York city.—Air is forced by the upward pressure of water in the base through a pipe, over the water in a chamber below, and, by its compressive force, ejects the liquid through the nozzle. A pump operated by a treadle is arranged within the base, and connected with the lower chamber of the basin by a pipe, so as to enable the water in the base to be forced into the lower chamber of the basin, and kept there in full supply.

Improved Combined Fluting and Sad Iron.

Charles Raymond Rand, San Francisco, Cal.—This invention relates to an improved fluting and sad iron which is heated internally with gasoline or other volatile distillate of petroleum. It may be readily used on different sides, either as a sad iron or for fluting. A detailed illustrated description will be found on p. 150 of our current volume.

Improved Bridle Bit.

Peter Casey, Newport, R. I.—Side pieces pass through mortises in the ends of a movable bar. The side pieces, in order to render them adjustable, are provided with holes, which receive the ends of set screws, so that the bar is securely held in place. The driving lines are attached to the loops of the bar.