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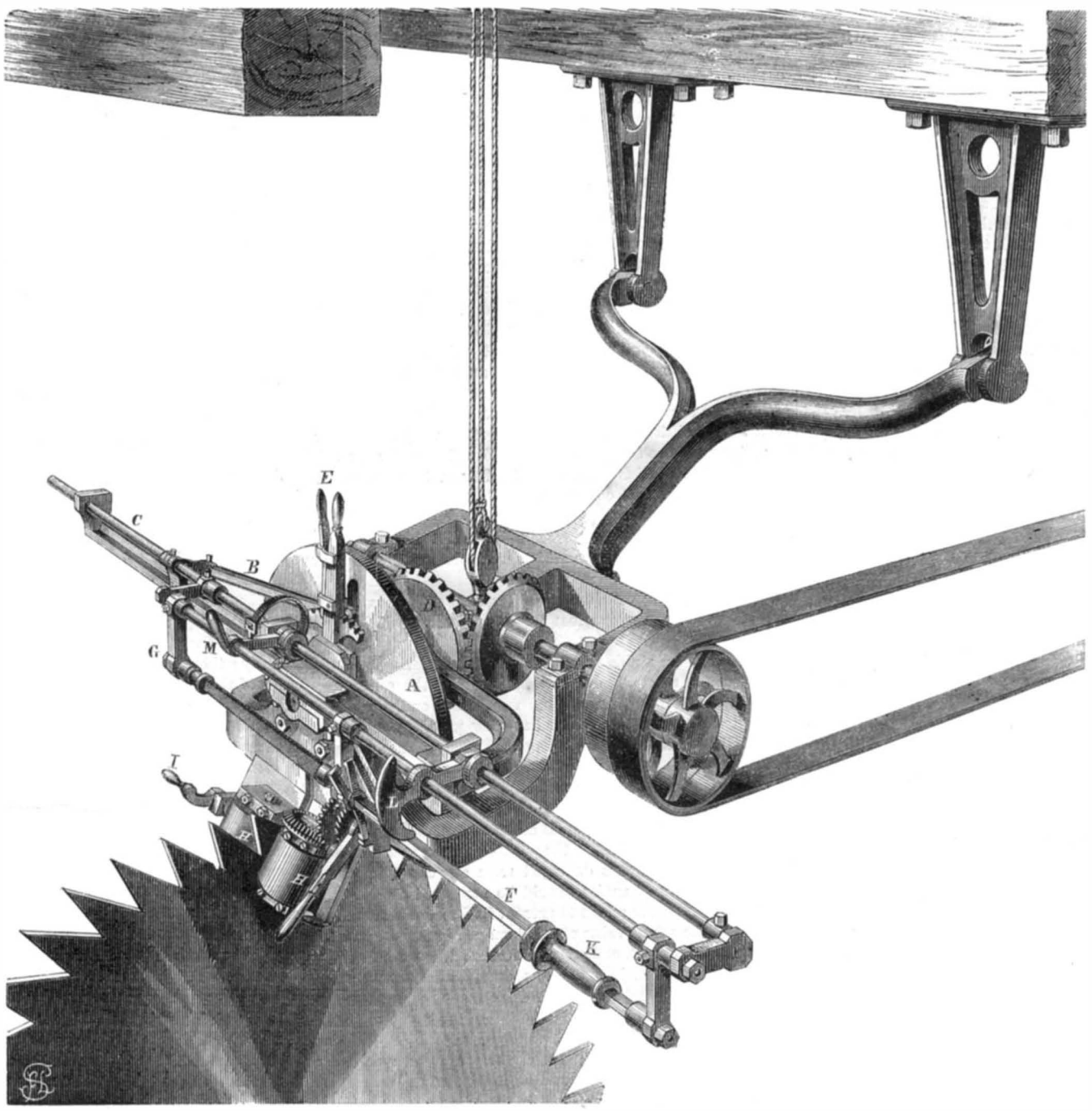
Automatic Saw Filing Machine.

The art of filing—the expertness, mechanical skill, and judgment necessary to use a file properly—is acquired only after long practice. This practice is required for ordinary filing in the machine shops, but for properly filing the teeth of circular saws, on which the value and amount of work performed largely depend, additional skill and practice are necessary. The object of the machine herewith represented is to secure a uniform result without the necessity of depending wholly on the judgment and practical skill of the workman. Yet some exercise of judgment is required, for the angle at which the file is presented to the teeth and the degree of pressure used are both under the control of the operator.



THOMPSON'S SAW-FILING AND GUMMING MACHINE.

The device is swung from suspended brackets by means of a forked brace, as shown, and motion is given to the rotary and reciprocatory parts by a belt, through the medium of fast and loose pulleys and bevel gears, or they may be driven by hand by placing a crank in place of the pulleys. Thus, on holidays or at other times when the mill is not running, the saws may be put in order. A fall, or other suitable means, is used to raise or lower the device to adapt its position to the diameter of the saw to be filed. The face plate, A, carries, in a slot, an adjustable crank pin by which the stroke of the file may be regulated. By means of a connecting bar, B, the bar, C, is made to slide forward and back through bearings in a transverse frame—that is, pivoted on the shaft of the bevel wheel, D—and a stud on the same line on the forward part of the frame proper. By means of the spring lever, E, and a notched quadrant, the inclination of this bar may be made to take any vertical angle (within certain limits) desired. To the bar, C, is connected by arms held by set screws, the file frame that accompanies the bar, C, in its reciprocating movement.

The file is held in two snugs so that it forms a part of the file bar, F, that may be turned to present the face or edge of the file to the teeth at the proper angle. The tang of the file is secured in the snug, or thimble, which is a part of the bar, F, and the point in one that revolves freely in the arm, G.

To an inclined plate, affixed to the front of the suspended frame and slotted to allow the periphery of the saw to pass, are attached two friction rollers, H, of wood, or covered with leather, one being made to slide, and being held against the face of the saw by a spring, or, as shown in the engraving, by an adjusting screw, I. The other is rotated by means of two bevel gears, a ratchet and pawl, J. By this arrangement the saw can be turned, one tooth at a time, to present a tooth to the file, successively, as the previous tooth is finished.

When not in use, as when placing the saw in the machine, the file bar may be raised by swinging on its arms, and held in position by the sliding thimble, K, engaging with the segment, L. By removing the filing frame and replacing the crank disk, A, by an emery wheel, the saw may be rapidly gummed. By a spring handle, M, attached to the arm of the file bar and pivoted on the frame the direction and pressure of the file may be governed by the operator. The saw with its arbor is placed in a movable frame, not shown, with adjustable or temporary boxes, so that no necessity exists for removing the saw from its mandrel.

Patent pending through the Scientific American Patent Agency. All communications should be addressed to Albert Thompson, Ridgeway, Elk Co., Pa.

Essence of Disease.

The following is from the pen of Doctor Hall, in the February number of *Hall's Journal of Health*:

The science of medication, as far as it has become a science, is beautifully simple, and carries with it, to the thoughtful and logical mind, a high degree of interest, which the reader may presently see.

All disease may be said to be founded in an unequal distribution of the blood, while its equilibrium is essential to high health and manly vigor.

While it is true that too much blood at a particular part of the body, causes a diseased condition of that part, such as head-ache, if in the head, the same amount of blood may give two very different diseases, or two very different symptoms or manifestations, according to the set of vessels which contain that excess of blood, whether artery or vein.

Many know the difference between a dull, heavy, depressive head-ache which invites repose, and the sharp, piercing pain which makes sleep an impossibility: between the burning feet in some forms of dyspepsia, which makes standing on the snow a perfect luxury, and the cold, clammy sweat of cholera consumption.

The blood is distributed to the body through the veins and arteries, and where there is an artery there must be a vein. The blood flows through the veins like a slow, steady river; but through the arteries like the dash of the leaping waters.

When there is too much blood in the veins, it is called "congestion," because it packs, it gorges, it dams up; when there is too much in the arteries it is called "inflammation," because it fires up the parts, makes them hot, red, flame-like.

When the veins of a part are too full, there is a dull pain, and the color is inclined to a black red; when the arteries are too full, there is a fierce, quick, darting pain, and a fiery appearance.

Disease being a breaking up of the equilibrium of the blood, whatever has a tendency to restore that equilibrium, to withdraw the blood from the over-stocked part, promotes health to that extent.

Although the very last part to die, death, in a sense, begins at the heart, by its not being able to relieve itself at a given beat, of all the blood that is in it; the next beat, and there is a greater surplus, and, with that, less power to distribute the vital fluid to the extremities of fingers, feet, and skin; then they begin to grow clammy and cold, and death-like. But if, almost in the article of death, any great physical or mental shock can be imparted, by which the heart shall bound with a superhuman throb, and clear itself of its entire contents, life is saved.

The devoted and indefatigable missionary Durfee was dying of low fever, the cold extremities, the fixed eye, the labored breathing, all showed that the powers of life were rapidly wasting away, although a loud voice would arouse him to consciousness. This suggested to the physician that if the heart could be relieved of its load of blood, if the equilibrium of the circulation could be for a moment restored, he might be saved. He was placed on the floor, and buckets of water were poured upon the body from the hight of a man. He seemed to wake up as from a heavy sleep or dream; the circulation was re-established, natural warmth restored, the voice became as clear and the mind as active as in health; he fondled his youngest child, and for a while all seemed hopeful, but nature had lost her recuperative power, had not strength to sustain herself, and he gradually pined away. A poor old woman had been bed-ridden for years with rheumatism, when, being left alone one day, she waked up to find the house on fire, with one bound she leaped from her couch, ran as fast as any body, and thereafter could walk as well as others of her age.

It is related of a celebrated physician, that journeying one day, he heard that a lady was dying with a low fever and greatly desired to see him, as they had not met since childhood, when they were very dear friends. On the instant of entering the chamber, he clapped his hands joyously, and exclaimed, "The Eagle's Nest"—and she lived. They had spent many happy hours of school time around the eagle's nest, and all the associations coming back upon her in an instant, caused a shock which other means were powerless to produce.

Within a short time, a young man named Joseph Wheeler, of New Orleans, who had been deaf and dumb for four years, in consequence of some sickness, sauntered up to a cannon's mouth, without any one noticing it; the match was applied, when it was too late to snatch him away. He fell down as if dead, but presently came to himself, speaking as fluently as he ever did, and answering all questions put to him, to the great wonderment of the bystanders.

All are familiar with the pallor of the face induced by sudden alarm or other great excitement; it is because that under the influence of great mental or physical shocks, the blood retreats to the heart in extra quantities, draining the other portions of the body, leaving such of them as were diseased by reason of their having too much blood there, in their natural or more healthful condition.

While the first effect of a shock is to send the blood of the body in upon the heart, the second effect is for the heart, by the excess of stimulus, to make a desperate effort to relieve itself; this is "re-action," but in making that clearance, although it received more blood from the diseased part than naturally belonged to it, it sends back only its proper proportion to that part, hence the restoration of the equilibrium and return to health.

In the first case the excess of blood or obstruction was in the head, hence the stupor; in the old woman, it was in the joints; in the young man it was in the ear; while in the case of the "Eagle's Nest," it was in the internal organs, the liver most.

But there are less heroic methods of restoring the equili brium; more quiet ways of equalizing the circulation. Persons have appeared to be dying, when the mustard or blister applied to the wrists and ankles has drawn the blood to the parts, evidenced by their being reddened, thus relieving the heart and saving life. A man sits down to dinner with a severe headache, eats heartily, and feels it no longer. It is because an excess of blood is required in the stomach when it is filled with food; the brain, by furnishing its quota, is relieved of the surplus blood which caused the pain, and the equilibrium is restored. But a hearty meal will not always remove head-ache for reasons not necessary now to be explained.

Insane persons cannot sleep enough, the arteries of the brain are too full of blood, it is sent to them in too large quantities; hence, in some cases, sleep has been obtained by feeding the lunatic six or eight times a day; thereby keeping the stomach full of food, and drawing the blood there for its digestion, thus relieving the brain. The medical proprietor of a lunatic asylum in England has pursued a plan of this sort for fifty years with very successful results. Most observant readers have felt the somnific effects of a hearty dinner. It is by restoring the equilibrium of the circulation that the "reaction" of the cold shower bath removes some forms of disease, which failed to be reached in other ways.

The practical lesson of this article is, they will live the healthiest and the longest, who have the equilibrium of the circulation least interfered with; hence an important means of avoiding sickness and attaining a good old age, is to live quietly, uniformly and regularly; there is no preventive of disease equal to this and it is well worth while for all to practice it.

PRACTICAL SUGGESTIONS ON TANNING LEATHER.

BY C. GILPIN.

If, as has been established upon high authority, the character and quality of the leather are determined by the nature and quality of the tanning material with which the gelatin is combined or, to adopt a more practical idea, if the leather partakes positively of the properties contained in the substances employed, as when mineral or gummy material is combined with the tannin, the result will be, not a perfect and insoluble union, as is the case when pure tannin alone is contained in the liquor, but an irregular and uncertain compound of gelatin with the base employed, and leather made thereform is more or less serviceable in exact proportion to the purity of the elements brought together and circumstances under which they are united; hence it becomes a very important object for the manufacturer, to direct his attention at all times towards securing that material containing the largest portion of pure tannin, freed from all extraneous matter, so far as practicable, to enable him not only to make the most durable article, but produce it in the shortest possible time; two objects connected with the leather interest that, it is believed, can be more fully developed than they are at present.

During a recent visit to the tanneries, nothing that came under my notice impressed me more forcibly than the necessity of adopting some rules and regulations among the trade, to correct the abuses and negligence that exist in every section, in this department of the business, by which great losses are sustained, not only by the tanner, but the consumer of his products, in the damage sustained by the bark, mostly it is believed from want of proper attention while in the forest and before it is hauled to the yard. Hence it is assumed that this is the direct and proper position to start from, if we ever expect to reform abuses, and avoid imposition, which, it would appear, judging from the condition of the bark that I examined in more than two hundred yards, have been increasing in a ratio proportionate to the demand and increase in price. I observed it was a common practice among the trade, to pay nearly full price for all qualities of bark, which ranged from six to eighteen dollars per cord, depending upon locality; and when a reduction was made it was not in proportion to the difference between damaged and sound bark; also discovered that considerable competition existed to obtain a supply of bark, the quality and value of which was doubtful, notwithstanding some of these competitors had, they informed me, a fair supply of good bark on hand, to whom I suggested perhaps they might find it more profitable to curtail their operations to meet the supply of good bark on hand, than to pay full price for material that had been deprived of fully one-half of its tanning properties. This growing evil is not confined to oak bark, but exists to an equal extent among the hemlock tanners, although it has been asserted that hemlock bark did not become injured by exposure; this assumption it is confidently affirmed cannot be maintained and for the following reasons:

First.—Because it is a self-evident proposition that all perishable articles when exposed to the influence of the elements which are known to destroy their virtues, must as an inevitable consequence part with a portion of their virtues just in proportion to the extent they are brought in contact with them. Hence we find that bark exposed for a length of time to rain and snow, the latter frequently melting and passing through the piles left standing in the woods, must yield up no inconsiderable portion of its tanning properties. Those who have not turned their attention to the real difference between a liquor made from first quality and that made from damaged bark cannot realize the comparative value in actual tanning material between the two. From a test made some years since, it was discovered that bark which had been exposed for two days to continued warm rains during the month of July, had yielded up one-fifth of its tannic acid, and consequently required that much more bark, to produce the required strength of liquor; or, in other words, one cord and one-fifth to accomplish what one cord of good, sound bark will do. A test was also made with hemlock bark, which proved that a cord of that bark which had been standing in the woods exposed to the weather for two months had parted with nearly one-fourth of its tanning principle, which had been leached out, entirely extinguished through negligence, by not being properly protected from those elements that are known to destroy the tanning properties of all barks used for tanning purposes. Nor is this the only loss incurred through want of some thorough system by which the bark can be immediately secured, beyond question, from being injured by exposure after it is peeled; the labor of handling, hauling, grinding, and pitching is the same, with twenty-five to fifty per cent less material to tan with, also the injurious influence of the dark moldy color, a general accompaniment of damaged bark upon the stock. In view of these facts we desire to direct the attention of the manufacturer to these existing, and we believe, increasing evils, that they may make a movement to correct them, and thereby in some measure avoid the heavy losses now sustained in this department.

It appears from information derived from high English authority that the trade both there and on the Continent understand fully the importance of securing the bark crop from possibility of damage, by housing it the same day it is taken off the tree. When we consider the fact that seven millions of cords of bark are peeled annually in this country at a cost of more than thirty millions of dollars, we can more fully realize the importance of the subject under consideration, and approach more closely the actual losses sustained from these causes to the manufacturer and consumer.

If we estimate the average loss upon the entire crop at one dollar per cord, which we believe is below, rather than above, the avearge, from enumerated causes it amounts to the startling sum of $7,000,000 annually, to say nothing of the expenses for handling, hauling, etc.; distribute this loss among 4,000 tanneries and we have an average loss for each of nearly $1,800 per year.

Now, these are stubborn facts, that stare us glaringly in the face, yet have rarely, if ever, been brought to the serious notice of the fraternity through the medium of our journals,—and why? Simply because we have few practical members, who will give us the advantages of their experience through that source; consequently the subject has not received that attention that its importance would seem to claim at our hands. In our judgment the price of all bark should be regulated entirely by the actual amount of tanning principle it contains, for in that alone the profits to the tanner consists; and when bark becomes damaged from any cause, its value, like all other merchandise, should be measured accordingly. A difficulty however seems to present itself, in reference to determining the actual value of all damaged bark, and which I will, to some extent, endeavor to remove by suggesting the adoption of a custom in general use among all manufacturers, *i. e.*, keeping on hand samples of all qualities of bark recognized as merchantable.

In the investigation of this branch of our subject, it occurs to my mind that, during the peeling season, there should be a sufficient number of hands detailed for the exclusive purpose of looking after the bark after it is peeled; never allowing it to remain exposed longer than one day to the weather if fair, and always have it turned ross side out, and so laid that it will be sure to shed all the rain let it come from whatever quarter it may; during the bark peeling season storms rarely come from a due northern or westerly course, hence you can always let the flesh side face either of those directions without exposing it to damage from that cause. It is well known that most men who peel bark for sale, pay but little attention to having it well secured, and in many instances I have known them to turn it flesh side out, so that it would curl up nicely and yield more to the vender and less to the tanner when measured. In all regions where competition exists the man who peels bark for sale being fully aware he can sell his bark readily at a large price and for cash, he is not apt to be very particular, either in regard to quality, or the manner in which his bark is packed in the wagon or other conveyance in which it may be brought to market, knowing as a general thing the demand is fully equal to the supply and consequently meets with ready cash sale; and my experience has satisfied me that it is a matter of economy for the tanner to have the control of the peeling, hauling, and management of the bark in the woods, as thereby he can have it secured in the best possible manner against damage, even if it should cost him an extra quarter or fifty cents per cord, which would be a small amount in consideration of the advantages gained. And as a further security against imposition, it occurs to my mind that the judgment of the tanner would be much assisted by making selections from bark in all conditions, from the very best down to the most inferior quality; make the best liquor possible from each, then have them analyzed to determine the exact proportion of tannin contained in each quality, and, as a still further assistance in arriving at correct estimates, let the samples be marked so as to indicate the quality and strength of liquor made from each specimen; by adopting this method it is confidently believed the manufacturer would have a more positive and certain guide by which he could always determine much more accurately and satisfactorily to all parties concerned, or pecuniarily interested, the real value of the article offered for sale. This plan would be preferable to any test that might be made through the medium of the Barkometer, for it is known beyond controvetsy, that results indicated by that instrument are not reliable, because it gives the density of the liquid, and not the quantity of tannin contained in it; and all liquors vary in density just in proportion to their purity, all things being equal, and while we might approximate towards the relative strength by applying the Barkometer, it is known that the surest and really only reliable test is the one suggested; actual analysis, or the more sluggish but equally certain indicator, the advancement of the stock when placed in conjunction with the liquor; that is to say, when all conditions are comparatively equal, hides thoroughly prepared, application and temperature of liquors favorable, method of leaching such as will guarantee the best quality of liquor, all of which operations have their influence beneficially or otherwise upon the character and progress of the stock. In concluding my remarks upon this branch of our subject, I desire to call the attention of the trade to the fact that while in Europe and England they tan out one pound of best quality of sole leather with four pounds of bark, it requires twelve to thirteen pounds to do the same work in this country; this alone should satisfy every inquiring mind engaged in the production of leather, that we receive a great amount of material in the shape of bark that does not pay for hauling and the other labor put upon it, or, in other words, is perfectly worthless and obnoxious in connection with their tanning operations, and earnestly invite the attention of the whole fraternity to the careful consideration of this important subject, whereby they may be induced to adopt some regulations by which these losses will be prevented, and millions of dollars saved annually that now perish, yielding no profit to anybody.

ARCTIC AND ANTARCTIC OCEANS.

From Chambers' Journal.

Among the navigators and scientific men of former times, it was disputed whether salt water was capable of being frozen. Experience—in many cases a stern teacher—has set that question at rest, proving that within the polar circles the sea is, for hundreds of miles, covered with masses of ice, which form a sullen, unyielding barrier to the poles. Maury describes the agencies at work in these terrible solitudes in a famous passage: "There icebergs are framed and glaciers launched; there the tides have their cradle, the whales their nursery; there the winds complete their circuits, and the currents of the sea their round in the wonderful system of oceanic circulation; there the aurora is lighted up, and the trembling needle brought to rest; and there too, in the mazes of that mystic circle, terrestrial forces of occult power and of vast influence upon the well-being of man are continually at play. Within the arctic circle are the pole of the winds and the poles of the cold; the pole of the earth and of the magnet. It is a circle of mysteries; and the desire to enter it—to explore its untrodden wastes and secret chambers, and to study its physical aspects—has grown into a longing."

Marine ice is whitish opaque, and rough on the surface, and consists of thin flakes of a porous spongy texture. From the quantity of strong brine enclosed in its substance, it is very heavy and dense, and projects only one-fifth above water. When sea-water begins to freeze, it partially deposits its salt, which, thus set free, retards the process of congelation below. Old floes are almost fresh, but a thaw renders them brackish. The polar seas do not congeal until the temperature falls to 28½ degrees of Fahrenheit, which takes place in September in the north, and March in the south; though even in summer, a slight increase of cold is sufficient to form young ice several inches thick. The sun sets early in November, and the severity of the arctic winter begins in December, continuing to the end of January, during which time the thermometer ranges to about 40 degrees below zero. A week or two of milder weather comes on; but the middle of February brings with it the sun, immediately followed by the most intense cold of the whole winter. After that, the sun's influence begins to be felt, and in July the ice breaks up. During the three summer months, the sun never sets, but noon and midnight are equally illumined by brilliant sunshine. A few stars appear in September. The darkest part of the winter is from the middle of December to the middle of January, when the aurora transforms the sky into a vault of fire, and paraselenæ appear, surrounding the moon with blazing crosses, circles, and mock-moons, scarcely surpassed by the wonderful deceptions of the solar rays. The intense cold of February is accompanied by considerable twilight; and in the latitude of Banks' Land, there is even at the end of January tolerable light from 9.30 A.M. to 2.30 P.M., so much so, that at noon Arcturus is the sole star unquench by the increasing daylight. The only navigable time is from July to September within the northern, and January, February, and part of March within the southern circle. During the rest of the year, the arctic regions are impenetrably sealed by vast fields of ice, both "floe" and "pack," covering every foot of water, from the shallowest inlet to the wide expanse of Baffin's Bay or Melville Sound.

The interior of Greenland is occupied by vast glaciers

which encroach on the coast, filling the deep dark fiords with frozen snow. As summer advances, those portions of the glacier that project into the sea are undermined by the waves, and fall with tremendous noise, rocking in the foaming water till they gain equilibrium, when, perfect icebergs, they float here and there, impelled by winds and currents. Many are borne by the polar current southward. They meet the warm waters of the Gulf-stream in latitude 50 degrees, where they melt, and deposit the loads of earth and stones borrowed from the Greenland soil. According to Maury, this has probably, in course of time, formed the Grand Bank of Newfoundland. They are in incredible numbers. As many as five hundred have been counted in sight together, ranging from fifty to three hundred feet in hight, and of all sizes up to a mile in extent. Their appearance is very beautiful and no less extraordinary. Gothic churches, Egyptian temples, aerial palaces with pillars and arched windows festooned with crystal draperies, are only some of the inconceivable varieties of form displayed, while they gleam under the summer sun like mountains of burnished silver, with pinnacles and cliffs of clear sapphire or the palest green, from which rush cataracts of limpid water mingled with fragments of ice. These various hues arise from several causes. Bergs are originally composed of fresh water ice of different ages, but that formed from salt water frequently overlays it in parts. A great deal of snow lies on their summits, and forms large ponds of fresh water, when dissolved by the heat of the sun. Finally, the solar rays touch the bergs with colors, changing with the position of the spectator. Only one-eighth of their total thickness is seen above water. Frequently bergs capsize in consequence of the sea undermining their base. An ominous rolling motion gives notice of this event; it continues for some time, and at last the berg heels over and disappears with a terrific plunge, sending up columns of spray. It reappears bottom upwards, balances itself, and floats quietly on with a changed face.

All the antarctic land yet discovered consists of gigantic cliffs without a single opening, three thousand feet high in some places, descending in others to one hundred feet. The whole is faced with ice of enormous thickness, and covered with snow, so that at a glance the eye can scarcely imagine it to be land at all, but for spots showing the dark stone where the cliff is too perpendicular to admit of even ice maintaining its hold. Nothing is so tenacious as the cold of the antarctic regions. In February, the warmest summer month of 1841, the thermometer never rose above 14 degrees at noon near the continent. It is rarely above 30 degrees in the sun at mid-day during summer, and falls in winter more than 50 degrees below zero. The sun stays a week longer north of the equator than it does south, making the winter and night of the antarctic regions longer. South Georgia, in a latitude corresponding with that of Yorkshire in the northern hemisphere, is always covered with frozen snow, and produces scarcely anything but mosses and lichens. The immense preponderance of water south of latitude 50 degrees, allows the fierce westerly winds to blow round and round the world, a perpetual cyclone, keeping the sea in constant agitation.

The two polar circles differ greatly in physical conditions. The antarctic has a marine climate, that is to say, it is equable. Though wet and stormy, it is not subject to extremes of temperature, and it is believed that the south pole must be warmer than the north in winter. Arctic sunshine raises the thermometer to 66 degrees or 70 degrees, and hung in the shade immediately after, the mercury falls to the freezing point. The arctic climate is continental—dry, calm, and variable. The thermometer has a range of about 120 degrees; and while the round of the seasons brings but little change in the frightful antarctic wastes, nothing can surpass the beauty of the arctic summer—"an endless blaze of light, the air and sea and earth teeming with life," plains glowing with richly tinted flowers, and strange, glittering forms sailing past "in stately and solemn procession." Its currents are strong, and bear large numbers of bergs to meet the warm Gulf-water, and, as it is natural to suppose, bergs are found to be most numerous where the drift is strongest. The antarctic seas are in direct opposition to this. Not only are its currents sluggish and feeble, but the most powerful of them, Humboldt's Current, carries few bergs along the Chilian coast, while the main ice-drift is towards the Falklands on one side, and the Cape of Good Hope on the other, where there is scarcely any motion of the water. This is a fact which no navigators are able to explain, except perhaps on the supposition that there may be strong submarine currents at a great depth below the surface. Bergs have been observed in Baffin's Bay drifting rapidly to the north, where there was a powerful surface-current running against them, showing that in consequence of their weight and immense draft of water (in some instances more than a thousand feet), they must be influenced by some "resistless undertow" yet stronger.

ILLUMINATING GAS—WHAT IT IS, AND HOW IT IS MADE.

The illuminating gas made in large gas works, and used almost universally for lighting the buildings and streets of large cities throughout the civilized world, is composed of products of the distillation of bituminous coal in close retorts.

The retorts used are made of refractory clay in the form of hollow half cylinders, the semi-cylindrical or arched portion being the top, and the flat floor the bottom as they are placed in the furnace. The ends of these retorts are open before they are set, but when placed in position the inner ends communicate with upright iron pipes or cylinders, which are secured at the top and communicate with what is called the hydraulic main, which we will describe further on. The outer ends of the retorts are closed when in action by iron doors, luted with fire-clay to prevent the escape of gas. The retorts are usually placed in groups of five, under which the fire-grate is placed.

The "hydraulic main" is a large iron pipe or cylinder many times larger than the recurved pipes, which connect it with the retorts. These tubes penetrate the hydraulic main, which is partially filled with water, and terminate beneath the surface, so that the gas which passes from the retorts when at work bubbles up through the water, and is prevented by it from escaping when any of the retorts are opened for repair or recharging with coal. This main receives all the distilled products from all the retorts, frequently numbering hundreds in large works, and of course has to be of a size sufficient to convey all away freely.

Before going further in our description of the apparatus employed, we will enumerate the products obtained from the distillation of coal as it is performed in gas retorts. They vary considerably in proportions according to the quality of the coal used. They are olefiant gas, light carbureted hydrogen, carbonic acid, carbonic oxide, hydrogen, oily vapors, sulphurous acid, sulphureted hydrogen, ammonia, steam, nitrogen, tar, and coke which remains in the retort and contains all the matters which are not distilled over. Beside these substances there are many others which occur in small quantities, and which, although they need not be mentioned here, are not altogether unimportant.

The volatile products which pass over, are totally unfit for use in their mixed and crude condition; the object of all the intermediate apparatus between the retorts and the gas holder is to eliminate those products which render the gas unfit for use, if we except the pump used to remove the back pressure against the ends of the tubes connecting the retorts with the hydraulic main.

About 120 lbs. of coal are used as a charge for each retort. It takes about six hours to work off one of these charges. When the volatile products are removed by the action of heat, the residue (coke) is raked out and and quenched with water.

A considerable proportion of the tar is deposited in the hydraulic main, from which it is removed as it accumulates. It contains the ammonia and the oily vapors, but the gas being still quite hot contains a large amount of impurities, much of which will deposit upon subsequent cooling. The gas is therefore passed from the hydraulic main to the condensers, a series of upright pipes surrounded with cold water, and through which the gas is successively forced. During the process of condensation the gas deposits more of its impurities, which trickle down through the pipes and are collected in a receiver provided for that purpose. From the condensers the gas passes to and through the scrubbers. The latter are large cylindrical structures filled with stones, through which running water is allowed to flow, the gas at the same time passing through to their tops. Being thus brought in contact with a great surface of water, the gas is washed and more of its impurities are absorbed and carried down by the running water to a reservoir below.

Between the scrubbers and the purifiers is situated the "exexhauster" or gas pump above alluded to. There are several varieties of these in use, and we shall not attempt a description of any of them. Their sole object is to remove pressure from the hydraulic main, by exhausting the gas from the portions of apparatus already described.

The gas having passed through the exhauster is carried along to the purifiers. The chief impurities which remain at this stage of the process are the sulphur compounds and carbonic acid. Portions of these compounds have been absorbed by water in the scrubbers, but enough still remain to render the gas offensive and deleterious to health, and to greatly impair its illuminating power. Among the substances employed to effect their removal, none have been so largely used as lime, which fact indicates the value of that substance for the purpose as compared to others. It is employed in two ways. The lime is either used dry, in which case it is placed upon trays with open-work bottoms, upon which layers of straw, moss, or other similar materials are laid, and the lime spread upon them; or it is in the form of cream of lime, and the gas is made to bubble through it until the impurities combine with the lime and are thus eliminated. Both methods have their special advantages; but the dry lime process has obtained latterly in large cities in this country on account of the greater ease with which the spent lime can be disposed of, and greater freedom from offensive odor. A method of purification by the use of brown hematite (bog iron ore), to absorb the sulphur compounds, has been employed with success in Europe, and although it is said not to remove the impurities so thoroughly as the lime, the disagreeable smell emitted from the latter when the purifiers are discharged is avoided.

An opinion prevails among many, that the vicinity of gas works must be unhealthy on account of the odors emitted. Experience, however, has shown that these odors do not engender disease, but really act as a preventive of epidemic and sporadic complaints. The sulphureted hydrogen and sulphide of ammonium escaping from the lime when it is taken out of the purifiers, are undoubtedly unwholesome, when the air is sufficiently saturated with them; but although their smell is extremely disgusting to most people, it is rare, we believe, that they contaminate the air in the vicinity of gas works so much that their effects upon public health need be feared.

After the process of purification is performed, the gas passes to the gas holder, an immense iron vessel inverted in a cistern containing water, through which the gas bubbles up under the receiver. Its buoyancy enables it to raise the receiver as the gas accumulates. As the receiver descends by its own gravity when the gas is drawn off through the general service, a constant pressure may be maintained. We say *may be* maintained, for we have pointed out in previous articles how a diminution of pressure may be made to wrong the consumers and enrich the producers. The consumer may be greatly wronged also by the improper purification of gas, paying for sulphurous acid or carbonic acid gases the same price per cubic foot as for good gas, while their presence interferes with illuminating power, and contaminates the air in dwellings.

The meter system now in use only measures bulk. It does that well enough, but it does not tell us anything about the quality or the pressure under which the gas is delivered, and is thus defective in two radical points. We will not, however, say anything more upon the subject of meters, having in previous articles exhausted the topic.

A case is now pending between the Metropolitan Gas Company, of New York, and the Board of Health, originating in the refusal of the Company to obey an order of the Board directing the former to either discontinue the manufacture of gas at the present location of their works, at the foot of West Forty-second street, or to adopt a method of purification (the iron process above described) that does not involve the escape of deleterious gases. The case is exciting much attention, and experts and chemists are called upon to give testimony in the case. The testimony seems strangely conflicting, so much so as to excite the suspicion that personal interest has given a bias to the opinions of some of the witnesses. Be this as it may, we give it as our opinion that nothing yet discovered, or likely to be discovered, is equal to lime for gas purification; and we also believe that the free escape into the open air of the gases to which objection is made, is preferable to permitting any larger portion of them to pass through the service and be delivered into the close rooms of our residences and offices, a necessary consequence of a more impertect system of purification.

The smell of a gas works is disagreeable, and real estate is always less valuable in their immediate vicinity than in more favored localities; now, is it the increased health of the people, or the increased value of real estate, that would result from the removal of the above works, that is the ruling motive in this raid against the Metropolitan Gas Light Company?

How to Build Houses.

Build your houses in the country, in preference to any place near the seacoast. In the country, choose a slope rather than a plain to build upon, and where the sun can have full access to it, if possible, all the day. Be sure (if need be, by effectual drainage) that the soil is thoroughly permeable to water. Let no moisture from the soil, from any source, be permitted to distill its pernicious influences upon the future dwelling or its inmates. Let the rooms be large, of substantial breadth rather than hight, and so pierced by windows that the air may have a bounteous and free entrance and exit. Let fireplaces be built in every room and chamber,—fireplaces made for real use, not kept for show, and not closed with iron plates which are to be pierced for air-tight stoves. Eschew all furnace heat except for warming the entries and corridors.

Outside the house let there be ample space for air and sunlight. One or two trees may be permitted to grow near the house, but not to overshadow it, for nothing but evil comes from too much shade, either of trees or climbing vines. Both of these may very materially prevent the warm rays of the sun from reaching and bathing the exterior, or from penetrating the interior of the house, which they should be allowed to do freely, even in the depths of summer. Nothing so deadens the atmosphere as the too constant closure of the windows, blinds, and curtains, whereby light and heat, as well as fresh air, are excluded. Every morning let the windows be opened widely, so as to drive off the remains of foul air that has necessarily accumulated from the sleepers during the previous night. Every night let a part of the windows be left open, and, if possible, at the top and bottom, so that during sleep there may be still a plenty of fresh, unbreathed air for the children and adults to use. Of course, the amount of space thus opened will vary with the season; but often, even during our Northern winters, especially in a furnace-heated house, a small aperture, at least, may thus be left. Two or three extra blankets only will be needed for any coldness thus caused.

As to the value of fresh air, alike for the healthy and the invalid, there seems to exist great doubt in this community. Even the healthy have no real faith in its efficacy as a means of giving health. Invalids, almost without exception, we have to educate to that faith. They have so many doubts about the weather. It is too cold, too hot, too windy, or too blustering. It is cloudy, or an east wind prevails. These and a hundred other trivial deviations from perfect weather are noted, and the unfortunate invalid quietly stays within doors, day after day, to avoid them. Nothing is more pernicious, no behavior more unwise. Both invalids and healthy persons ought to eschew all such views as arrant folly. "Whenever *in doubt*," we say to our patients, "about going out, *always go out*. If a violent storm is raging, to which no one would willingly expose himself, then keep to the house, but the moment it ceases, seize the occasion for exercise out of doors." "It would be better," said the late John Ware, "for everybody, sick and well, to face every storm, than to be fearful, as we now usually are, of even a trace of foul weather.—*Dr. H. I. Bowditch in the Atlantic Monthly.*

PERSEVERING INVENTORS.—Evan Skelly, one of our old clients, writing from Iberville Parish, Louisiana, says: "I shall send you another model in a few days. I have to work on it at night time, after my day's work is done. Now, is not that much better than spending time in a grog shop? I have now 32 orders for sulphurous acid machines, for the next crop. Patented September 15, 1868, thanks to the Scientific American Patent Agency—long may it prosper."

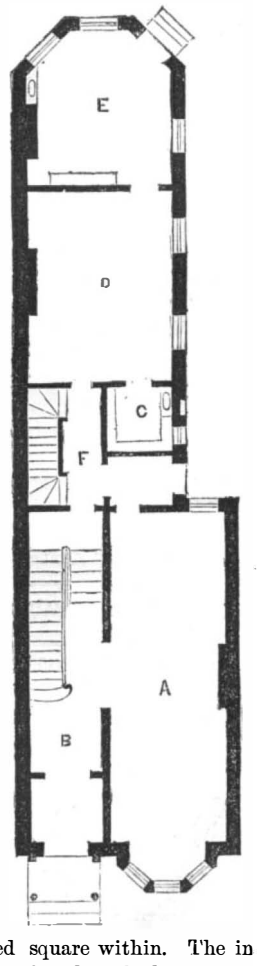
DESIGN FOR A BLOCK OF SIX DWELLINGS.

We copy from *Sloan's Architectural Review and Builders' Journal*, a design in the Franco-American style, and a description of a block of six dwellings, which we consider much superior to the ordinary method of building blocks of buildings, in which each dwelling is built without reference to the general design of the entire block. We give elevation of the whole and ground plan of each.

The design is particularly applicable to small cities, and to larger towns which, like Philadelphia, do not adopt the vicious system of tenement houses in vogue in New York, and is commendable as being at once tasteful and inexpensive.

BLOCK OF SIX DWELLINGS---FRANCO-AMERICAN STYLE.

From the elevation it will be seen, that the intention is to construct six houses in connection; each house, eighteen feet front and three stories high, being surmounted by a French roof, making a fourth story. The sky line is thereby agreeably and effectively diversified by the different hights and breaks of the roof.



The long façade, or face line of the front, is but slightly varied, no projection being more than twelve inches beyond the receding sections, thus dividing the block into compartments, affording opportunities for slight but tasteful decorations, and obtaining what are the greatest desiderata in architecture, breadth of light and depth of shadow.

Each house has a bay window in the front, together with a porch to the front door, projecting about the same distance The form and features of these bay windows may be different in each, by being made square, circular, or octagonal; and, by these means, an effect of pleasing variety will be obtained, considerably to improve the external appearance of the block. The windows, also, are intended to have their heads slightly curved on the outside, but finished square within. The intention is to exhibit the conception of such a block as can be erected at a very moderate cost, and one that would be within the reach, while still meeting the wants, of the major class of the business men of ordinary means.

Beginning with the principal floor: A is the parlor, 12×28 feet, with a front bay window. B, the main hall, containing the stairway to the upper portion of the house, with a vestibule on the front. C, the butler's pantry, D, the dining-room, 12×16 feet. E, the kitchen, 12×14 feet. F, the private staircase to the upper stories.

The other floors may be arranged to suit individual requirements and taste.

The front of this block would present a very pleasing and agreeable effect, if it were constructed of pressed brick, relieved with white marble trimmings, and quoins on the four corners.

Zinc as a Material in Building.

It appears, from a report published in France, on the use of zinc for purposes of construction, that most of the defects experienced in the employment of this material arise from ignorance as to the proper mode in which it should be thus used —the one object to be kept in view being to permit perfect freedom to the sheets; to confine them nowhere, and to separate lengths of guttering, and any other portions of a roof requiring to be made in long pieces, as much as possible. Eaves' gutters should be made in short lengths, bent in the direction of the way in which the sheet has been rolled and soldered, the solder being put between the sheets, and one sheet lapping over the other, nor must they be screwed to the rafters, as this is a practice which occasions a constant failure in the joints of iron eaves' gutters.

Wherever a down pipe comes there should be a stopped end in the gutter, and the gutter should not be continued longer than possible in one place; where it is laid behind a parapet a separate piece of flashing will disconnect it wholly from the sheeting on the roof. For guttering, the gage used should be increased in proportion to length; there should be a proper substance in all cases. Oak boarding will spoil the zinc, and the fir should be dry—the boards with an aperture of about half an inch between each. If they are damp, as much oxidation will take place on the under side of the zinc as on the top of it. It appears from actual experiment that the oxidation proceeds for about four years, gradually diminishing after the first three months, when it hardens into a protecting coat of a dark gray color, preserving the metal beneath from further deterioration. It appears to be evident that a sheet of zinc exposed to the atmosphere for a series of years losses little or nothing of its weight or thickness, and that its surface remains hard and polished like enamel.

Ink from Elder.

According to a German journal, an excellent permanent black ink may be made from the common elder. The bruised berries are placed in an earthen vessel and kept in a warm place for three days, and then pressed out and filtered. The filtered juice is of such an intense color that it takes 200 parts of water to reduce it to the shade of dark red wine. Add to 12½ parts of this filtered juice, one ounce of sulphate of iron and the same quantity of pyroligneous acid, and an ink is prepared which, when first used, has the color of violet, but when dry is indigo blue black. This ink is superior in some respects to that prepared with galls. It does not become thick so soon; it flows easier from the pen without gumming; and in writing the letters do not run into one another.

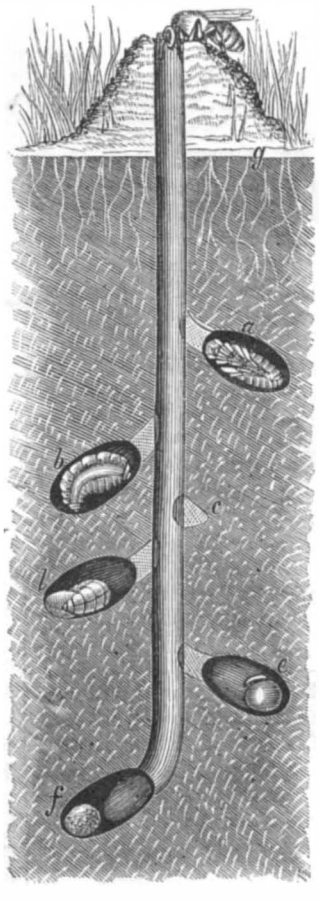
Important to Woolen Manufacturers.

It is announced that the Supreme Court has given a decision in the case of E. D. Jourdan *vs.* the Agawam Woolen Company, confirming the validity of the Goulding patent. This decision involves several millions of dollars, and affects the whole woolen manufacturing interests of the country. There were several curious points in the case, which constitute it one of the most remarkable suits ever instituted under the patent laws of the United States. In the year 1826, letters patent were granted to John Goulding for an "improvement in the mode of manufacturing wool and other fibrous materials." This patent was reissued in 1836, and expired in 1840. In 1862, twenty-two years after the patent had expired, Goulding succeeded in having an act of Congress passed for his relief, which renewed and extended his patent seven years from that date, with the proviso, however, that such renewal and extention shall not have the effect or be construed to constrain persons who may be using the machinery invented by said Goulding, at the time of the renewal and extension hereby authorized, or subject them to any claim for having used the same. This extraordinary legislation on a patent which had expired nearly a quarter of a century before was eclipsed by the action of the United States Patent Office in reissuing the patent, giving to Goulding an exclusive property in said woolen machinery. It was under this reissue that Eben D. Jourdan, the assignee of Goulding, sued the Agawam Company for an infringement of the patent, and his success involves nearly every woolen manufactory in the country, as Goulding's improvement was in common use when Congress authorized its conditional renewal and extension.

Burrowing Bees.

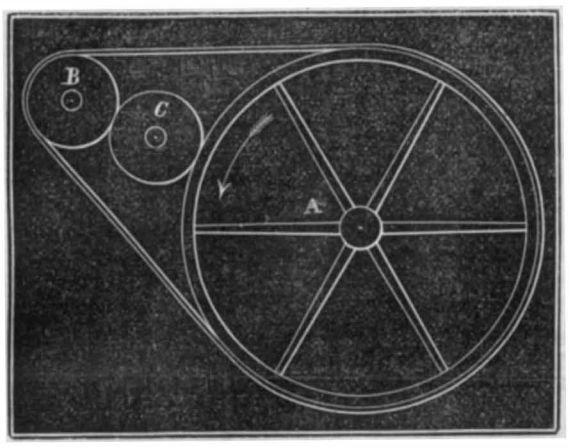
Packard's *Guide to the Study of Insects* gives an account of certain species of bees that burrow in the earth, and a drawing of the home of a family of them, which we herewith reproduce. This species is called by the entomologists *Andrena vicina*, one of the most common of burrowing bees. Mr. Emerton has closely observed the habits of this species, which builds its nest in grassy fields.

The burrow is sunk perpendicularly, with short passages leading to the cells, which are slightly inclined downward and outward from the main gallery. The walls of the gallery are rough, but the cells are lined with a mucus-like secretion, which, on hardening, looks like the glazing of earthenware. In the annexed figure, Mr. Emerton gives us a profile view of natural size of the nest, showing the main burrow and the cells leading from it; the oldest cell, containing the pupa, *a*, is situated nearest the surface, while those containing larvæ, *b*, lie between the pupa and the cell, *e*, containing the pollen mass and egg resting upon it. The most recent cell, *f*, is the deepest down, and contains a freshly deposited pollen mass. At *c* is the beginning of a cell; *g* is the level of the ground The bees were seen at work on the 4th of May, at Salem, Mass., digging their holes, one of which was already six inches deep; and by the 15th, hundreds of holes were observed. On the 28th of May, in unearthing six holes, eight cells were found to contain pollen, and two of them a small larva. On the 29th of June, six full-grown larvæ were exhumed, and one about half-grown. About the first of August the larva transforms to a pupa, and during the last week of this month the mature bees appear.



INTERMEDIATE BEARING PULLEY FOR SHORT BELTS.

It not unfrequently occurs that pulleys, the driver and driven, must be placed very near together, necessitating a short belt, which, whether for efficiency or durability, is not economical, as the belt must be kept very tight. Especially is this arrangement objectionable when the driver is very much larger than the driven. We give an illustration of a device

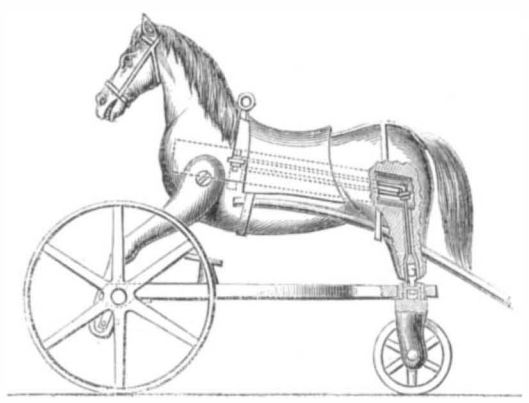


for obviating this annoyance, which we see in *Engineering* applied to a portable centrifugal pump. The driver, A, revolves in the direction of the arrow, carrying a belt to the driven, B, and between the two is interposed a friction wheel, C, bearing equally on the faces of both pulleys. The face of this intermediate is hollowed so that it bears on the outer edges of the pulleys. Its effect is to relieve the great strain on the shaft of B.

PROGRESS OF THE VELOCIPEDE.

Parties interested in the manufacture of velocipedes have recently been called upon by Calvin Witty, of this city, to arrange with him for the right to build velocipedes, such as embrace the devices for propelling the vehicle, as shown in Lallement's patent, illustrated on page 102 of the SCIENTIFIC AMERICAN. A new claimant has entered the field in the person of Stephen W. Smith, of this city, who claims that the so-called French velocipede is an American invention, perfected in this city, and introduced into France by patent, and personally by himself.

It appears by reference to the Patent Office Report of 1862, that P. W. MacKenzie, a citizen of the United States, patented a "cantering propeller," which illustrates a hobby horse mounted upon wheels, as shown in the accompanying engraving. The patent has recently been reissued for the pur-



pose of widening the claims, so as to cover the whole ground occupied by the patent bicycle of Lallement. The reissued claims are as follows:

1 claim, in combination with a saddle seat for the rider, the employment and use of a cranked axle, arms, and foot-rest, so arranged that power applied by the feet of the rider shall give motion to the vehicle, substantially as described and specified.

2. The combination of the following elements, namely, a saddle-seat for the rider, a cranked axle for propelling the vehicle by power applied by the feet of the rider, and a steering mechanism, so constructed that the direction of travel of the vehicle may be governed by the rider, substantially as described and specified.

3. The universal joint, in combination with the fulcrum of the vehicle and the steering wheel, constructed and operating substantially as and for the purposes specified.

4. The hinged legs in combination with the body of the horse, and with the cranks, substantially as and for the purposes specified.

5. The foot-rests upon the arms, substantially as and for the purposes specified.

6. The double-armed levers and diagonal cords in combination with the handle and steering wheel, substantially as described and specified.

It will be seen that the first and second claims are intended to embrace, and do embrace so far as words can accomplish it, the essential elements of the velocipede now in use. It remains to be determined by the courts how far the rival claimants clash with each other. The fight begins to assume an interesting aspect, and it may be that other old patents will be reissued to enter upon the contest.

There is no dearth of velocipede incidents and inventions. In fact, from indications we are inclined to think that inventive genius will not leave a stone unturned till this little vehicle has reached perfection as nearly as any human device can be supposed to approach it.

An invention has been made by a Western gentleman which may be attached to any two-wheeled velocipede, enabling the rider to propel either with the hands or feet, or both. This invention will make a five-foot driving wheel practicable, without raising the saddle too far from the ground.

Rev. Arthur Edwards, Assistant Editor of the *Northwestern Christian Advocate*, said to be a most expert velocipedestrian, has had rubber tires put upon the wheels of his "Pickering," and finds it practicable by their use to ride over ice and snow without slipping. He believes that their use would be advantageous in summer as well as in winter, as the rubber would relieve the jar from roughness of roads.

An exchange asserts that among those that distinguished themselves as velocipedists in England thirty years ago was Michael Faraday, the chemist, who frequently drove his machine through the suburbs of London.

The police had a battalion drill the other day at the Twenty-second regiment armory in New York. There were a number of velocipedes around, and one of the "boys in blue" and brass, believing himself an expert on the thing, got on one of them and started on a run. For about ten paces it went very well, and the policeman gaining confidence, gave the crank a more violent push, and up went the velocipede and down went the policeman, and while he was standing on his head, his feet cutting the air furiously, the velocipede, as if in mockery, turned a somersault over him and ran away.

Our sister city Brooklyn, is showing an enterprise in velocipede matters decidedly characteristic. It is announced that the managers of the Prospect Park Driving Association, of Brooklyn, have made arrangements to signalize their first annual spring meeting with a grand velocipede tournament, by which they intend to inaugurate a series of bicycle contests on their handsome course during the ensuing summer. A feature of the Parisian racing meeting now is the velocipede races, and they have proved far more attractive and exciting than even the turf meetings. The Prospect Park Association Course is a level one, and just suited for velocipede riding, and it is to be specially prepared for the races in question, the velocipede contests taking the lead of the horse races on the course of the coming spring meetings.

It is intended to make this tournament an exhibition of velocipede riding unprecedented in this country, and as the list of entries will be open to all comers, there will of course be considerable competition. The highest rate of speed reached on a Parisian course has been a mile in 2:14, but this was done only on one occasion, and has not been equaled since. A mile in three minutes is very fast time.

The races will be governed by a special code of rules, which will include handicapping for weight of machines and riders, diameter of driving wheels, and extent of treadles. The amount which will be presented in prizes will reach $1,500. There will be first, second, and third prizes for the greatest speed; prizes for best time made, and prizes for slow riding. The tourney will afford not only an excellent opportunity for a display of skill in American velocipede riding, but also a fair chance to show off the merits of the different styles of velocipedes. There is no doubt of the fact that the races will create an excitement, and we should not be surprised to see 20,000 people there.

All those intending to enter the lists should at once set to work to get themselves in training by practicing road riding. It will be found to be no child's play to run a mile race on a velocipede against a well-trained proficient, and therefore plenty of practice should be had by all of our leading experts who desire to enter the lists. The tournament will take place the last of April. We shall give due announcement of the details of the programme as soon as the managers have prepared it.

Mr. Cuyler, the Engineer in charge of Prospect Park in Brooklyn, announces, officially, that the velocipede riders have been and are permitted to make use of the walks of the Park, and are also allowed to use the tarred area or plaza and walks at Fort Green. The question of the general use of the Park by velocipede riders has not, as yet, been officially acted upon.

From the above it will be seen that velocipedists can avail themselves of all the privileges in Prospect Park granted to equestrians, for they can use all the bridle paths and plazas in the Park.

The Brooklyn *Union* of March 4th says that "Palm Johnson, the noted Brooklyn skater, returned from Paris last week, and he informs us that not only have we better velocipedes here than they have in Paris, and greater facilities for practice under cover, but that the most expert riders now in Paris are Americans. He says that the Parisians would be astonished to see the beautiful machines our Broadway makers turn out."

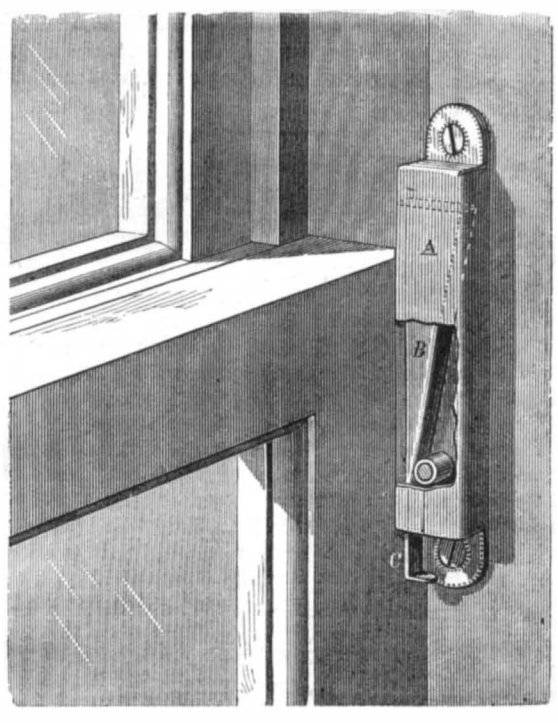
The bicycle has been introduced into gymnasiums, for ladies' exercise who use the dress commonly used by them in calisthenic exercise. The fair ones who have learned to manage "the beast" are in transports, and a rush is the consequence of the new attraction. Gentlemen are excluded while the ladies practice the art, but a few Benedicts who have been permitted to look behind the scenes while their better halves were performing on their fiery untamed steeds, say that they make a very pretty and graceful appearance. We can see no valid objection why ladies should not adopt a special dress for this sport, and enjoy it in the open air, instead of close and confined rooms. What say our *modistes*.

A correspondent from Poughkeepsie writes us that he has invented a machine in which both of the hind wheels are drivers instead of the forward one. They are three feet eight inches in diameter, and fast on independent axles meeting in the center, connected by a beautiful and novel arrangement of gearing, so that either wheel can stand as a pivotal point and the other be driven around it by the operator on the machine fast enough to make one's head swim. He says "I can turn it in less space than any other velocipede ever made. The leading or steering wheel is thirty-two inches in diameter, hung upon a swivel (as the front wheel of the bicycle) with the tiller, which has a cross handle running back to the operator, and is jointed to the top of the swivel, extending forward and downward with a block or rubber on the end, so that by lifting up on the tiller the rubber is brought in contact with the wheel and acts as a brake. I have for foot pedals two boards about thirty inches in length by five in width, suspended or jointed at the forward ends, and connected at the rear ends by rods running up to the vibrating levers which are pivoted on the axles; and are capable of being lengthened or shortened at pleasure, to get more or less power according to circumstances. To these levers are attached pawls which engage ratchet teeth on a wheel or cylinder which drives the axles. The levers are vibrating so that when one pedal goes down the pawl catches and moves the cylinder forward, at the same time the other lever is moved backward to continue the operation. These levers are so connected that they throw each other back. I have other foot levers fastened to the pedals, and standing vertically or nearly so, so that the operator, by sitting down and placing his feet against them, can drive the machine as well as by standing up."

HUTTON'S PATENT AUTOMATIC SASH LOCK.

On page 152, Vol. XVII, of the SCIENTIFIC AMERICAN, we published an article on the desirability of an improved window sash fastener, particularly for railway car windows. The one we herewith illustrate seems to meet this requirement perfectly, and is also applicable to other similar cases. It appears to possess in a high degree the qualities of simplicity, cheapness, durability, and effectiveness, beside being easily applied and not unsightly. No mortising or cutting of the window frame or sash is required, the paint or polish of the sash is not defaced or marred, and the device may be applied by any one who can use a screwdriver.

It consists of a case, A, of sheet metal, japaned, silvered, or gilded, held to the casing by two screws, as seen. Inside the case is a wedge-shaped key, B, also of sheet metal, clasping a



filling of rubber that projects slightly beyond the edges of the metal and bears against the sash. The side of the case, A, toward the sash, is open. The metallic back of the wedge key bears against a friction roller in the lower part of the case, and a portion of it extends below the case and is bent or formed into a thumb-piece, C. This thumb-piece is for raising and disengaging the face of the wedge or key from the sash when the latter is to be lowered. When it is to be raised nothing is necessary but to lift the sash with a force proportioned to its own weight only, as there is no friction in this direction from the wedge. For car windows it seems nothing could be contrived to answer the purpose better, and as it requires no particular effort to raise or lower the window and prevents the incessant rattling so annoying to the weak, ill, or nervous, we hope to see it generally adopted by steam and street railway companies.

If placed on the sash instead of the window frame it becomes a secure lock, preventing the opening of the window from the outside; it may be equally well applied to the upper sash; it costs only $18 per gross, and is susceptible of elegant external form and finish.

Patented through the Scientific American Patent Agency, January 1, 1867, by Robert Hutton, Brooklyn, N. Y. Orders should be addressed to the patentee, care "Waterbury Brass Company," First street, near Grand, Williamsburgh, N. Y.

The Invention of Lithography.

The impatience of a German washerwoman led to the invention of lithography. The history of that elegant art begins with a homely domestic scene, which occurred at Munich about the year 1793, and in which three characters figured,—Madame Senefelder, the poor widow of an excellent actor, then recently deceased; her son, Alois Senefelder, aged twenty-two, a young man of an inventive turn; and the impatient washerwoman just mentioned. The washerwoman had called at the home of this widow for the weekly "wash;" but the "list" was not ready, and the widow asked her son to take it. He looked about the room for a piece of paper upon which to write it, without being able to find the least fragment, and he noticed also that his ink was dry. Washerwomen are not apt to be overawed by such customers, and this one certainly did not conceal her impatience while the fruitless search was proceeding. The young man had in the apartment a smooth, soft, cream-colored stone, such as lithographers now use. He had also a mass of paste made of lampblack, wax, soap, and water. In the hurry of the moment, he dashed upon the soft, smooth stone the short list of garments, using for the purpose this awkward lump of oily paste. The washerwoman went off with her small bundle of clothes, peace was restored to the family, and the writing on the stone remained.—*James Parton in the Atlantic Monthly.*

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Boiler Testing and Boiler Examining.

Messrs. Editors:—I have often thought, when reading in the columns of the Scientific American and in other papers, accounts of explosions of boilers, that the treatment to which they are subjected in testing them for the pressure they are to sustain is one cause of the explosions. It seems improper to subject a boiler, either new or old, to a hydrostatic pressure of 125, 150, or 200 pounds to the square inch, when in use it is not intended to carry more than 50, 60, or 80 lbs. steam pressure. Does not this excessive strain tend to permanently weaken those parts which under a more sensible treatment would with safety withstand the working pressure? Is there any necessity of testing the boiler so far above its intended capacity? If the object is to detect faults, the after treatment, when the fault is detected, is rarely calculated to remedy it. If a leak shows itself in a seam, the calking iron and hammer is used; if under the head of a rivet, a similar process—hammering down the rivet head around its edge. If a sheet bulges because of the imperfect welding of its laminæ, a stay is put in or a patch put on. It does not appear to me that either of these methods amount to anything; I do not approve of makeshifts and temporizings, I believe in going to the root of the matter; remove the faulty rivet, and put in one that fills the hole; put in a new plate, or fit the one already there to its fellow; do not put patches on a faulty plate or sheet.

These remarks apply with greater force to old or second-hand boilers than to new, for no boiler in use deteriorates equally in every part, and it is not always easy to determine the exact point of weakness by the hydraulic test, as the very weakest point may be protected and defended by a deposit of scale, sufficient to resist the pressure when cold, yet liable to break up and expose the imperfection when heated. The hydraulic test as used by the legalized inspectors of steam boilers is, in most instances, a farce, ridiculous but for its possible consequences. The inspectors are frequently pretenders or self-deluded imposters, wise in their own conceit; and their certificate of inspection and safety lulls the fears and encourages the confidence of the owner, who might otherwise be reasonably anxious and exercise proper care.

It appears to me, as an old engineer, that personal examination of the boiler internally, if possible, but, at least, externally, and carefully, is far better for ascertaining the condition of a boiler than the hydraulic test. If this duty was religiously performed, at least once a month, by those who run stationary boilers, and the blowing off occassionally attended to, I feel certain that the number of explosions would be materially reduced. J. H. L.

New York city.

Congelation of Water.

Messrs. Editors:—Having carefully perused in the columns of the Scientific American the descriptions of the various machines for congealing water, recently patented in this country and in Europe, all of which are troublesome and expensive to manage, and impracticable for general use among a large portion of the agricultural communities throughout the United States, I would suggest the following method of obtaining ice in warm climates, superseding the use of machines or chemical mixtures, involving but a trifling expense after the first outlay, and possessing the additional advantage of the process being conducted by any person above seven or eight years of age. Travelers from the East have informed us of the method the Hindoos employ during the winter months, when the temperature has descended to 40°, or less, above zero; which is, to select a piece of level ground on their respective farms, of about four acres in extent, and, having made shallow excavations throughout the field of two feet square by four inches deep, with intervalling walls, four inches in thickness, and having placed therein pieces of straw matting, covering the bottom and sides about an inch in thickness, at night they place in the cavities tin pans filled with water of corresponding dimensions with the cavities, namely, nearly two feet square by three inches deep, the water in which will, in the morning, have become solid ice, if the temperature has fallen during the night as low as 40° Fah. above zero. The meteorological explanation is, that the straw matting, inclosing a wall of air an inch in thickness, prevents the heat underneath it, that is constantly radiating from the interior of the earth, from escaping into space otherwise than by the uncovered partitions or walls surrounding the cavities, which act as funnels conducting the radiating heat into space, before it has time to sensibly affect the water in the tin pans, which latter assumes the solid form, from the lack of the supply of caloric, necessary to maintain its fluidity, that is constantly radiating throughout unimpeded space and matter. Experience has probably determined that the area of cavity, etc., here given, is the most suitable for the successful operation of the phenomenon. Any farmer throughout the warmer latitudes may, by thus understanding the nature and reason of the process (the sole varying condition being the attainment of a temperature not above 40° Fah.), secure an abundant supply of this necessary luxury whenever desired, at a comparatively small expenditure of time, expense, or trouble.

New York city. H. M. R.

Increase of Resistance as Velocity Increases.

Messrs. Editors:—In the article signed "Mathematician," in your issue of January 30, 1869, at page 70, on the question, "Does Resistance to Ships Increase as the Square or Cube of the Velocity?" there is a confusion of ideas arising from omitting to include time as an element of the power required to overcome the resistance. It will require only four times as much steam to be developed and utilized in driving a steamer from New York to New Haven in one hour, as will be required if the voyage is performed in two hours; but the engine and boiler which perform the voyage in one hour must have the capacity to develop and utilize 8 times the steam per hour, since it is to overcome 4 times the resistance in half the time. In other words, the resistance is as the square of the velocity, but the power of the engine must be as the cube of the velocity.

Following this article a quotation is made from "Silliman's Principles of Physics," as follows: "The resistance increases as the square of the velocity; for, if the velocity is doubled, the loss of motion must be quadrupled, because there is twice as much fluid to be moved in the same time, and it has also to be moved twice as fast." There is in this paragraph a confusion of ideas somewhat similar to that before referred to. The single fact that "the fluid has to be moved twice as fast" is alone sufficient to quadruple the resistance. The further fact that "there is twice as much fluid to be moved in the same time" does not add to the resistance in the proper sense of that term, but it makes it necessary that the power of the engine, which has already been quadrupled for the former reason, should be doubled for this reason. Thus, as before, the resistance is as the square of the velocity, but the power of the engine that overcomes it is as the cube of the velocity.

B.

Required Power for Increased Speed of Steamers.

Messrs. Editors:—Your correspondent of March 6th, page 151, cannot discover my position on this subject, as published in an article of Feb. 20th, page 119, wherein I stated that the required power, or steam, was for a given *distance*, as the square of the velocity, and for a given *time*, as the cube.

I gave a practical example of a steamer's ordinary time of passage from New York to Liverpool, being ten days; and to perform it in five days, by double velocity, would require a supply of four times the coal and steam over the former ten days' passage, or as the square of the velocity; but that during the five days' time in which the distance was made, the consumption of steam would be at the rate of eight times the former ten days' passage supply, or as the cube of the velocity. I am charged with a supposed error in omitting the important item of the time occupied, being only one-half "which he would not have done, had he been a more accurate mathematician."

If we try figures, that "won't lie," and place the quantity of steam used on the ten days' passage at 1 per diem, we have $1 \times 10 = 10$; and during the five days under double velocity at 8 per diem, we have $8 \times 5 = 40$; or four times that of the ten days' passage, being as the square for the *distance*, and eight times, or as the cube of the velocity for the *time*, as previously asserted. T. W. Bakewell.

Pittsburgh, Pa.

Noiseless Air Guns.

Messrs. Editors:—My attention was drawn, a short time ago, to a paragraph in one of our dailies, on air guns, assuming their noiselessness and consequent adaptation to the assassin's purpose. The following is the description:—"It consists of lock, stock, barrel, and ramrod. The stock is made hollow, and provided with proper cocks for filling it with compressed air by means of a force pump. Each lock is nothing but a valve which lets into the barrel a portion of the air compressed in the stock, when the trigger is pulled. The gun is loaded with wadding and ball, in the ordinary way, and the air, suddenly introduced from the stock, propels it with a velocity proportional to the square root of the degree of the of the compression of the air. By this weapon a person may be killed at a distance of sixty or eighty yards. Later improvements give it a propelling force almost equal to the old-fashioned musket. Its chief advantage to criminals is its noiseless discharge."

It is surprising that such statements should find currency when they are so self-contradictory. In your valuable paper, page 57, No. 4, Vol. XVII., this subject is treated, and the notion of the noiselessness of air guns effectually disposed of.

Now, that projectiles may be thrown with deadly effect, almost noiselessly, is beyond dispute. It was one of the most ancient methods of warfare, and even now, and in this country, the fatal effects of the Indian's arrow receive almost daily illustration; and a bullet, or other form of projectile may be also impelled with great force by the bow or some other modification of the spring.

The air gun is nothing new; every schoolboy has used the quill air gun, loaded with its potatoe disk; but it has its explosion—it is not noiseless. Now, in the air gun, the air is compressed, and it is a well-known fact, that compressed air or gas cannot be suddenly liberated against the atmosphere without producing a detonation. But while exploding gunpowder exerts a force against the air of about twenty thousand pounds per square inch, air cannot be compressed by mechanical means more than about forty times, or to exert a force of six hundred pounds per square inch; consequently, the effect of the projectile impelled by the compressed air and the detonation produced are less than those of gunpowder.

New York city F. W. B.

Patent Office Fees.

Messrs. Editors:—I hope you will excuse me for referring to the following interesting question, "Is Our Patent System Defective?" found on page 105 Scientific American. I am impressed that this is a question of profound interest to all classes of mechanics. At the present time there is a great deal said and published in regard to extravagance, and advocating reform and retrenchment in all branches of the Government, but nothing is said about reducing exorbitant fees, high salaries, etc.

I hope the Scientific American will become a strong advocate for reducing the patent fees, which I think are entirely too high. This is an important question.

Mount Olive, Va. L. Pitman.

[Certainly they are, and we should be glad to have the fees reduced; but the danger is, that when Congress commences to tinker the patent laws, we shall be saddled with a more complex and costly system. Reforms in legislation usually proceed very slow.—Eds.

To Find the Contents of a Cylinder in Gallons.

Messrs. Editors:—As a good many of your readers may sometimes be called upon to find the capacity of a cylinder in gallons, permit me to offer you a rule, which I think is new and short, and as near correct as in most cases may be wished for. It is: Multiply the diameter by diameter and hight of cylinder, and divide the product by the number 294, which I have found to be nearly correct—taking 231 cubic inches to the gallon. Anything better will be thankfully received by a good many of your readers.

M. J. St. ——.

Richmond, Va.

Crank Pin.

Messrs. Editors.—Friend Watson, asks, on page 151, of your issue of March 6, why an inside connected locomotive engine must have a crank-pin so much larger than an outside connected one.

Suppose he puts his question in the following form, when it will almost answer itself; viz.,

Why does the axle of a locomotive need to be larger than the crank-pin? Callipers.

Worcester, Mass.

Railway Restaurants.

It is an astonishing thing that, with scarcely an exception, there is not a railway restaurant properly conducted in the United States. There are, indeed, no end of cake and pie shops; places where viscous and glairy pies, likewise doughy cakes, are to be had unlimitedly, but of honest bread and beef, clear unadulterated coffee, and tea that grew in China, there is very little; and the traveler with a simple stomach may starve for aught the restaurant can do for him. Doubtless there are people in the world who live and thrive on pie, dough boiled in fat, and similar edibles; but there are still others who, when hungry, satisfy their appetites with bread and beef, and some provision should be made for such ridiculous tastes.

Along the line of the New York Central road are huge restaurants, one especially at Utica, where the eye ranges up and down immense tables covered with platoons of cakes decorated in the highest style of art; small cones of dough with holes in the top like volcanoes, others rolled up in scrolls and still others spotted, ringed, and streaked with red sugar. Pies are strongly represented also, but for that juicy sirloin from which one can get a generous slice, for well made, well baked bread, for the round of corned beef, one looks in vain, and those who cannot feed upon such trifles may go hungry. It is perhaps useless to complain, but for all that we shall lift up our voice against such places in the hope that there may be a coming man who will keep a restaurant at railway stations with clean, well cooked, simple, food, at *high* prices, so that he can make some money out of it. In that event the institution will be universal, for hosts of imitators will arise and establish themselves in every corner of the land.

Cannot the Falls of Niagara be made to Run the Machinery of Buffalo.

A correspondent from Ann Arbor, has been thinking, like many others, about the utilization of the enormous, and now wasted power of Niagara Falls. He sends us the following description of a plan for transmitting that power to the machinery of Buffalo, which, though it may be objected to by some, contains some good suggestions. He says:

"First, I would make a proper channel for conducting the water from the river above the Falls to the bank or precipice below, where a sufficient number of turbine wheels may be put in to get the power wanted. With the power brought under control by these wheels, I would, by a series of force pumps, compress air into a proper receiver, from which a large main pipe may be laid to Buffalo, having branches connecting with the engines scattered in the various parts of the city in the same manner as gas and water are now conducted to buildings.

"I can see no reason why air could not be compressed so as to give a pressure of four or five hundred pounds to the square inch (perhaps more) in Buffalo. Hence, much smaller engines might be used, which in many cases would be no small consideration. It would, of course, be desirable to obtain as high a pressure as practical as a proportionally smaller pipe might be used, and it would be difficult to lay a very large pipe so great a distance. It seems to me that this is an enterprise which might be managed by a stock company, and made to pay large dividends. The running expenses would be very slight. I am not prepared to say what capital would be required to put it in operation. It would not, I think, be very great as compared with the profits likely to accrue from it."

It is stated that the injurious action of mercury upon those employed in the looking-glass manufacture, can be prevented by using one-half per cent of sodium in the mercury, while at the same time the saving of the quicksilver will compensate for the coat of the sodium.

ON THE POISONOUS EFFECTS OF BISULPHIDE OF CARBON, AND ITS USE FOR THE EXTERMINATION OF ANIMALS LIVING UNDERGROUND.

Bisulphide of carbon, when diffused in a large volume of atmospheric air, may be introduced into the respiratory organs of living beings, without producing immediate effects; such a mixture, however, will prove fatal when inspired for a sufficient length of time.

If the atmospheric air, instead of being loaded with some millionth parts of bisulphide of carbon, contains one-twentieth of this gas in volume, it will act very promptly, death ocuring invariably, if its effects are not interrupted in time. M. S. Cloëz sometime ago communicated a series of experiments to the French Academy of Sciences on the effects of the gaseous mixtures in question, which he had undertaken with various species of mammalia, birds, and reptiles, with the view of applying them for practical purposes.

I. In a first experiment, a large rat was brought under a tabulated bell jar of seventeen liters capacity, after a plug of cotton saturated with bisulphide of carbon had been placed under it. The animal kept quiet in the first instance and seemed to get sleepy, but after half a minute it began to move violently, and attempted to withdraw itself from the poisonous atmosphere; its movements, however, soon became slower, convulsive affections followed, the animal fell on one side, its breathing gradually became slow and labored, and death followed some minutes after the commencement of the experiment.

II. The second experiment was made with a full-grown rabbit. A sponge impregnated with bisulphide of carbon was held under its nose for a few moments. The animal first kept quiet, but then tried to resist, when it was set at liberty; it soon lost control of its muscles, appearing as if it were intoxicated. It was then forced anew to respire the sulphide of carbon vapors, until a complete insensibility of all its limbs had taken place, when the same phenomena were witnessed as in the first experiment. The sponge, however, was withdrawn when death seemed to have occurred. The rabbit remained in a state of unconsciousness for half an hour, but gradually life returned again; after the lapse of an hour it lifted its head, and, though the posterior extremities still remained paralyzed, it attempted to resume an erect attitude, and after another hour the animal resumed all its functions as if nothing had happened.

III. This experiment was also undertaken with a rabbit and forms a repetition of the second one, with the only difference that the poisonous vapors were allowed to act until life was destroyed, which occurred nine minutes after the commencement of the experiment. In dissecting the body, it was found that congestion had taken place at the lower termination of the lungs, and it was also noticed that the right ventricles of the heart continued to contract, though they had been removed from the cavity of the breast, together with the respiratory organs, for over five hours.

Upon birds, the bisulphide of carbon appears to act more promptly than upon mammalia. Upon reptiles, however, as might be foreseen, it acts much slower. The respective experiments were undertaken with sparrows and frogs.

Experiments on the applicability of bisulphide of carbon, for the extermination of rats and other vermin living underground, were undertaken with rats in the museum for natural history in Paris, where these animals had lodged themselves near the menageries for the wild beasts, and in the neighborhood of the laboratory for comparative physiology.

Bisulphide of carbon is now manufactured on a large scale, and may be bought at a comparatively low rate. The mode of its application for the extermination of rats is also very simple. M. Cloëz employs for this purpose a lead pipe of a length of from three to five feet, and of suitable diameter, open on both ends, and provided at one end with a small funnel of sheet tin and near the other with some holes, through which the liquid may flow into the rats' nests, in case the lower aperture should get choked up with earth.

Before the experimenter proceeded to try his method on a large scale, he made a trial in the small alley which leads to the laboratory for comparative physiology. Here, on an area of fifty square yards, some inhabited rat holes existed, which were connected together by subterranean canals. In one of these holes the lead pipe was pushed as far as possible, while the others were closed with bricks. Fifty grammes of the liquid were poured through the pipe, when the latter was withdrawn and the hole stopped with earth. This method was repeated at the rest of the holes. Two days after the ground was dug up, and not less that fourteen dead rats were found, which had suffocated in their nests. Numerous trials undertaken thereafter in various quarters of the city met with no less satisfactory results.

Limekiln at Ingleton in Yorkshire, England.

A new limekiln, constructed on the principle of a German patent, which seems to be a very effective plan, has been erected at the above place. The kiln is oval, and measures in circumference 450 feet, being surrounded by a road for the use of carts. At the hight of four feet from this road there is a platform all round the kiln, six and a-half feet wide. From the platform there are fourteen arched openings into the chambers, for the purpose of taking in the stone and bringing out the lime. Each chamber, which is nine feet in hight at the center of the arch and eighteen feet wide on the floor, is capable of holding 100 tuns of limestone, and, as the stone is calculated to lose by burning two-fifths of its weight in carbonic acid and moisture, a chamber yields at one draw about sixty tuns of lime. As it requires many days to convert the stone into lime, and three days to cool a chamber before it can be discharged, sixty tuns of lime is the amount produced per day. From the platform to the feeding chamber it is in perpendicular hight eleven feet, but as the wall slopes it measures fourteen feet. The feeding chamber extends over the whole of the fourteen lime chambers, and is 150 feet in length and 65 feet in breadth. This chamber, which measures from the floor to the ridge fourteen feet, is covered over with a wooden roof, which cost £200. In this chamber, into which there are forty-one brick openings six and a-half feet high by five feet wide, there are 424 feeding holes, through which, by the use of a small funnel and scoop, the fires are supplied with fuel. In the center of this chamber are fourteen valves 2 feet 1 inch in diameter, connected with the chambers which surround a central chamber in the kiln, called the smoke or carbonic acid chamber, through which the carbonic acid gas and moisture pass through a long flue, and escape from a brick chimney erected on the top of Meal Bank. As all the smoke is consumed, and the men who feed the fires are under cover, and have only to use a wheelbarrow, a funnel, and a scoop in performing their labor, they can do it with much more cleanliness, comfort, and ease than on the old plan. About 500,000 building and fire bricks, which cost about £1,000, have been used in the erection of the kiln.

Why Don't Boys Learn Trades?

The *Morning Post*, published at Philadelphia, answers this inquiry, which recently appeared in the SCIENTIFIC AMERICAN, as follows:

It is popular to say that young men should learn trades. Those people are especially fond of saying so to whom manual labor or any extra exertion in the matter of gaining a living is distasteful. But such self-satisfied advisers apart, young men do, in fact, get the wisest counsel when advised to so employ their youth as to always have at their command in after times some sure means of independence. But how is this desirable end to be obtained? The entire apprentice system seems destined, under the present tyranny of the Trades' Unions, to be driven out of existence. It is a rule with many of these societies to refuse to allow their members to work in any shop, office, or factory, with non-members or with apprentices. When the society is powerful and virtually controls the journeymen of its particular craft (as it does in many instances in this city and elsewhere), the door is conclusively shut in the faces of would-be workers in that direction. The employer is quite at the mercy of the society. If he takes apprentices, his journeymen, bound by the articles of their association, leave him. He cannot replace them, for the good hands are all in the same boat. With the best of feelings, therefore, for the boys who want one day to be journeymen themselves, what can he do for them? Nothing.

This may be all very well for the mechanics and artisans of the present; but for the future? While now labor is controlled and good prices obtained, no skilled workmen are growing up. We may be well off, but what is the next generation to do? We must take care of ourselves, say the Unions. You must, indeed, gentlemen, but it is none the less a fact that such is a short-sighted and illiberal policy that says "there are workingmen enough in the world, every individual added to the force diminishes our profit, and, therefore, we combine to keep the body where it is." A reasonable protection to mechanics and others, who have worked to achieve a special excellence in their business, is to be approved, but such exclusiveness, when it comes to the point of shutting young men and boys out of opportunities of learning the best trades, cannot be too strongly condemned. Such a policy will be, in the end, destructive to industry.

Telegraphs---Europe and United States.

The whole number of messages sent in Europe, in 1866, was 18,688,000, and the sum received, $10,329,000 in American gold, or $14,461,000 in currency, at 140. This makes the average cost of these messages 77½ cents each. The Western Union Company, which does about 75 per cent of the business in this country, for the year ending June 30, 1867, transmitted 10,068,000 messages, and received for the same $5,739,000, equal to 57 cents a message, and in that number is not included the vast amount of railway business, nor the regular dispatches to the press, in which the number of words delivered were 295,000,000, equal to 14,725,000 messages of 20 words each. In Europe the press dispatches are not a tenth part of those in this country. The number of offices to population is vastly greater here than in Europe. In Prussia there is an office to every 33,000; in France, one to 32,000; in Great Britain, one to 14,000; in Belgium, one to every 12,000; in Switzerland, one to every 10,000; and in the United States, one to every 7,500, and in the Pacific states one to every 2,500. So in the use made of the telegraph America stands pre-eminent. In France the number of messages sent is one to every 13 persons; in Prussia, one to every 9; in Great Britain, one to every 5; in Belgium and Switzerland one to every 4; and in the United States, one to every 2½.

How to Make Dense Negatives from Engravings.

Sufficient density, when reproducing engravings, may be obtained without having recourse to any of those operations which some are pleased to designate as "dodges," but which, so far from coming under such a category, are most legitimate and useful. Develop with iron somewhat old and peroxidized, intensifying with silver and pyrogallic acid; then fix and examine the clearness of the lines. If they are not composed of clean glass, bring about that result by means of a wash of a very weak solution of iodine, followed by one of cyanide of potassium. When the black lines are thus rendered quite clean, and free from any deposited silver, further density is obtained by a reapplication of the silver and pyrogallic acid. Negatives possessing great density may be obtained by first chlorizing the deposit by immersing it for two or three minutes in a solution of three drachms of bicarbonate of potash, and one drachm of hydrochloric acid in twelve ounces of water. After rinsing, pour over the surface a weak solution of sulphantimoniate of sodium (or Schlippie salts) by which the color will be changed to an intense and deep scarlet.

The Cobden Club Medal.

The Cobden Club, of London, last summer announced in their organ, the London *Star*, that they would give a gold medal for the best essay "on the best way of developing improved political and commercial relations between Great Britain and the United States of America." The essays were to be presented to the secretary of the club on the 1st of January, 1869, and the prize to be awarded by a committee of three of the highest authorities in England, both in economical science and in literary criticism.

The cable informs us that the award was made February 26th, to Dr. Joshua Leavitt, of New York city. Dr. Leavitt has been for many years one of the most earnest and successful advocates of sound economical principles in the New York press.

The Prize Essay will be published at once in London, by the Cobden Club, and will be at once republished in the United States. It will be a timely discussion of a subject which is attracting more and more attention, both at home and abroad, as the great questions of the navigation laws, of international coinage, and of tariffs, are becoming better understood in their influences upon international relations.—*Evening Post.*

Quicksilver and Iron.

The difficulty of imparting to iron a complete and uniform coating of mercury by dipping it in a solution of mercury is well known. The process may, however, be very easily accomplished by cleaning the iron first with hydrochloric acid, and then immersing it in a diluted solution of blue vitriol mixed with a little hydrochloric acid, by means of which it becomes covered with a slightly adherent layer of copper, from which it must freed by brushing, or rubbing with sandpaper, and washing. It is then to be brought into a very diluted solution of mercurial sublimate, mixed with a few drops of hydrochloric acid. The article will now be covered with a layer of mercury, which cannot be removed even by hard rubbing. This layer of quicksilver protects the iron from rust, especially if it be washed with spirits of sal ammoniac after the amalgamation. Articles for the laboratory, and for other purposes, coated with quicksilver in this way, and allowed to lie exposed with similar articles not so protected, retain their luster perfectly, while the others become covered with rust. This same process is especially applicable to the coating of the steel or iron instruments for which oil is generally employed, and will probably be found to resist the injurious effect of moisture much more perfectly than the oil.

Safe Illuminating Oils.

Professors Horsford and Doremus have lately made tests of an excellent illuminating oil manufactured from crude petrolium, the results of which prove that the flashing point of the oil is about 125° Fah., and the burning point about 145° Fah. They say that there is a great want for some more definite mode of determining the safety and value of petroleum oils; and one which could be practiced by the consumers of the oil, as well as by appointed inspectors. The invention of such an instrument has evidently not received the attention of inventors which it deserves, and the subject affords an opportunity for some party to bring credit and profit to themselves by supplying the want.

This oil is manufactured by Mr. Charles Pratt, a very reliable dealer, whose advertisement appears in another column.

Beware of Benzoic.

From the facility with which it removes grease spots from fabrics, this substance is regarded almost as a household necessity. But few persons, however, are aware of its explosive character, or the dangers attending the careless handling of it. Being one of the most volatile and inflammable products, it vaporizes with great rapidity, so that the contents of a four ounce phial, if overturned, would render the air of a moderate sized room highly explosive. The greatest care should be taken in handling this substance in proximity to fire, and it is important to remember that the vapor escaping from an uncorked bottle will cause a flame to leap over a space of several feet.

Gas on Shipboard.

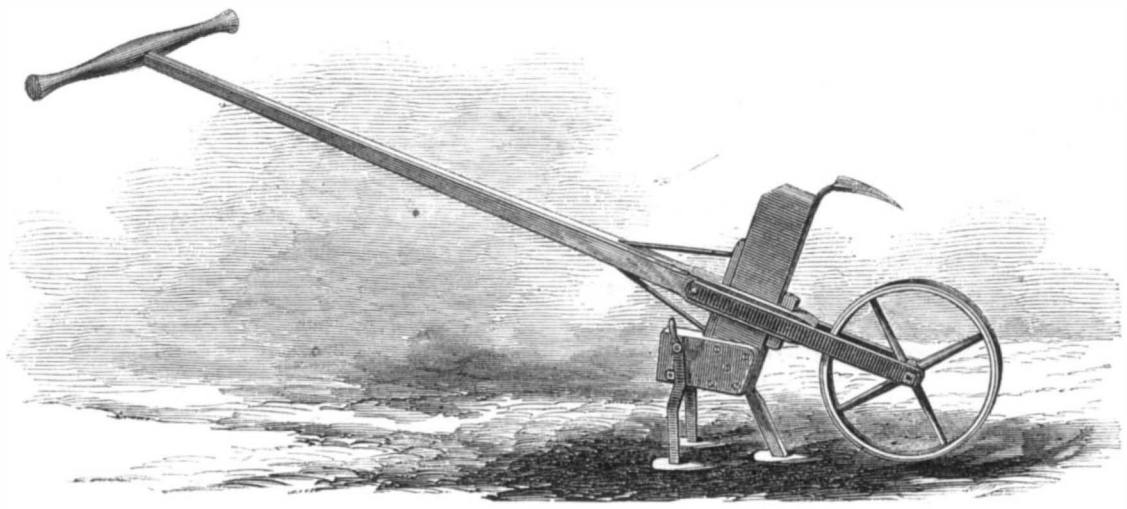
Attention has recently been directed in England to the practicability of lighting men-of-war with gas manufactured on board. Two vessels in the royal navy are illuminated with gas, but a correspondent of an English paper states that forty years ago the *Duke of York*, a steamer carrying mails and passengers between London and the Mediterranean, was lighted with gas, stored in iron bottles, one of which screwed on to the "main," and when the gas contained in it was consumed, a fresh bottle was substituted.

A STRONG liquid glue for repairing broken vessels, cementing glass, etc., is made, according to M. Knaff, by taking three parts of glue in small pieces, and placing them in eight parts of water for some hours, when half a part of hydrochloric acid and three quarters of a part of sulphate of zinc are added, and the whole kept at a moderately high temperature for ten or twelve hours. The glue thus treated retains its liquid condition, and will not become gelatinous again.

A CORRESPONDENT of the *Boston Journal of Chemistry*, says that water-spouts and sink-spouts frozen up may be speedily thawed out in the following manner: Procure a piece of lead pipe of suitable length and size; place one end against the ice to be thawed, then, through a funnel in the upper end, pour boiling water. Keep the pipe constantly against the ice, and you can penetrate one foot or more per minute.

Improvement in Hand Cultivators.

This device is calculated primarily for cultivating growing crops, especially those planted in rows, and is intended to supersede, in a measure, the use of the hand hoe, or at least to reduce the labor by that well-known implement, so far as cutting down weeds and loosening the soil are concerned. It also may be used for describing and forming furrows for the reception of seed, while it will cover them and compact the earth above them when they have been deposited. Its simplicity of construction and the fact that it is worked entirely by hand are greatly in its favor. These qualities, with their exhibition by actual experiment, have secured for the machine the first premium at several State and county fairs, and the commendation of all who have tested it. The lower portion (as shown in the position represented in the engraving) presents three shares, or blades, the front one rigidly fixed to an arm, and the two others suspended to pivoted arms, so arranged that one or both may be raised from contact with the ground to adapt the implement to the width of the rows between the growing plants. By reversing the position of the implement the shovel seen projecting over the wheel may be brought to the ground to make a furrow for the reception of seed. The contrivance is pushed by the operator, like a barrow, before him. The depth of the cultivator blades or shovel may be adjusted by a wedge that holds the block sustaining the blades, and may be, of course, guided as to depth and direction, by the hands of the operator.



TAYLOR'S PATENT HAND CULTIVATOR.

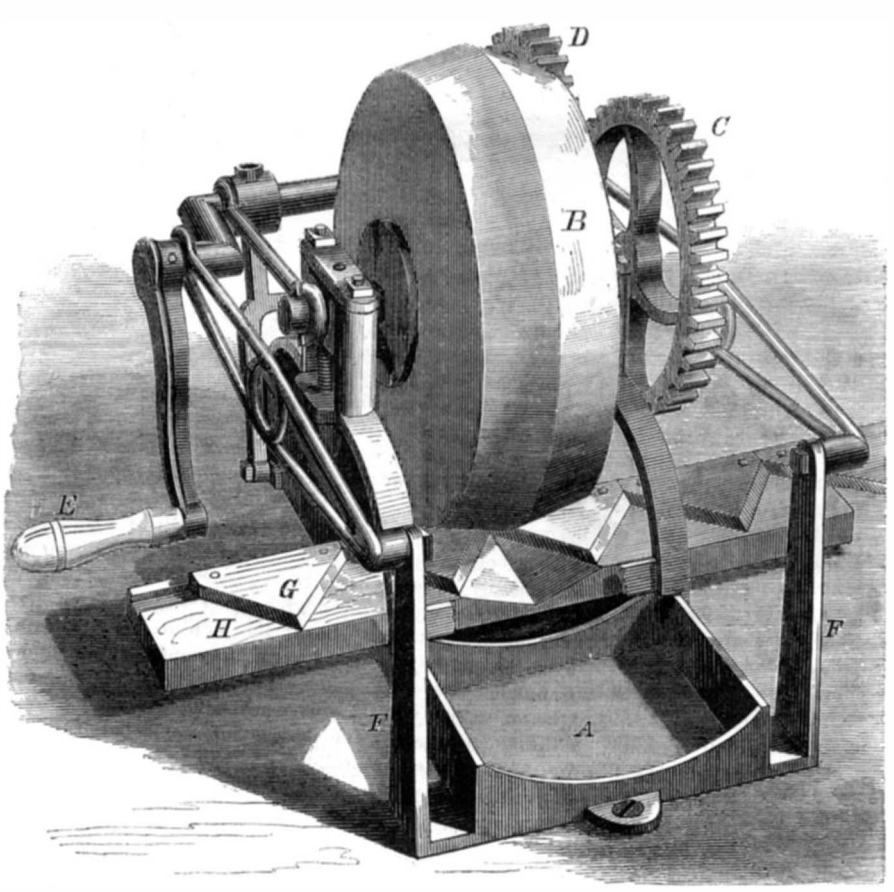
Patented through the Scientific American Patent Agency, August 11, 1868, by Barnett Taylor. Orders for machines or rights should be addressed to the patentee, at Forestville, Fillmore county, Minn., or D. E. Runnals, same place, J. L. Michener, Leroy, Mower county, Minn., or R. B. Brown, New Concord, Ohio.

Portable Grinding Machine for Harvester Knives.

Mowing and harvesting machines are now so extensively used that any device that renders them more useful and easier of application is advantageous to the farmer. Grinding the knives or cutters of these machines is a work requiring time and labor, neither of which can be well spared at just the point when the sharpening is most needed —the period of gathering the crops. To remove the cutter bar, leave the machine idle in the field, and go to the barn to grind the knives, requiring the services and time of a man and boy, is quite vexatious.

The accompanying engraving shows a portable machine that may be carried to the field and be a portion of the mower or harvester, ready at all times for use. A bed or frame, A, supports a sliding carriage on which is mounted a grindstone, B, having a gear wheel, C, on its shaft, engaging with a similar wheel, D, the shaft of which has a crank, E, for giving motion to the stone and its parts. From uprights, F, pivoted connections run to a crank on either end of the driving, or crank shaft, and from the same shaft go pivoted bars to the axle of the stone or grinding wheel. The bearings of this crank shaft are in a vibrating frame pivoted to the base or bed plate of the machine. It will therefore be seen that by turning the crank not only is the stone revolved, but it and all connected with it on the sliding frame, are moved backward and forward.

The knives, G, to be ground, are seated on a guide, H, fixed to the frame at the proper angle to insure the right bevel to the edge of the blade and held in position by the cutter bar sliding in a corresponding groove in the guide. The face of the stone is razed to a double bevel so that one side of the two blades is ground simultaneously The reciprocating movement of the stone insures the even grinding of the blades from root to point, and keeps the stone from wearing out of shape, an object that is more fully secured by the fact that the teeth in the two gears are odd and even, so that no one place on the stone is presented to the blades in two successive revolutions. The stone is hung in vertically-sliding boxes that may be raised or lowered by means of set screws to adjust the stone to the blades to be ground. The whole machine can be easily carried by one man, and it requires but one person to operate it.



THE EMPIRE HARVESTER CUTTER GRINDER.

Patented through the Scientific American Patent Agency, January 19, 1869, by Milton Fowks, assignor to himself and A. and J. A. Foote, to whom all orders should be addressed at Catskill, N. Y. State and county rights for sale.

Telegraphs versus Rogues.

The New York *World* illustrates the extent of telegraph operations in some comments on the fact that a knavish Chinaman in California having contracted the barbarian vice of swindling, has been cheating sundry merchants in San Francisco out of $18,000, and, getting on board the Pacific Mail steamship, fleeing to the Central Flowery Kingdom. In this way he hoped to put between himself and those whom he had robbed, first, some 10,000 miles of ocean, but "A telegram from San Francisco bears the tidings of his crime to New York. New York sends it by cable across the Atlantic to London, London through France and under the Mediterranean to Alexandria, Alexandria by the Red Sea and Persian Gulf to Bombay, Bombay to Ceylon, and Ceylon by the Peninsula and Oriental steamers to China. So that when Hong-Kee trips lightly down the ship's gangway at Hong-Kong or Shanghai, dreaming of much opium and many almond-eyed daughters of the Sun in the Land of Flowers, his placid soul will be disconcerted by the tap of a bamboo on his shoulder and a voice of doom will murmur an ungentle summons in his ear. Poor Hong-Kee! The bad morals of the Christians have corrupted him, and in the steam engine of the Christians has he put his hope. But the literal 'chain-lightning' of the Christians is after him, to outstrip their steam engine, and to teach him in sorrow and in shame how much better is a pot of honest rice and the teachings of Confucius therewith, than many thousands of illegal dollars and a warrant of arrest therewith."

Chemical Equivalents.

The following will convey to a young photographer or a curious reader an idea of chemical equivalents, or combining proportions. It has been found by accurate experiment, that when oxygen and hydrogen combine, they do so in the proportion of eight of the former to one of the latter; hence the chemical equivalent of hydrogen is 1, that of oxygen 8, sulphur 16, silver 108, etc. These numbers indicate the proportions in which the elementary bodies combine with each other. Stöckhardt's illustration is one of the simplest that can be adopted: For the same sum can be purchased six ounces of gold, or 12 ounces of platinum, or 100 ounces of silver, or 1,500 ounces of mercury; consequently six ounces of gold have the same mercantile value as 12 ounces of platinum, or 100 ounces of silver, etc. The same principle holds good in chemistry. Twenty-eight ounces of iron, forty ounces of potassium, or two hundred ounces of mercury, combine with eight ounces of oxygen; accordingly twenty-eight ounces of iron have the same chemical value as forty ounces of potassium or two hundred ounces of mercury. By one equivalent, from *æquus* (equal) and *valor* (value), of oxygen is to be understood eight parts of it by weight, and the same with the other elementary bodies.

Recent Improvements in Electro-metallurgy.

Mr. Kress, in a treatise on this art recently published in Stuttgardt, Germany, describes a new composition (an invention of Mr. Kress) for reverses or molds of objects to be reproduced by galvanic action, from which a faithful cast in gutta percha can not be obtained, as is the case with plates presenting landscapes, etched clouds, or other fine designs in relief or intaglio. While in other cases accurate reverses by means of gutta percha can only he obtained by the application of pressure, this is not the case with the composition of Mr. Kress, which, in assuming a liquid state at a comparatively low temperature, allows the reproduction of all kinds of objects in a uniform manner at a cheaper rate and with less loss of time than heretofore known. In operating with the composition spoken of it is necessary that the various objects should first be inclosed with a strip of potter's clay. This done, the mass is liquefied and poured over them, care being taken that the mass be not too hot, as in such a case its subsequent removal would probably be attended with difficulty. It is also indispensable that the original should previously be slightly greased. These precautions being taken, the molds may, when cool, he quite easily lifted from the forms. The finest etched tones in *aqua tinta* may thus be reproduced faithfully and in a short space of time.

The molds are finally rubbed over with fine graphite powder until they acquire a shining black appearance, when they are ready for the bath. The composition, however, is not quite as hard as gutta percha, therefore brushes of the softest kind must be employed, otherwise the surface will be roughened and the work will have to be done over again.

The composition itself consists of 12 parts of white wax, 4 parts of asphalt, 4 parts of stearin, and 4 parts of tallow These ingredients are melted together in the following order: 1. Asphalt, as possessing the highest melting point; 2. wax; 3. stearin, and, finally, tallow. When the whole forms a homogeneous liquid, enough soot is stirred into it, to impart to it a fine black color. In order to give to the mass more body and also to prevent its adhesion to the original, some plaster of Paris is mixed with it.

Molds of this composition may not only be taken from medals, dies, and engraved plates, but also from plaster casts. In this case the latter are previously immersed in tepid water until thoroughly soaked, which will have taken place when the generation of air bubbles has ceased. But another method may also be adopted. The plaster cast may be kept immersed in glue water, until, when withdrawn, a drop of glue water will not remain upon the surface. The original is in this case to be greased before cast, and if the glue water has been applied with a brush, which may likewise be done, the model ought to be allowed to dry. Substitutes for glue water are solutions of gum arabic and isinglass.

When the copper deposit has been removed from the mold the latter may be used anew, and in case it should ultimately become too brittle by use, it is only necessary to stir a small portion of tallow or yellow wax into the previously liquefied composition.

For small objects, as for coins and medals, a simple mixture of wax and stearin has proved to work perfectly well, but for objects of several inches diameter, such a composition would be useless because the contraction which it undergoes is so great as invariably to produce fissures upon its face. Mr. Kress, whose very valuable treatise we would like to see translated into English, furthermore states, that, although all the known and recommended compositions for electrotyping were subjected by him to trial, he had not met with any which answered all purposes so well as the one described.

Covering for Tents.

The best and lightest material for covering a tent is a thin india-rubber coated fabric, sold by all dealers in india-rubber. It is very light, and quite impervious to both rain and light. Black twilled calico, coated with boiled linseed oil, will form a rain tight cover. Cloth may be rendered waterproof in a variety of ways; for example, brushing it over on the wrong side with a solution of gelatin, followed when dry by an application of an infusion of nut galls. If one is not afraid of an unpleasant smell (of short duration), make a varnish of india-rubber dissolved in bisulphide of carbon, and apply it to the cloth.

PIPE clay rubbed on the hands will remove the unpleasant ordor caused by the use of chloride of lime and salts.

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Contents:

(Illustrated articles are marked with an asterisk.)

THE NEW ADMINISTRATION.

The inauguration of President Grant marks a turning point in the history and policy of the Government, and the people have abundant reason to feel confident that the new administration will speedily commence reforms which shall not end until the public service is purified of those corruptions and villainies which disgraced the last administration.

The appointmont of Alex. T. Stewart, of this city, to the responsible office of Secretary of the Treasury means business. The most successful merchant of his time—his vast wealth places him beyond the possibility of temptation, and if he had no higher motive to guide his action, Mr. Stewart's social position and wealth are sufficient guarantees that he will endeavor to administer the affairs of the Treasury in an honest and economical manner. The revenue service, at the present moment, is filled with a set of sharks who are cheating the Government and robbing the people of their hard-earned substance.

We undertake to say, that, if Secretary Stewart takes as good care of the public treasury as he does of his own private affairs, he can save $50,000,000 every year, and to that extent lighten the burdens of the tax payers. Secretary Stewart cannot afford to do wrong—he has every incentive to do right and to give us a class of honest men in positions now held by swindlers and thieves. We venture the prediction that the business of the Treasury Department will be very much improved in its character and efficiency.

The appointment of Ex-Governor Cox, of Ohio, to the position of Secretary of the Interior, is eminently a good one. Under his administration, we shall expect to have no more Dempsey & O'Toole contracts in the Patent Office; and we cherish the belief that the new Secretary will give earnest consideration to the pressing affairs of that bureau.

The service of the Patent Office is now inadequate to the demands of inventors. Some of the employés are notoriously inefficient, and ought to be removed; and the Commissioner needs to have his hands strengthened by an energetic and able corps of examiners. There is work enough for all the new Secretaries to do, and President Grant has shown his practical good sense in selecting men who are untrammeled by strict party rules; in other words, while they are pronounced adherents to the political creed of the successful party, they come to their new duties pledged to no class of greedy spoil-seekers, but are free to do honest, fearless work for the country, irrespective of partisan selfishness. The politicians, it is said, growl; but the people, who make parties, are heartily sick of the corrupt rings which, for four years, have made our public service a scandal to the nation. We go for solid reforms, and for an honest collection and application of the public revenues

THE SUM OF ALL THE MOTIONS IN THE UNIVERSE.

Motion is a constant quantity; "The sum of all the motions in the universe is always the same." This sentence placed at the foot of a column in a recent issue of our paper, has attracted the attention of a correspondent, who, while admitting its truth, says he finds it "hard to solve all the perplexing problems that grow out of such an admission. For instance, suppose a terrible conflagration to take place at midnight. Thousands of persons awake from sleep and rush to the fire. Where so many are rushing, in what form would that motion have been manifested, if there had been no fire and the people had remained in bed?"

The doctrine of the perpetuity and indestructibility of motion involves the truth that all motions originate, or are increased by subtractions from other pre-existing motions, or cease, or become diminished, only by imparting motion.

The difficulty in accounting for the origin of a new motion, arises chiefly from not clearly comprehending the distinction between mass motion and molecular motion. In the motion of a mass, the relative position of its geometrical center is constantly changed. Molecular motion may exist in a body without any relative change in the position of its geometrical center. When mass motion suddenly appears, without being immediately caused by other mass motion, it results from the immediate conversion of molecular motion.

Of all the molecular motions heat is the one most concerned in the direct production of mass motion. The case suggested by our correspondent, of people suddenly aroused from sleep into action, is analogous to that of a locomotive standing in a depot with steam up, and then suddenly, by the simple act of the engineer, expending the power confined in the boiler in the propulsion of itself and its load. All the motion that it and the train it draws possess after starting, existed previously in the form of heat in the furnace and boiler, and molecular motions of the coal in the tender and oxygen in the atmosphere, which, when chemical combination (combustion) takes place between these elements, are converted into heat, which in its turn is converted into mass motion.

Men and animals are locomotives. Their food is the fuel which drives them; their wills are the engineers which control them. The fuel (food), which is put into their furnaces (stomachs), is however applied to two purposes. Part is expended in warming the machine and part is stored up in the various tissues of the body, to be consumed either for warmth or motion, as occasion may require. But because it is thus stored up, it must not be inferred that motion does not exist in it. It may or may not possess mass motion, according to the state of action or repose in which the animal chances to be; but in all cases where mass motion of a living body exists, as an act of the will, consumption of tissue also takes place, that is, a change of molecular motion into mass motion. After the crowd have rushed to the fire and rushed back again, their aggregate weight will have been considerably reduced, and they will find it necessary to "coal up" next morning at breakfast to make up for the loss.

Thus we see that in the case cited there is no difficulty in referring the mass motion, suddenly resulting from the interposition of will, to previously existing molecular motion. In all other cases, although in some the connection between a mass motion and pre-existent molecular motions may be difficult to trace, there can be no reasonable doubt of its existence; and in the light of modern science it is certain that the sum of all the motions in the universe is a constant quantity.

SOLUTION.

Every one is familiar with the phenomenon of solution, but few except scientific men really know what a remarkable thing it is. We toss a handful of common salt into some water; in a little while it has entirely disappeared. So far as our sight can determine it has ceased to exist. We can still detect its presence by taste, and by its effects upon other bodies, but until, by the aid of heat or some chemical reagent, we wrench it from the strong grasp of its transparent menstrum we cease to see it.

So alcohol absorbs into itself camphor, and other gums or oils, and retains them. Add a little water to these solutions and you will immediately see the dissolved substances reappear like spectres, to again vanish upon the addition of more alcohol.

The analytical chemist knows well how to make such appearances and disappearances answer his inquiries, both as to quality and quantity, of any substance contained in a given mass which he examines. In fact the deportment of substances in solutions in the presence of certain reagents forms the basis of one method of analysis.

One of the most conspicuous characteristics of a solution is transparency. This is a test as to whether a solid contained in a fluid is perfectly dissolved. Very concentrated solutions may intercept to a great degree the transmission of light molasses is an example; but if the solution be perfect, thin layers will prove to be transparent. Any opacity or cloudiness is an index that either solid or vesicular matter is present. Solid substances when dissolved are changed into fluids. What is the agent by which the intense cohesion existing between the atoms of the most solid bodies can be so overcome? To this question science has, we think, yet given no satisfactory answer.

The only means known to us other than solution by which solid bodies can be made fluid is heat. It is a well ascertained fact that heat and cohesion are opposing forces, but in the phenomenon of solution sensible heat does not appear except in such quantity as may be accounted for by the increased density of the entire mass of the solvent and the substance dissolved. In cases where solids placed in contact become liquefied we have decrease of temperature and absorption of heat; an example of this kind of action is the liquefaction of mixed ice and salt.

The books account for the phenomenon of solution by classing it among the manifestations of adhesive force. Cohesion is the attraction existing between molecules of the same kind at insensible distances; adhesion is the attraction existing between molecules of *different* kinds at insensible distances. A very slight consideration of the nature of these attractive forces, and their effects upon the condition of material bodies, will show that solution involves something more than disruption of the particles of a solid by the superior adhesive force of a liquid.

A solid body is *solid* by virtue of the great cohesive force by which its particles are held together. When cohesive attraction is nearly or quite in equilibrium with repulsive molecular force, bodies assume the liquid form. Liquids may therefore be considered as practically without cohesive attraction, that attraction being neutralized by repulsion. Suppose now the cohesive force in a solid body to be represented by 4, the superior adhesive attraction of some liquid for that solid to be 6, and the cohesive force in the liquid as neutralized by the repulsive force to be nothing. What ought to take place upon the immersion of the solid into the liquid as the result of cohesion and adhesion? The particles of the liquid adjacent to the solid ought to adhere to the solid so strongly that they could not be removed by an external force without rupturing the solid. If either body be acted upon by an external force, the rupture ought to take place in that body having the least cohesive power, *i. e.*, the liquid. A stick thrust into treacle is a good illustration of this action. When the stick is withdrawn it carries a portion of the treacle with it; the stick is not broken nor any of its particles removed.

But it may be said in this case the cohesive force acting between the particles of the wood is greater than the adhesive force of the treacle. Let us then suppose the adhesion of the treacle to the wood to be so powerful that the treacle can not be removed from the stick except by scraping down into the body of the wood itself. If solution depends solely upon the fact that adhesion in the liquid is greater that cohesion in the solid, the stick ought in this case to dissolve. But in order that a substance may dissolve, its particles must not only be seized upon by the particles of the solvent but conveyed away from their position in the solid to new positions in the liquid. We submit that adhesion accounts sufficiently for the seizure but it does not account for the convection. Standing in a boat by the side of a wharf, a man may clutch a timber attached to the wharf with great force; he may, however, tug in vain to remove it, so long as the want of cohesion in the water upon which his boat is floating affords a resistance less than that which holds the timber to its place.

There must be some other principle involved in this matter. Something perhaps analogous to electrical attraction and repulsion, at least some force acting independently of adhesion which overcomes the cohesion of the solid.

DROWSINESS AND REMEDIES FOR IT.

A correspondent writes us that the excellent article on "Wakefulness," recently published in the SCIENTIFIC AMERICAN, does not meet his case, which he states is a common one with laboring men. His affliction is drowsiness. He says within the narrow circle of his acquaintance there are not less than three-fourths who are afflicted in the same way. This affection is a standing obstacle in the way of self-improvement; and our correspondent complains that his own acquisitions have been greatly limited on account of it, and desires to know what may be done to remedy the evil.

We are well aware that drowsiness is a much more common complaint than wakefulness, and, in general, it is one, which, owing to the difficulty of inducing people to renounce long established habits, is hard to cure.

The phenomenon of sleep is yet enveloped in profound mystery. Volumes have been written upon it; numberless experiments have been performed; and after all we know nothing whatever of its true character. Experiment has taught us, however, that drugs produce it when taken into the stomach, or otherwise conveyed into the system; that certain habits produce a greater desire for it than is natural; and that the will has power to resist its demands to a limited extent.

The causes of sleep are then either natural, or unnatural, and the phenomenon is correspondingly morbid or healthy. The natural and healthy sleep, consequent upon exhaustion, can never be interfered with without greater or less damage to the general health in each instance. Unnatural drowsiness generally results from some error in the habits of living, or it is a constitutional defect. The latter is difficult to cure, but the majority of cases are not constitutional affections, and they are curable.

Many cases of supposed abnormal drowsiness, are not abnormal at all. People who work hard all day, or who have been exposed to cold winds, are apt to feel sleepy when they find themselves comfortably housed in the evening, especially if they have indulged in a *hearty supper*. All these causes naturally induce sleep, and when the tendency to sleep is powerful it ought not to be resisted. Many will find the disposition to sleep postponed for several hours, by the substitution of a very light meal for the hearty one which is often taken at the close of the day's work. Others will find that this does not avail them, and that notwithstanding their abstemiousness, the drowsy god still asserts his sway. These people will have to submit, and either doze in their easy chairs or go to bed; but they need not on that account be deprived of time for study. They will almost invariably find that they can rise two or three hours earlier than other people, without inconvenience, and they will further find that their three morning hours *before breakfast* are as good as four in the evening *after supper* would be if they could keep awake and study. They may, at first, find some difficulty in waking at the proper time; an alarm clock will overcome that. They should not, at first, apply themselves to reading or study in these reclaimed morning hours, but should engage in some active occupation until the habit of thoroughly waking is established, after which in the majority of cases no inconvenience will be experienced.

A feeling of drowsiness after eating is perfectly natural and healthy, but it is easy to see that over-eating might so intensify the feeling as to render it nearly impossible to resist it. Those troubled with this complaint, ought then to carefully

avoid over-eating at any time, and particularly so before any period during which they desire to keep awake.

In this, as in all other complaints, an ounce of prevention is worth a pound of cure. It will, we think, be rare that drowsiness will occur if perfectly regular hours for sleeping are observed; unless it is induced by a plethoric condition, consequent upon high living, or a constitutional habit. Nevertheless, there are some simple remedies. One of the best is to wet the head suddenly and thoroughly with cold water. The shock will generally suffice to throw off the sleepy feeling. Strong tea or coffee will often aid in preventing drowsiness, but these are only temporay helps. A radical cure can only be attained by the correction of the habits, whatever they may be, that induce it. Temperance in *eating* as well as in drinking, regular hours, avoidance of too exhausting labor, must be observed. We do not advocate the use of drugs for this complaint. Each person so afflicted ought to make a thorough examination of his habits of living, and in most cases he will find the stomach to be the offending organ.

EDUCATION OF IDIOTS.

With all our advancement in science the question "What is mind?" still remains unanswered, and will probably remain unanswered till the end of time. Like the question "What is force?" it seems beyond the reach of human intelligence. We know something of its manifestations, and a little—very little—of the laws which govern them; that is all. One primary fact is sure; viz., the increase of its powers by exercise. We have also found by experience that certain methods of training are more successful than others, and that a certain order in the presentation of ideas is desirable. The reasons for differences in mental power wholly elude us. We observe that, in general, extraordinary mental deficiencies are accompanied by marked bodily defects; but whether the latter are the cause or the effect of the former, we are totally unable to decide.

Elaborate treatises have been written upon mental philosophy. Physiologists have struggled for ages with this question, and nothing but hypothesis has been the result of their labors.

The present age has, among its other achievements, demonstrated the fact that many of those formerly considered hopelessly imbecile, are capable of considerable mental development. It needs no argument to convince those familiar with the trials imposed upon parents by the idiocy of a child, that anything which can render these unfortunates capable of even measurably caring for themselves, is worthy of careful attention.

It has been reckoned that between thirty and forty per cent of genuine idiots are capable of being educated to some extent. Not unfrequently some particular faculty is developed in a high degree. The writer of this article once knew an idiot, who, although singularly deficient in most mental qualifications, had that of construction very highly developed. He could never lay out or plan work, but he could execute with great precision, and was of much assistance to his father, who was a carpenter. This lad (lad only in appearance, at the time we saw him he was 25 years old) would cut a hole in a plank with a compass-saw nearly as round as it could be described with the compasses. He delighted in work, and was always ready to go to bed as soon as he had eaten his supper.

We might mention many other instances, both from hearsay and observation, showing that the minds of idiots frequently possess some faculty or faculties as fully developed, or nearly so, as others more richly endowed by nature. One of the most remarkable cases, and one with which the public is already familiar, is that of Blind Tom, the negro boy pianist.

Quite a number of schools and asylums for idiots, are now in successful operation in Europe and America. One of the prominent facts brought to notice in the results of these institutions, is that the majority of imbecile children capable of any improvement at all, may be taught to do and delight in doing simple kinds of labor. As most idiots are meager in stature and of weak constitution, such exercise improves their bodily health, which, of course, reacts favorably upon their mental condition.

The qualifications of patience, insight into individual character, and adaptability to mental peculiarities, are even more requisite in teaching these weak minds, than those of ordinary children. Indeed, it has been asserted by many heads of institutions like those mentioned above, that their greatest difficulty has been to find good teachers. It is thought by some, that almost any person capable of teaching average intellects, ought to be competent to teach inferior ones, but such is not the case.

We look with great interest upon the humane efforts now making to ameliorate the condition of imbecility; and we have no doubt much that will be valuable to mental science may be obtained by the study of the means by which light is made to dawn on the clouded minds of imbeciles.

PROTECTION CONSIDERED AS A CONSERVATIVE ELEMENT IN NATIONAL AFFAIRS.

No better illustration of our proposition, made in a recent article, that it is unwise for a nation to depend upon foreign sources for any commodity which is a national want, when that want can be supplied by home production, could be furnished than the present rise in the price of sugar consequent upon the Cuban insurrection. A very much larger proportion of the sugar used in the United States has hitherto come from Cuba than from all other sources put together.

The rapid rise in this commodity, shows how thoroughly commercial men understand the effect upon the market, sure to occur upon a total or partial interference with the successful harvest of the sugar crop in the (so far as size is concerned) insignificant area upon which we have become so abjectly dependent for one of our most important articles of diet.

The inconvenience and rise in price which is certain to take place, should the apprehensions of a diminished crop be realized, will in this instance more than counterbalance the burden of twenty years' protective duty, to those not engaged in the production of sugar, to say nothing of the value of such protection to all engaged in that industry.

The deprivation of accustomed comforts—necessities, for comforts are necessities to people of the present age—engenders discontent among the masses, and thus becomes a disruptive force. Citizens demand of Government that it shall secure to them the privilege of living comfortably as well as safely, and they are discontented, and reasonably so, with a government that fails in this respect. Deprive the mass of American citizens of shoes and compel them to go barefoot, by want of proper foresight on the part of the Government, and such an important mistake would produce a murmuring that would shake its foundations.

A protection to home industry, which will make our nation as far as possible independent of others for any important product, is, then, a conservative power. Though it increases the price of particular manufactured commodities, it hightens the price of agricultural products also by its indirect effect upon all collateral branches of industry.

We do not in these views disregard the claims of commerce for protection, in our zeal for the manufacturing interests of the country, but we do believe that if the interests of any class of people have a prior right for consideration, they are those of the hard-toiling producing class. All we want of commerce is to bring us those things which we cannot produce, and those things which it is not easy to produce in our own land. We can easily produce iron, cotton goods, woolens, sugar, etc., in quantity ample to meet our requirements. It is such industries that we believe it theduty and the wise policy of the Government to protect.

CONNECTION ON ENGLISH RAILWAY TRAINS.

The great trouble now, and the great trouble for years past, that has bothered English railway managers, is the insolvable problem how to enable a passenger to communicate with the "guard," or conductor, and the guard to communicate with the "driver," or engineer. Probably more time in inventions and tests, at which Col. this and Capt. that, and Hon. Mr. Blank, M. P., and Sir Toodles, K. C. B., assisted, has been spent in the repeated attempts to solve this terrible problem —to cross this modern *pons asinorum*—than has been expended by all our improvers of steam engines, agricultural machines, and velocipedes; and these may be counted by the hundreds. Still the railway murders, and ravishments, and assaults, and insults go on, and the passengers are still locked in their cushioned and upholstered cells, subject to the exploitering pleasure of any well-dressed and purse-competent villain.

Some of the ingenious arrangements for establishing communication between the victims of Müllers and Booths and the guard (what a misnomer!) are sufficiently ridiculous to excite a laugh, was not the subject one too mortally serious. The passenger, in peril of his life, or throttled by garotters, has only, in one case, to smash a pane of glass and turn a handle, previously defended by that glass screen, when he will show a signal that *may* be seen by the driver or guard if either happen to be looking back over the train. As it is the constant custom for the driver (engineer) to be always looking back over the top of the cars, and the guard (conductor) in his van is continually doing the same thing, it is evident that the after telegraphic communication between the two could be established within less than an hour, and, better still, the railway officials would be able to ascertain in what compartment the audacious breaking of the protective glass was done, and possibly fix the act on the impertinent and presumptuous victim of English fashionable railway assault.

Semaphore signals worked by similar means, electric signals and alarms, ringing a bell or waving a flag, and flexible air tubes extending the length of a train, and operated by the compression of air, and other similarly ingenious (?) contrivances have been tested, but as hitherto without success. Not entirely so, however; for recently at a trial of the atmospheric "kudingus" a Col. somebody, stationed on the "foot-plate" of the locomotive *for the purpose*, really recognized the signal and informed the engineer. It was highly successful.

Seriously, this nonsense is pitiable—shameful. But, there may be some reason after all for it. One of our exchanges gives a probable solution of what might be otherwise incomprehensible to our minds. The Hartford *Post* says:

The manners of our English cousins don't seem to be as refined as they might be, indeed many of them would fare hard if tried on a charge of rudeness and boorishness. The English railway companies steadily resist all efforts for the adoption of the American mode of communication, by a cord, between the different portions of passenger trains and the locomotive, on the ground that the trains would be liable to constant stoppage by young gentlemen "on a lark" or by other mischievous people. It is said to be useless to tell the railway officials that in America trains are never stopped in this manner, and that there is no good reason for supposing the British traveling public worse than the Americans. They know their countrymen too well. It does really seem as though there is something exceptionally rude, to say the least, in the average Briton and there seems to be a natural proclivity to wanton mischief even among the educated classes. Two illustrations of this are recently reported: Two persons described as "gentlemen," lately amused themselves on the way from London to Dover, with tearing up the cushions and carpetings of the railway carriage; and another, likewise dignified with the title of "gentleman," was fined five shillings at Dewsbury for singing "If I had a donkey," in a church, while a funeral service was going on. Both of which instances are cheerful evidences of refinement and gentlemanliness. We know better than that even in this "dom blarsted country."

Another instance of rudeness not mentioned by the above writer lately occurred in Dresden. An elderly English gentleman persisted in pounding with his cane on the floor of the chapel, whenever the chaplain undertook to pray for the President of the United States. He was very devout and docile when Queen Victoria and other members of the royal family were mentioned, but became violent the moment an attempt was made to remember our Chief Magistrate. A Frenchman would have recognized the propriety of such a prayer, but an Englishman "could not see it."

SCENTING, DEODORIZING, AND VENTILATING.

The sense of smell is one of the most important of the warders on the walls of health's citadel. When alert it is unfailing and reliable in its warnings, but it may be drugged or stupefied by the insidious foe if too often allowed to hold a parley. To drop metaphor, the sense of smell is as useful as a guardian of health as it is as a contributor to pleasure. As a rule, any atmosphere that is offensive to the olfactory nerve is detrimental to health. The effluvia from decaying animal or vegetable substances is instinctively shunned by the human race, unless the demands of business or duty have proved strong enough to silence the monitor. There are those, however, who seem but little affected by villainous smells, and some who by accustoming themselves to such offences come to disregard them; yet it would be difficult to find one possessing the sense of smell in any degree who could stand unmoved the assaults of sulphureted hydrogen. Others there are who are injuriously affected by scents which yield a positive pleasure to most. Some sicken at the smell of musk; some faint at the aroma of cheese; others turn with disgust from the pungent onion, the succulent cabbage, or the fragrant lemon. To these, where the instinct is natural and not an affectation, there can be no doubt that these scents are really harmful.

The bodies of all animals have a scent peculiar to their kind. The healthful scent of the cow is associated in the mind of many a country-bred resident of the city with the labors and pleasures of the farm. The scent of the horse is not unpleasant, the cat and the dog have each their own peculiar; aroma. To go further, it is more than conjecture that each individual of the human race gives out his own atmosphere else how can the dog, the horse, the cat distinguish, by smell alone, the person of his master or mistress? The dog will track his master through traveled roads by the sense of smell. In some individuals this personal atmosphere, more pungent than pleasant, surrounds them with an acrid flavor, despite frequent bathings and great care in cleanliness. This misfortune is more general than may be supposed, and after cleanliness there is no remedy but a neutralizing agent in the form of an odor, pungent and powerful, or soft and suggestive as the case may demand. And here we may say that strong odors of any one element, or any one kind rather, are to be shunned as possibly being more offensive to those with whom we come in contact than the annoyance they are designed to remedy. A judicious mingling of differing odors blending into one perfume is the most agreeable boquet for the handkerchief, gloves, or hair.

The utility of scents is, however, noted more strongly in the sick room. Here perfumes that would be most agreeable and refreshing in health are positively unpleasant and injurious in sickness. He who is ill cares little for the scent of musk, cologne, or even of flowers. These are for the convalescent. What he desires is pure air; the life-giving oxygen. But at times it is impossible to purify the sick room of its offensive and unhealthy odors by the comparatively slow process of ventilation, without danger to the invalid. Then resort must be had to some powerful deodorizer that will act at once. Latterly, carbolic acid has been strongly recommended for "killing" the offense of human excretæ and the other offenses of the sick room; but to many persons the odor of this acid is very unpleasant. It gives an idea of cleanliness, to be sure, an idea born of our consciousness of the fact; but the sense of smell instinctively revolts at it. Burning sugar is objectionable for the same reason, and it loads the atmosphere of the the room with a bitter, acrid property, trying to weak lungs and the throat. On the contrary, the scent of boiling sirup, as in "sugaring off" in the manufacture, and the sweetness in the shop of the candy maker are pleasant and healthy.

Probably no means of deodorizing, quickly, and not offensively, the atmosphere of a sick room equals that of roasting coffee. The agreeable aroma thus thrown off is due, undoubtedly, to the essential oil in the berry and not to the element known as caffein. The best method of using it is to pound up or grind the unroasted berry and sprinkle a few grains on a hot shovel or pan. If the raw material is not obtainable, the roasted material will do, treated in the same manner.

But, after all, ventilation is the proper means of affording the invalid and his attendants the comfort of pure air; but where these scenting and deodorizing agents must be employed, no opportunity to change the loaded and vitiated atmosphere of the room for God's life-bearing and health-giving air should be neglected.

PERIODICAL SCIENTIFIC PUBLICATIONS.

The periodical literature of the period may be divided into four classes. The first may be said to include those papers—chiefly dailies—which make the publication of news, upon any and all subjects, their prime object.

A second class including a large number of weekly papers, and all the purely literary monthlies either make news subordinate, or omit all mention of facts as they occur, unless they can be made the text for some discussion, or otherwise sub-

serve some general literary purpose; general literature being the scope of this class of publications. A third class includes those papers and magazines devoted to some specific object, to the advancement of whose interests, and the collation of news specially bearing upon it, their entire space is allotted. A fourth class comprises those devoted partially or exclusively to scientific literature, and to scientific news. It is of the latter class, we propose to speak in the present article, confining ourselves to those published in America.

The sole claim any publication can make that can entitle it to public favor is, that it *educates* its readers. If it does not accomplish this it is a failure, unworthy of public patronage. Whatever its scope may be, whether scientific, purely literary, or amusing, it should still educate, or it is worthless. More than this it should educate in the right way, or it is mental poison. The scientific press of the country claim more than any other department to instruct the masses, and the demand for popular scientific instruction is largely increasing in this country. Our own paper, which is the oldest of its kind published in the United States, has without doubt been largely instrumental in developing the present popular taste for scientific information, and its success is an evidence that it has supplied satisfactorily the public demand in this regard.

The *Journal of the Franklin Institute*, the oldest monthly scientific periodical in this country, and *Silliman's American Journal of Science*, the oldest quarterly scientific periodical, respectively fill places in American scientific literature which is occupied by no other. The SCIENTIFIC AMERICAN also fills another and distinct place, and notwithstanding the many attempts which have been made, and are making, to compete with it, its progress is steady, and its circulation larger than at any former period of its history.

The more recent publications devoted to scientific and industrial matters are the *American Builder*, Chicago; *Sloan's Architectural Review*, Philadelphia; *Journal of Chemistry* Boston; *Industrial American, Manufacturer and Builder, American Artisan, Inventors' and Manufacturers' Gazette*, New York; and Van Nostrand's *Eclectic Magazine*—a monthly which consists of articles copied from the current scientific literature of this country and Europe. The two numbers of this monthly already issued are well supplied, and the articles generally are selected with considerable care. We are happy to record a growing interest on the part of our people for a greater knowledge of scientific subjects.

A Mechanical Whale.

The ingenuity of man often manifests itself in curious shapes, a recent instance of which was brought to light in one of our city courts. It appears that a German, by the name of Gebhard, was employed by one of his countrymen to construct a whale, to be exhibited as a veritable monster at his "natatorium," or swimming tank, at the foot of Sixty-sixth street, on the East river. Gebhard set to work, and applied all his inventive and mechanical skill to produce a whale rivaling in appearance the famous creature which swallowed up Jonah.

A nice mechanical contrivance was introduced inside the whale, whereby it might be "vivified" and made to enact the part of the genuine thing. Gebhard then placed flaming advertisements in the newspapers, announcing himself as an eminent doctor and traveler who had just arrived from the Pacific ocean, where he had captured a monster whale, which would be exhibited on such a day at his "natatorium." This advertisement drew a large crowd of persons to the place designated on the day set down for the exhibition. But the amazement and delight of the people, who had paid to see the sight, were destined to be of short duration; for on the return of the whale to the "natatorium" one or two parties, who had secreted themselves for the purpose, saw four modern Jonahs emerge from his capacious belly, and a further inspection revealed the fact that the whole operations of his whaleship in the water had been managed by machinery. The nonplussed Gebhard had to beat a speedy retreat, or he would have received rough treatment at the hands of the incensed crowd, who vented their chagrin on the now inanimate whale, and almost tore it to pieces.

The party who employed Gebhard's skill, brought suit against him to recover sixty-seven dollars, the amount paid for constructing the animal, and, strange to say, the judge encouraged the swindle by giving judgment to the plaintiff.

Carbon Printing by a Single Transfer.

Some months ago M. Soulier submitted to the French Photographic Society numerous proofs (some of which were of very large dimensions) obtained by the carbon process. These proofs were on very thin but tough films, which remained perfectly flat during the development of the image, and could afterwards be applied to the cardboard with great exactness. There is no occasion to transfer the proof twice, as in Swan's process. M. Soulier operates as follows: He spreads on glass a very thin collodion; when this has been effected he covers it with a very thin layer of gelatin which is afterward rendered insoluble. On these two layers adhering together, he spreads, lastly, the sensitive mixture in which the image should afterward appear. After desiccation the film is easily detached from the glass and is sufficiently rigid to be handled. The exposure is made in the usual way as in Swan's process, and the washings are proceeded with afterward in the ordinary manner. When this is done nothing further remains but to paste the pellicule on the cardboard. M. Soulier showed by numerous specimens what could be achieved by this process, which is very economical and very quick. With the chromatized gelatin are mixed lampblack, carmine, sepia, purple, etc.

Editorial Summary.

AN INDIGNANT INVENTOR.—Andrew Whitely has issued a printed memorial to Congress wherein he pitches into Secretary Browning, Commissioner Foote, and Chief Examiner Hodges, because they refuse to execute the decree of a court which ordered certain patents to issue to said Whitely. In his memorial, he twits the Honorable Andrew Johnson of "being politically dead," "a rebel and a knave," and then goes on to compliment President Grant, and calls upon him to name a fit man for the Commissionership of Patents, and also "to name three men fit to take the place of the present unfit Board of Examiners-in-Chief. He also wants Congress to enact a law to send to the penitentiary officials of the Patent Office who refuse to execute the decision of the judge. This is a good suggestion. For some reason Mr. Whitely has had a good deal of trouble in getting his patents issued to suit his views, and, if we mistake not, this is not the first manifesto that he has put forth on the subject. It appears to us that if the Commissioner refuses to execute the decrees of the courts, the shortest and best way is to have him arrested and brought up for "contempt of court," and compel him to behave in a legal manner. We are not now speaking of the merits of the case, but desire simply to point out to Mr. Whitely a simple remedy, the choice of which may save him the trouble and expense of printing sensation pamphlets.

REFINING OF ALLOYED GOLD.—Certain kinds of gold, especially from Australia, are alloyed with antimony, by which they are rendered brittle and unfit for use in many practical applications. One method of removing this ingredient has been to melt the gold with oxide of copper, which converted the antimony into a volatile oxide, but left the gold alloyed with copper, which has to be removed by a subsequent operation. Another method consisted in melting the gold with corrosive sublimate, by means of which both antimony and mercury were driven off as volatile chlorides, involving, however, serious loss of mercury. A new and much improved plan has finally been adopted in Australia, applicable to the purification of gold from silver and the baser metals, and which consists in passing a stream of chlorine gas through the melted metal for an hour or two, and after allowing the gold to harden, the still liquid chlorides are poured off. A subsequent operation recovers the silver and every remaining proportion of gold.

LARGE PUMPS.—The *Colliery Guardian* notices some centrifugal pumps just completed at the Hammersmith Iron Works, England, which are the largest ever made. Each is intended to lift 250 tuns, or upwards of 50,000 gallons of water per minute, to the height of six feet. The revolving disk, or "fan," is 4 feet 6 inches in diameter, and its width at the periphery 8½ inches. The suction and delivery pipes are 3 feet 6 inches in diameter. The whole hight of each pump is 11 feet 6 inches, and its length 9 feet, while the extreme width in the direction of the main spindle, is 8 feet 6 inches. The spindles are of Bessemer steel, 6 inches in diameter through the disk. The weight of the disk is 18 cwt., of the spindle 16 cwt., and of each side casing 2 tuns 13 cwt., the whole weight of each pump being 7 tuns.

SHEEP multiply so prodigiously in Australia, that the boiling down of the animals merely for the extraction of the tallow, has grown into a business of huge proportions. Four hundred sheep are cut to pieces, and thrown into a big boiler, steam from another boiler is turned on, and soon the carcasses are reduced to a pulp; the tallow rises to the top, and is drawn off through large taps into barrels for export. The gravy and other juices, the remains of the meat, and the bones, which are so softened as to crumble easily in the hands, are given to pigs. Four thousand sheep are boiled down in a day.

THE New York Society of Practical Engineers recently spent a whole evening in discussing the feasibility of flying. The discussion was simply a rehash of all the absurd notions upon that subject, which have troubled the minds of enthusiasts for nearly a century. Not a single practical idea was suggested.

SHARP JUSTICE.—A man in England was recently fined for holding a rough political controversy in the cars, to the annoyance of three other passengers. The court considered the case a gross one, and inflicted a fine of £3 upon the offender. If we could get such a fine as this upon similar offenders here, it would pay a man well to go about picking up jobs.

A NEW illuminating material, recently patented in Germany, consists of a mixture of two parts of the poorest rape seed oil, and one part of good petroleum. It is burned in a lamp of peculiar construction, but somewhat similar to that of the ordinary moderator lamp, and gives a light not to be surpassed for purity and brilliancy.

A CEMENT said to possess many advantages, and to be especially adapted for sealing up vessels containing benzoles, etherial oils, etc., is prepared by rubbing up finely ground litharge with concentrated glycerin. The liquid cement is to be poured upon the cork or stopper, or it may be applied with a brush.

FOR a polish for mahogany cameras, take three ounces of white wax, half an ounce of castile soap, and one gill of turpentine. Shave the wax and soap very fine, and put the wax to the turpentine; let it stand twenty-four hours; then boil the soap in one gill of water, and add to it the wax and turpentine.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

In pegging boots by steam, twenty cases, or 240 pair of boots, are a usua day's work. One man in Hopkinton, Mass., has pegged eighty-three cases 1,982 boots, in two days. He once pegged forty-eight boots, twice round in fourteen minutes, and did one boot, in a trial of speed, in thirteen seconds.

The California papers state that the total amount of treasure exported during the year 1868 from San Francisco to New York and foreign countries was $35.444,395, a decrease of over $6 000,000 from 1867, and that the amount of merchandise exported was $22,000,943, showing an increase of about $500,000 over the previous year.

California exchanges state that the track of the Central Pacific Railroad was a week ago laid to a point 495¼ miles east of Sacramento. The road is graded 100 miles west from the northern end of Salt Lake—and between these two points the gap is only 65 miles, 56 miles of which are graded. Forty to fifty days more will complete it.

In several of the mines in Cornwall, England, there are galleries which extend under the sea, where the sound of the waves is distinctly heard when the seain a storm rolls boulders and pebbles over their roofs.

The little town of Lisbon, N. H., manufactures annually over 50,000 mackerel kits, 500,000 bobbins, 25,000 bushels of shoe pegs, and over 300 tuns of starch.

The large six driver engine recently put on the Boston, Hartford, and Erie Railroad will draw with ease one hundred loaded freight cars.

From 1804 to 1827, North Carolina furnished all the gold produced in the United States. The aggregate of all her gold yield up to 1866 is about $9,300,000.

The Pacific Railroad Company have commenced arrangements for a grand excursion from New York to California upon the completion of the road.

We have received some good specimens of okra paper made at the Chickasabogue Paper Mills, near Mobile, Alabama, recently noticed in our paper.

An English improvement in envelopes is to gum the under side, so that the tongue is not applied to anything but the paper in sealing.

It is contemplated to erect water works in Meriden, Conn., including six dams, which will cost nearly $200,000.

It is said that for every acre put in cotton last year in Tennessee two will be planted in 1869.

A very fine quality of glue has, it is said, been made from the eyes of fishes.

The twelve leading railway companies of Great Britain own 6,595 locomotives valued at over $80,000,000.

A line of four first-class steamships is proposed to run between Philadelphia and Bremen.

A starch manufactory in Massachusetts uses a thousand bushels of potatoes daily.

East Tennessee is experimenting in the culture of tea.

A plan for driving piles by gunpowder has been invented.

The Madison, N. H., lead mine is being worked with great success.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1 00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

O. I. C., of Ind.—The best and cheapest material for making concrete pavement with gravel is coal tar from the gas works.

J. K., of Boston.—A person has no right to construct a velocipede or any other machine for his own use, which would infringe on an existing patent.

J. W. R., of N. J.—A permanent magnet will gradually lose its power when the armature or keeper is removed from the poles. The circumstance you mention will not affect the action of this law.

C. Y., of N. Y.—You can easily make your name upon steel by the process called etching. Coat over the tools with a thin layer of wax or hard tallow, by first warming the steel and rubbing on the wax; warm until it flows, and then let it cool. When hard, mark your name through the wax with a graver and apply aquafortis (nitric acid); after a few moments, wash off the acid thoroughly with water, warm the metal enough to melt the wax and wipe it off with a soft rag. The letters will be found etched into the steel.

W. R. J., of Pa.—A perpetual motion as the term is understood in mechanics, is a machine that creates the force by which it is driven independently of any external cause. It must of course be able to start itself and remain in motion until its parts are worn out. Any machine that depends for its motive power upon any force derived from any external source as heat from coal, electricity from the corrosion of metals by chemical reagents, etc., is not a "perpetual motion." A body immersed in a fluid, subjected to pressure would require more power to move it than when the pressure is removed.

W. G., of N. Y.—A hollow tube in order to possess maximum strength must have its external and internal diameters in the proportion of 10 to 7. The external diameter of a bar being 5 inches, its internal diameter should be 7-10 of 5 equal to 3·5 inches. When this proportion is maintained the hollow bar has twice the strength of a solid one containing the same amount of material. The absolute strength of beams, geometrically similar in form, is as the squares of their corresponding dimensions. These data will enable you to solve the particular case you mention.

F. D., of La., wishes to know the composition and mode of manufacture of gold colored and violet colored inks. We have seen these and other colors lately displayed in store windows, and we are inclined to to the opinion that coal tar, or aniline colors are the coloring bases. We do not understand the manufacture. Perhaps some correspondent can give the information.

J. E., of Mass.—We were correct in our reply to B. M. R., of Va., that plumbago is a compound of carbon and iron. The purest ever yet discovered contains 98·55 per cent of carbon and about 1 per cent of iron, the remainder being made up of other impurities. Graphite or plumbago is formed or produced artificially in the slags of furnaces in the process of reducing iron ores. To your second question we reply that, when dissolved, common salt is muriate of soda, when dry it is chloride of sodium. This may seem paradoxical, but if we had room we could give you an explanation of its reactions under treatment which would be convincing.

J. R., of Ohio.—"Gas lime" is regarded as being a good and cheap fertilizer upon soils deficient in lime.

J. F., of Ind., asks how to temper blacksmith's anvils. We never imagined there was any peculiar difficulty in it. We have known of a "new laid," or new faced anvil, hardened simply by heating to the proper degree then immersed in a tank of cold water, face up, so that two or three inches of water were above the face, and a constant stream of cold water from a hose pipe kept playing over the face

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

ELECTRO-MAGNETIC SIGNAL TELEGRAPHS.—W. R. Smiley, New Lisbon, Ohio.—The nature of this invention relates to an apparatus for making telegraphic signals by means of electro-magnets, and embodies improvements upon the analogous instruments heretofore in use.

SCAFFOLD.—Frederick App, Selin's Grove, Pa.—The object of this invention is to provide a scaffold for house painters and other persons employed n working on the walls of buildings.

PRUNING SHEARS.—D. B. Seeley, Portland, Ill.—This invention relates to a new and improved implement for pruning plants, bushes, trees, etc.; and it consists of a stationary hook-shaped blade in connection with a sliding one.

STENCH TRAP AND OVERFLOW FOR BOWLS, CLOSETS, ETC.—John McClosky, New York city.—This invention relates to a new and improved method for constructing the stench traps and overflows of wash bowls, sinks, water closets, etc.; whereby the same are more simple in their construction, and are more easily cleaned out and repaired, and more effectually prevent the rising of noxious and unpleasant gases.

WINDOW BLIND AND DOOR HINGES.—L. R. Chapman, Grand Rapids, Mich.—This invention has for its object to furnish a neat, simple, convenient, and reliable self-adjusting hinge for doors, window blinds, etc., which shall be so constructed and arranged as to hold the blind or door securely locked when swung open, in such a way as not only to hold it securely, but also to prevent rattling.

BOAT AND DAVIT TACKLE.—Capt. Edgar Wakeman, Brooklyn, Cal.—This invention has for its object to improve the construction of my improved boat and davit tackle, patented April 2, 1867, and numbered 63,585, so as to make it stronger, and more convenient, reliable, and effective.

WATER ELEVATORS.—W. G. Hamilton, Milton, Wis.—This invention has for its object to furnish an improved apparatus for raising water, which shall be simple and durable in construction, and convenient and effective in operation.

WOOD-BENDING MACHINE.—Robert Fitts, Jr., Fitchburg, Mass.—This invention has for its object to furnish an improved machine, designed especially for bending the frames of chair seats, but which shall be equally adapted for bending wood for other purposes, and which shall be so constructed and arranged as to apply the pressure to the timber to be bent gradually and progressively until it is brought into the desired form.

HAMES FASTENING.—William Fawcett, New York city.—This invention has for its object to furnish an improved hame fastening, designed more particularly for the hames of light harnesses, and which shall be so constructed as to hold the hames securely against side strain, and at the same time be easily and conveniently detached and attached.

SMITHS' BELLOWS.—J. P. Hemmingsen, Marshalltown, Iowa.—This invention has for its object to improve the construction of the ordinary smiths' bellows, so that it may receive and retain a supply of air, to be given off gradually, to keep up a blast upon the fire to heat one piece of iron while the smith is working upon a piece previously heated, without the employment of a bellows blower being necessary.

STEAM ENGINE.—Horace Bartine Martin, San Francisco, Cal.—This invention relates to a new oscillating steam engine, which consists of a two-ended cylinder, in which two pistons are arranged, they being connected on the outside by means of a yoke. Steam is alternately let into the cylinders so as to act upon one of the pistons, the cut-off being produced by the weight of the yoke, and the pistons connected therewith.

SHOE KNIFE.—G. W. Spencer, South Groveland, Mass.—This invention relates to improvements in shoe knives, such as are employed on machines for channeling the soles of boots and shoes; and consists in certain improvements in the knife holder, and the combination with the knife of a grooving instrument for forming a grove in the channel for the thread.

PLOW TRUCK.—Joseph Clees, Darbyville, Ohio.—This invention relates to improvements in plow trucks, the object of which is to provide a simple and convenient arrangement for adjusting the same to vary the depth and width of the furrowing as may be required.

FIFTH WHEEL FOR VEHICLES.—Henry Poth, Pittsburgh, Pa.—The object of this invention is to provide a more simple and durable fifth wheels for vehicles than was heretofore in use. It is designed more particularly for buggies or spring wagons, and is applicable to such vehicles when constructed either with a single or double reach.

BRICK MACHINES.—Rembrandt Lockwood and Charles C. Schmitt, New York city.—This invention relates to improvements in brick machines, whereby it is designed by the employment of a sliding clay receiver, reciprocating molding apparatus, and delivering carrier arranged to receive the clay from the bottom of the mill, and carry it to the vertically reciprocating molding apparatus, where it is molded and delivered to the delivering carrying apparatus, which delivers the molded bricks from the mill, to provide an improved and simple apparatus for accomplishing the molding and pressing of bricks.

APPARATUS FOR LOADING ICE.—Peter F. Whitney, Saugerties, N. Y.—This invention relates to improvements in mechanism for receiving ice as it is shuted from the store houses, and delivering it into the holds of vessels. The object of which is to reduce the labor, and preserve the ice from breaking. It consists of a framing to be placed over the hatchway of a vessel, having a rotating drum, from which is suspended a carriage, which, when in the elevated position, forms the termination of a shute extending to the bulwarks or thereabouts of the vessel to receive the ice. The said carriage is lowered into the hold by the weight of the ice, under the restraining action of a friction brake, and is raised again by a weight.

SPARK EXTINGUISHER.—E. H. Garrigues, St. Louis, Mo.—This invention relates to a new and improved device for extinguishing sparks from chimneys and smoke stacks.

MATCH SAFE.—Jesse E. Folk, Brooklyn, N. Y.—This invention relates to a new and useful improvement in boxes or safes for keeping lucifer matches whereby they are rendered much more convenient and useful than they have hitherto been, and it consists in forming on the top of the cover of such box or safe a receptacle for the stubs or waste ends of matches.

PROCESS FOR PREPARING ARTICLES FOR GILDING AND PLATING.—G. J. Sturdy and Solomon W. Young, Providence, R. I.—This invention relates to a new and improved process for finishing, gilding, or plating various metallic articles, as hooks and eyes, buttons, eyelets, and all metallic articles of a similar nature.

LUBRICATOR.—William McCully, Paterson, N. J.—This invention consists in providing a single cock, in combination with an oil reservoir and suitable oil passages, by which the oil, or other lubricating material, is distributed to each of the cylinders.

NEWSPAPER FILE.—Michael Sullivan and John Reedy, New York city.—This invention relates to a new and improved "file" for the preservation of newspapers, unbound periodicals, sheet music, and all descriptions of papers, whether printed or written, which papers it is desired to preserve in order, or to keep on file before binding.

HORSE HAY RAKE.—G. M. L. McMillen, Dayton, Ohio.—This invention is a simple, cheap, convenient, and effective device for automatically locking down the teeth so as to hold them in contact with the ground while allowing them to be easily raised by the attendant when occasion may require.

SAFETY LAMP BURNER.—John Pons, Baltimore, Md.—The object of this invention is to provide for public use a lamp so constructed and operating, that when, by being overturned, or from any other accident, the chimney shall drop off or cease to bear upon the cap, the flame of the lamp shall be automatically extinguished and all danger of explosion thereby avoided.

TANNERS' TABLE.—Franklin C. Sexton, Shelbyville, Ind.—This invention relates to a new and useful improvement in apparatus used by tanners in dressing and coloring hides in the process of making leather.

STACKING.—Robert McLarn, Shirland, Pa.—The object of this invention is so to improve the process of thatching stacks of hay, grain, etc., that the labor can be more conveniently and expeditiously performed than heretofore, while the stack will be neat in appearance and will be well protected against the weather.

SAFETY CATTLE TIE.—Charles P. Winslow, Westborough, Mass.—The object of this invention is to provide means for releasing cattle, horses, or other animals which are tied in barns or stables, in case of fire, and thereby enabling them to escape.

STEAM ENGINE.—Henry B. Verry, New York city.—This invention relates to a new and important improvement in steam engines, and consists in the arrangement of the valves and ports whereby the steam is exhausted from the same ports through which it entered the cylinder.

CARRIAGE FOR SAWING SADDLE TREE STUFF.—James H. Preston, Jefferson City, Mo.—The object of this invention is to facilitate the construction of saddle trees. Heretofore it was customary in the manufacture of saddle-trees to rive or split the billets of wood in order to give them the proper triangular cross section preparation, to working them down into "bars," "cantles," "heads," and "side trees," so-called, and other accessory parts of saddle trees that require to be beveled more or less. By means of this invention these enumerated parts may be sawed with the proper bevel or triangular cross section and a great saving thereby effected in time and material.

LOUNGE.—Francis Hayek, New York city.—The object of this invention is provide a lounge with an arm or foot support at its open end, so that it may, if desired, be used like a sofa by two persons who can both support their arms. Such an attachment is also important, as it allows a convenient position on the foot end of the lounge, when on dark days it is desired to read on the lounge, whose foot end generally is nearer to a window than the head end. For reclining postures this attachment is also convenient as it forms a support for the feet.

SMOKING PIPE AND CIGAR HOLDER.—August Tappe, Johnstown, N. Y.—The object of this invention is to provide a new attachment to the stems or mouthpieces of pipes and cigar holders, whereby the tobacco juice is prevented from entering the mouthpiece and from thereby injuring the health of the smoker. The invention consists in the application within the stem of a perforated conical tube, suspended from a perforated diaphragm, and of a perforated tube projecting upward above said diaphragm, so that by the said tubes the juice will all be arrested and only smoke allowed to pass into the mouth piece.

PUDDLING-FURNACE FRAME.—P. E. Shear, Saugerties, N. Y.—The object of this invention is to construct the bit or tool-support of a puddling furnace door so that it cannot shrink and bend by coming in contact with the cold metallic surface underneath, and so that it can be moved in if its inner exposed edge has been destroyed by the excessive heat. Also, to so construct the frame of the door, that the fire brick, built against it, can be left stronger to be less liable to burn out.

FAN ATTACHMENT FOR TABLES.—J. C. Mansker, Clinton, La.—This invention relates to improvements in fan attachments for dining and other tables, to be operated by any suitable weight or spring mechanism, or by treadles, as may be preferred.

WATER SUPPLY REGULATOR FOR WATER WORKS.—Birdsill Holly, Lockport, New York.—The object of this invention is to provide an effective and reliable means for governing or regulating the supply of water in the street, of town water works. It is designed more particularly for those towns and cities where there is no material head to give the requisite pressure for carrying the water into the upper stories of the buildings, but is also applicable solely as a fire apparatus in any city, whether supplied with artificial water works or otherwise.

HAND SEED PLANTER.—John Jeffcoat, Onawa, Iowa.—This invention relates to a new hand seed planter, which is so condensed as to be of convenient size, and easily handled, and which is cheap and can be readily made by any ordinary mechanic. It can be used single or double; that is, one person can operate one or two of them at once, and the mechanism is easily adjustable to different kinds or quantities of seed to be planted.

UNCUT CAPS FOR CANS.—J. I. Livingston, Pittsburgh, Pa.—This invention relates to improvements in caps for sheet-metal cans, such as are designed to close a vessel hermetically, when packed for shipping and to be opened by cutting out a portion of the metal, the object of which is to promote an arrangement whereby the part to be cut out may be removed more readily, and whereby, also, the removable cap commonly applied to close the opening so cut out, may be attached more readily, or a plug or cork inserted in place thereof; also, to provide a cheaper construction.

PROCESS FOR BAKING BREAD, ETC.—J. Y. Betts, Coventry, England.—This invention relates to an improved process of baking, whereby the quality of the bread and other farinaceous articles operated upon will be greatly improved, the chemical change set up by the heat of the oven being more thorough throughout the loaf, and from which there result an economy to the manufacturer, and lighter and more wholesome bread (with an improved appearance) than is ordinarily obtained. These advantages are attained by the introduction of steam into the ordinary or any approved oven charged with the dough to be baked, and heated in any well-known or approved way. The steam will be supplied from an adjacent steam boiler. The oven is kept charged with an atmosphere of steam for the greater portion of the time that the charge of bread, biscuits, or other articles, is submitted to the heat of the oven, but before the oven is drawn the supply of steam is cut off. The heat of the oven will superheat the steam admitted thereto; and the more effectually to insure this result, the steam supply pipe may be coiled or given a turn or two round the interior of the oven. The steam admitted to the oven will serve to keep open the pores of the bread, and allow the heat effectually to penetrate the mass.

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FOR THE WEEK ENDING MARCH 2, 1869.

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87,317.—MACHINE FOR DRYING AND FINISHING TUBULAR KNITTED FABRICS.—Nelson P. Akin, Philmont, N. Y.

87,318.—METHOD OF SECURING COVERS TO GLASS PITCHERS. Charles Ballinger (assignor to McKee and Brothers), Pittsburgh, Pa.

87,319.—USE OF NITROUS OXIDE AS AN ANÆSTHETIC AGENT. W. P. Barker, Grand Rapids, Mich. Antedated Feb. 20, 1869.

87,320.—MEDICATED CIGAR.—Joseph Barrett, Chicago, Ill.

87,321.—SPRINKLER FOR WATERING POTS.—James Barrows, Hyde Park, Mass.

87,322.—APPLE PARER.—A. G. Batchelder, Lowell, Mass.

87,323. — BUTTER TUB. — George S. Batcheller, Saratoga Springs, N. Y.

87,324.—APPARATUS FOR DESTROYING INSECTS ON TREES.—Constant Baudoin and Alphonse Fteley, New York city.

87,325.—PROCESS OF TANNING.—J. F. Bechmann, Abbot's Corners, N. Y.

87,326.—CONCRETE-BRICK MACHINE.—Bolivar Bisbee, Ames, Iowa.

87,327.—FURNACE FOR ROASTING ORES.—S. W. Bullock, Elizabeth, N. J., assignor to Hamilton E. Towle, New York city. Antedated Feb. 12, 1869.

87,328.—BALE-BAND SHEARS.—A. H. Daniels, Manchester, N.H

87,329.—SLIDING-DOOR SHEAVE. — Mark L. Deering, New York city.
87,330.—MACHINE FOR WHIPPING CLOTH.—Eben Eaton, Norwalk, Conn.
87,331.—SEWING MACHINE FOR SEWING SHOES.—G. W. Eldridge, Cambridgeport, Mass.
87,332.—MACHINE FOR PACKING COILED SPRINGS.—J. W. Evans, New York city.
87,333.—BOOT CRIMP.—Benjamin C. Finfrock, Stephenson's Depot, Va.
87,334.—FUR BOX.—Maurice Fitzgibbons, New York city.
87,335.—SEAT FOR STREET CARS.—Charles H. Foster, San Francisco, Cal.
87,336.—FENCE.—Eugene L. Fraker, Oshkosh, Wis.
87,337.—MECHANISM FOR OPERATING THE SHUTTLE BOXES IN LOOMS.—Robert Burns Goodyear, Elkton, Md., assignor to Barton H. Jenks, Bridesburg, Pa.
87,338.—SEWING MACHINE FOR WORKING BUTTONHOLES.—J. A. House and H. A. House, Bridgeport, Conn., assignors to the Wheeler & Wilson Manufacturing Co., New York city.
87,339.—PRINTERS' FURNITURE. — Thomas J. House, Pittsburgh, Pa.
87,340.—PROCESS OF WORKING SILVER ORES.—Henry Janin, Virginia City, Nevada.
87,341.—LOOM.—Barton H. Jenks, Bridesburg, Pa.
87,342.—CARDING ENGINE.—Barton H. Jenks, Bridesburg, Pa.
87,343.—MEDICAL COMPOUND.—Alexander Johnson, Brockport, N. Y.
87,344.—TOY BOW.—F. W. Judd, New Britain, Conn.
87,345.—HORSE RAKE.—Edmund E. Lauer and Henry W. Eisenhart, York, Pa.
87,346.—PREPARED COFFEE.—Benj. B. Lewis, Bristol, Conn.
87,347.—HORSE HOE.—Calvin Lobdell, Fort Hill, Ill.
87,348.—REFRIGERATING CAR.—A. L. McCrea, Chicago, Ill.
87,349.—HOISTING GRAPPLE.—Thomas McGrath, Albany, N.Y.
87,350.—COMPOSITION FOR PRINTING DESIGNS ON BOOTS AND SHOES.—David McKellar, Lowell, Mass.
87,351.—RAILWAY SWITCH.—John McLaughlin and Benj. F. Dean, Columbia, Pa.
87,352.—METALLIC CARTRIDGE. — Joe V. Meigs, Washington, D. C.
87,353.—MECHANICAL MOVEMENT.—George R. Metten, Cleveland, Ohio.
87,354.—MANNER OF FORMING AND PRESSING BRICKS.—Joseph Miller, Olean, N. Y.
87,355.—VELOCIPEDE.—Frederick Myers, New York city.
87,356.—HILLING PLOW.—George Notman, Deerfield, Ohio.
87,357.—DITCHING MACHINE.—Abram B. Overbaugh (assignor to Oliver Reeves), Newark, N. J.
87,358.—CARRIAGE JACK.—Calvin H. Paine (assignor to himself and W. E. Barratt & Co.), Providence, R. I.
87,359.—MANUFACTURE OF PASTEBOARD. — H. L. Palmer, Stillwater, N. Y.
87,360.—CENTRIFUGAL ORE SEPARATOR.—S. T. Pearce, New York city.
87,361.—MACHINE FOR SEPARATING ORES AND OTHER GRANULAR SUBSTANCES.—S. T. Pearce, New York city. Antedated February 18, 1869.
87,362.—PLOW STOCK.—Lawson G. Peel, Preston, Ga.
87,363.—HORSE RAKE.—John Perry (assignor to himself and and Benjamin C. Baker), Vernon, Ind.
87,364.—FENCE.—Thos. E. Phillips, Coatesville, Ind.
87,365.—MANUFACTURE OF ACETIC ACID.—Anthony Pirz and Manuel Pirz, East New York, N. Y.
87,366.—CAR COUPLING.—Theodore R. Power, Arsenal Post Office, Pa.
87,367.—LAMP.—Daniel C. Ripley, Pittsburgh, Pa.
87,368.—GARDEN HOE.—A. M. Ross, Ilion, N. Y.
87,369.—CONSTRUCTION OF SHEARS.—Joseph Ryals, Terrysville, Conn.
87,370.—TRUSS.—William Schnebly, Hackensack, N. J.
87,371.—WAR AND SIGNAL ROCKET.—Taliaferro P. Shaffner, Louisville, Ky.
87,372.—BLASTING IN OIL WELLS, ETC.—Taliaferro P. Shaffner, Louisville, Ky.
87,373—CULTIVATOR.—D. Slaughter, West Hempfield township, Pa.
87,374.—FLYER FOR SPINNING MACHINE.—Aaron W. Smith, Manchester, N. H.
87,375.—PROPELLING APPARATUS.—C. T. Smith, Nyack, N.Y.
87,376.—CORN PLANTER, GRAIN DRILL, AND HARROW COMBINED.—H. Smith, Kirksville, Mo.
87,377.—SPINNING MACHINE.—John Speight, Bradford, England.
87,378.—CRADLE CHAIR.—Marietta Studley, South Yarmouth, Mass.
87,379.—SWEAT SHIELD FOR SADDLE PADS.—R. C. Sturges, Boston, Mass., assignor to "American Saddle Company."
87,380.—BEDSTEAD FASTENING.—George Sugg and William Metz, Chicago, Ill.
87,381.—FILE FOR GAGING THE TEETH OF CROSS-CUT SAWS.—W. G. Tuttle, Geneva, N. Y.
87,382.—APPLICATION OF GRAHAMITE IN THE MANUFACTURE OF GUNPOWDER AND LAMP BLACK.—P. H. Vander Weyde, New York city. Antedated Feb. 13, 1869.
87,383.—HAY SPREADER.—M. N. Ward (assignor to himself, B. S. Grant, and T. Hersey), Bangor, Me.
87,384.—HORSESHOE.—Wm. R. Watson, Stockton, Cal.
87,385.—METALLIC SCREEN FOR PAPER PULP.—A. S. Winchester (assignor to himself and Jas. S. Parsons), Boston, Mass.
87,386.—SCHOOL DESK AND SEAT.—W. S. Wooton (assignor to himself and J. F. Piehl), Richmond, Ind.
87,387.—VALVES OF STEAM GUNS FOR SEPARATING AND DISINTEGRATING FIBERS.—H. Allen, New York city, assignor to the American Fiber Company.
87,388.—HULLING MACHINE.—A. Angell, Newburgh, N. Y.
87,389.—SCAFFOLD.—F. App (assignor to himself J. S. Burkhart), Selin's Grove, Pa.
87,390.—ADMISSION OF STEAM TO BAKING OVENS.—John Y. Betts, Coventry, England, assignor to F. W. Betts, New York city. Patented in England, April 20, 1865.
87,391.—PREPARATION OF SOLDER.—C. D. Blinn, Port Huron, assignor to George Cary, Detroit, Mich.
87,392.—HAY SPREADER.—Nathan Brand, Ilion, N. Y.
87,393.—MEDICAL COMPOUND.—John Carnrick (assignor to Reed, Carnrick, and Andrus), New York city.
87,394.—ATTACHMENT TO REED ORGANS.—R. W. Carpenter, Chicago, Ill.
87,395.—MODE OF OPERATING TREMOLOS IN ORGANS.—R. W. Carpenter, Chicago, Ill.
87,396.—HINGE.—L. R. Chapman, Grand Rapids, Mich., assignor to himself, George H. Traxsbury, and Elbert Ward. Antedated February, 26, 1869.
87,397.—CATTLE FOOD.—J. Christie, Atlanta, Ill., and Henry G. Dayton, Maysville, Ky.
87,398.—PLOW TRUCK.—J. Clees, Darbyville, Ohio.
87,399.—CAR JUMPER.—C. C. Dow (assignor to himself and L. Hylton), Philadelphia, Pa.
87,400.—CULTIVATOR.—D. S. Early, Hummelston, Pa.
87,401.—CULTIVATOR.—Benj. M. Ely. Perry, Mo., assignor to himself, L. T. Tulley, and W. A. and L. P. Munger.
87,402.—HAMES FASTENING.—W. Fawcett (assignor to Fawcett Brothers and R. Campbell), New York city.
87,403.—SPRING BED BOTTOM.—J. A. Fegan, Brooklyn, N. Y.
87,404.—MACHINE FOR BENDING WOOD.—R. Fitts, Jr. (assignor to W. Haywood Chair Company), Fitchburg, Mass.
87,405.—MATCH SAFE.—J. E. Folk, Brooklyn, N. Y.
87,406.—SPARK ARRESTER.—E. H. Garrigues, St. Louis, Mo.
87,407.—MANUFACTURE OF PASTEBOARD.—William E. Hale, Chicago, Ill. Antedated Oct. 6, 1868.
87,408.—WATER ELEVATOR.—W. G. Hamilton, Milton, Wis.
87,409.—CLOTH GUIDE FOR SEWING MACHINE FOR WORKING BUTTONHOLES.—A. Harroun, Jr., Onondaga, N. Y.
87,410.—ROULETTE APPARATUS.—G. Hauschild, St. Louis, Mo.
87,411.—LOUNGE.—F. Hayek, New York city.
87,412.—SMITHS' BELLOWS.—J. P. Hemmingsen, Marshalltown, Iowa.
87,413.—WATER SUPPLY REGULATOR FOR WATER WORKS.—B. Holly, Lockport, N. Y.
87,414.—HAND-SEED PLANTER.—John Jeffcoat, Onawa, Iowa.
87,415.—UNCUT CAPS FOR CANS.—J. I. Livingston, Pittsburgh, Pa.
87,416.—BRICK MACHINE.—R. Lockwood and C. C. Schmitt, New York city.
87,417.—FAN ATTACHMENT FOR TABLES.—J. E. Mansker, Clinton, La.
87,418.—SASH FASTENER.—M. R. Margerum, Trenton, N. J.
87,419.—OSCILLATING ENGINE.—H. B. Martin, San Francisco, Cal.
87,420.—PLOW.—E. G. Matthews, Newton, Mass.
87,421.—PLOW CLEVIS.—E. G. Matthews, Newton, Mass.
87,422.—STENCH TRAP AND OVERFLOW FOR BASINS.—John McCloskey, New York city.
87,423.—LUBRICATOR.—W. McCully, Paterson, N. J.
87,424.—MODE OF FASTENING TRUSSES.—R. McGee, Martinsville, Ind.
87,425.—THATCHING FOR STACKS OF HAY AND GRAIN.—R. McLarn, Shirland, Pa.
87,426.—SEEDING MACHINE.—George Paddington, Springville, Iowa.
87,427.—TREMOLO FOR WIND INSTRUMENTS.—Robt. W. Pain (assignor to Brainard and Wing), New York city.
87,428.—LAMP SHADE.—J. F Phelps, Havana, N. Y.
87,429.—FIFTH-WHEEL FOR CARRIAGES.—Henry Poth, Pittsburgh, assignor to himself and G. A. Klages, Birmingham, Pa.
87,430.—CARRIAGE FOR SAWING SADDLE TREE STUFF.—James H. Preston, Jefferson City, Mo.
87,431.—CENTRING DEVICE.—N. L. Revere, Worcester, Mass.
87,432.—PROCESS OF PREPARING BAMBOO FIBER.—Louis S. Robbins, New York city, and John A. Southmayd, Elizabeth, N. J.
87,433.—MANUFACTURE OF FLOCK FROM BAMBOO OR CANE FIBER.—Louis S. Robbins, New York city, and John A. Southmayd, Elizabeth N. J.
87,434.—MANUFACTURE OF OAKUM.—Louis S. Robbins, New York city, and John A. Southmayd, Elizabeth, N. J.
87,435.—HYDRAULIC LIFTING JACK. — Joseph Ryan, St. Louis Mo.
87,436.—PRUNING SHEARS.—D. B. Seeley, Portland, Ill.
87,437.—TANNERS' TABLE. — Franklin C. Sexton, Shelbyville, Ind.
87,438.—DOOR OR FRAME OF PUDDLING FURNACES.—Peter E. Shear (assignor to himself and William Mulligan), Saugerties, N. Y.
87,439.—FIRE ALARM TELEGRAPH.—W. R. Smiley, New Lisbon, Ohio.
87,440.—SHOE KNIFE.—George W. Spencer, South Groveland, Mass.
87,441.—SMUT MACHINE.—Wm. P. Springer, Oswego, N. Y.
87,442.—PROCESS OF CLEANING METALLIC ARTICLES FOR PLATING AND GILDING.—George J. Sturdy and Solomon W. Young, Providence, R. I.
87,443.—PAPER FILE.—Michael Sullivan and John Reedy, New York city.
87,444.—SMOKING PIPE AND CIGAR HOLDER.—August Tappe, Johnstown, N. Y.
87,445.—RAILWAY CAR WHEEL.—Theodore R. Timby, Saratoga, N. Y.
87,446.—CASE FOR PRESERVING BUTTER, CHEESE, AND OTHER ARTICLES.—Theodore R. Timby, Saratoga, N. Y.
87,447.—BARREL FOR COOLING FLUIDS.—Gustave Verplaetse, New York city.
87,448.—STEAM ENGINE VALVE GEARING.—Henry B. Verry, New York city, assignor to himself, G. Koonz, New York city, and D. G. Whitman, North Kingston, R. I.
87,449.—BOAT-DETACHING APPARATUS.—Edgar Wakeman, Brooklyn. Cal.
87,450.—HORSE POWER.—Seth Wheeler, Albany, N. Y.
87,451.—SHOE FASTENING.—L. F. Whitman and O. P. Whitman, Macomb, Ill.
87,452.—APPARATUS FOR LOADING ICE.—Peter F. Whitney, Saugerties, N. Y.
87,453.—MINING MACHINE. — David Williamson, Elizabeth, Pa.
87,454.—SAFETY CATTLE TIE.—Charles P. Winslow, Westborough, Mass.
87,455.—BURNING KILN FOR BRICKS, TILES, ETC.—Henry Aiken. Pittsburgh, and Henry McAllister, Jr., and Henry G. Morris, Philadelphia, Pa.
87,456.—ROTARY BLOWING FAN FOR FURNACES, GAS WORKS, ETC.—Henry Aland, London, England, assignor to Samuel and George Aland.
87,457.—CLOTHES MANGLE.—Daniel Arndt, Toledo, Ohio.
87,458.—SPRING LINK FOR PLOW CLEVIS.—John Ball, Canton, Ohio.
87,459.—STOVE PIPE.—J. W. Bates, St. Paul, Minn.
87,460.—LOCK NUT ATTACHMENT FOR RAILROAD CHAIRS.—G. W. R. Bayley, Algiers, La.
87,461.—VIOLIN BRIDGE.—Samuel Boden, Louisville, Ky.
87,462.—LOCOMOTIVE ALARM BELL.—Benjamin Briscoe, Detroit, Mich.
87,463.—INVALID BED AND BEDSTEAD.—Smith S. Brown, Woonsocket, R. I.
87,464.—PUNCH, SHEARS, AND IRON SHRINKER COMBINED.—Dennis C. Burdick, Milton, Wis.
87,465.—LIFTING APPARATUS.—D. P. Butler, Boston, Mass.
87,466.—MANUFACTURE OF ILLUMINATING GAS.—Car Carpenter, Buffalo, N. Y.
87,467.—MANUFACTURE OF INDIA-RUBBER TRUNKS, VALISES, BOXES, ETC.—John H. Cheever, New York city.
87,468.—STEAM ENGINE MECHANISM.—Mirtillow R. Clapp, New York city, assignor to himself and Edward D. Jones, Brooklyn, N. Y.
87,469.—SHUTTER FASTENER.—Edwin S. Collamer, Georgetown, D. C.
87,470.—POST HOLE AUGER.—S. W. Corbin, Bainbridge, N. Y.
87,471.—THREE-HORSE EQUALIZER.—Joseph E. Coveney, Buchanan, Mich.
87,472.—RAILROAD CAR HEATER. — Archibald C. Crary, Utica, N. Y.
87,473.—NAILING OR PEGGING MACHINE.—J. B. Crosby, Boston, Mass.
87,474.—MACHINE FOR MAKING SPIKES.—Ferdinand Davison, Liberty, Va.
87,475.—ENAMELING IRON AND STEEL.—Jules George Dreyfus, New York city.
87,476.—APPARATUS FOR BURNING GASES FOR METALLURGIC AND OTHER PURPOSES.—Cyprien Marie Tessié du Motay, Paris, France, assignor to Edward Stern, New York city.
87,477.—PREPARING ZIRCONIA FOR USE IN PRODUCING LIGHT, AND FOR OTHER PURPOSES.—Cyprien Marie Tessié du Motay, Paris, France, assignor to Edward Stern, New York city.
87,478.—PROCESS AND APPARATUS FOR GENERATING COMBUSTIBLE GASES.—Cyrien Marie Tessié du Motay, Paris, France, assignor to Edward Stern, New York city.
87,479.—MANUFACTURE OF IRON AND STEEL.—Cyprien Marie Tessié du Motay, Paris, France, assignor to Edward Stern, New York city.
87,480.—LAMP BURNER.—R. N. Eagle, Washington, D. C.
87,481.—LEATHER-CUTTING MACHINE.—Hemon Eichler, New Lisbon, Wis.
87,482.—APPARATUS FOR RENDERING LARD, TALLOW, ETC.—Charles J. Everett, New York city.
87,483.—STONE DRESSING MACHING.—A. M. George (assignor to himself and B. F. George), Nashua, N. H.
87,484.—PLOW POINT.—Edward C. Gero and James N. Cooley, Kalamazoo, Mich.
87,485.—MANUFACTURE OF LUBRICATING OILS FROM PETROLEUM.—Samuel Gibbons, Freedom, Pa., assignor to Excelsior Oil Manufacturing Company of Pennsylvania.
87,486.—STREET-CAR DRAW BAR.—John C. Gove, Cleveland, Ohio.
87,487.—PROCESS OF PURGING AND DRAINING SUGAR.—W. H. Guild, Brooklyn, E. D., N. Y.
87,488.—HARVESTER.—J. C. Hall, Monroe, Wis. Antedated February 20, 1869.
87,489.—BED BOTTOM.—J. J. Harris, Pewamo, Mich.
87,490.—SEED SOWER.—Alexander Hathaway, Independence, Iowa.
87,491.—ICE TONGS.—Randolph Hayden (assignor to Ferree and Hayden), Middletown, Conn.
87,492.—CULTIVATOR.—G. J. Hayes, Ionia, Mich.
87,493.—MACHINE FOR BUNDLING CIGARS.—F. A. Henckell, New York city.
87,494.—DEVICE FOR SOLDERING TIN CANS.—W. H. Henderson, Franklin, Ind. Antedated Feb. 20, 1869.
87,495.—MACHINE FOR BRUSHING AND NAPPING HATS.—Jos. W. Hopkins (assignor to himself and Chas. B Hardick), Brooklyn, N. Y.
87,496.—CAR WHEEL.—R. B. Hugunin, Cleveland, Ohio.
87,497.—DEVICE FOR CHECKING HORSES.—Theodore Itzstein, New York city.
87,498.—PROJECTILE.—R. H. Jones, San Francisco, Cal. Antedated Feb. 21, 1869.
87,499.—FLY-NET FOR HORSES.—S. B. Kline, Mechanicsburg, Pa. Antedated Feb. 27, 1869.
87,500.—BUCKLE FOR GRAIN-BANDS, BAG-TIES, ETC.—Le Grand Kniffen, Rochester, Pa.
87,501.—THILL COUPLING.—E. Lane, Philadelphia, Pa.
87,502.—WASH BOILER.—Alex. Lee, Scranton, Pa.
87,503.—FLAT-IRON SCRAPER, POLISHER, AND STAND.—Wm. B. Mason, Boston, Mass.
87,504.—HORSE RAKE.—G. M. L. McMillen, Dayton, Ohio.
87,505.—COTTON PRESS.—J. J. Morrison, Atlanta, assignor to himself and V. A. Gaskell, Fulton, Ga.
87,506.—GLASS MOLD.—Thos. G. Otterson (assignor to S. B. Rowley), Philadelphia, Pa.
87,507.—APPARATUS FOR HARDENING STEEL.—D. O. Paige, Detroit, Mich.
87,508.—KNITTING MACHINE.—Robert Peberdy (assignor to Jas. Creighton), Philadelphia, Pa.
87,509.—PIANOFORTE.—D. T. Peck, New York city.
87,510.—REVERSIBLE KNOB LATCH.—Frank P. Pfleghar, New Haven, Conn.
87,511.—LAMP EXTINGUISHER.—John Pons (assignor to himself, J. S. Russel, and Henry Vogler), Baltimore, Md.
87,512.—MACHINE FOR ROLLING METALS.—George Reynolds, Collinsville, Conn.
87,513.—WATER METER.—Ira Robbins, Hughesville, Pa.
87,514.—LOCK FOR DRAWERS, ETC.—Ira Robbins, Hughesville, Pa.
87,515.—SCREW FASTENING FOR THE COVERS OF FRUIT JARS.—S. B. Rowley, Philadelphia, Pa.
87,516.—LIQUID METER.—Thomas A. Searle, Providence, R. I.
87,517.—WOODEN RAILWAY.—J. Y. Smith, Pittsburgh, Pa.
87,518.—KEY FOR LOCKS.—F. W. Smith, Jr., Bridgeport, Ct.
87,519.—FURNACE STOVE AND REGISTER.—Earl Spaulding, Ionia, Mich.
87,520.—ROCKING CHAIR.—Geo. H. Spaulding, Rockford, Ill.
87,521.—MILK COOLER.—E. P. Spencer, Scott, N. Y.
87,522.—GAS-COCK.—Matthias Stratton, Philadelphia, Pa.
87,523.—BLOWER CASE.—Benjamin F. Sturtevant, Boston, Mass.
87,524.—CAR STARTER.—R. R. Taylor, Reading, Pa., assignor to himself, J. H. Boone, J. M. Heller, and C. B. Bertolette.
87,525.—RAILWAY RAIL CHAIR.—Geo. Tefft, Salem, N. Y.
87,526.—LAMP SHADE.—J. F. Travis (assignor to Archer and Pancoast Manufacturing Company), New York city.
87,527.—SHIFTING RAIL FOR CARRIAGE TOPS.—J. J. Waldron, East Durham, N. Y., assignor to himself, T. G. Palmer, and Henry Brown.
87,528.—STOP-MOTION MECHANISM FOR WARPING MACHINE.—Henry Weber, New York city.
87,529.—RAILWAY SWITCH.—William Wharton, Jr., Philadelphia, Pa
87,530.—PICK FOR DRESSING MILLSTONES.—Cornelius Whitehouse, Bridgetown, near Cannock, England.
87,531.—WRENCH FOR BIT-BRACES.—Darius Wilcox, (assignor to himself and E. A. Johnson), Ansonia, Conn.

REISSUES.

24,397.—LAMP.—Dated June 14, 1859; reissue 3,315.—R. S. Merrill, Irasburg, Vt.
85,121.—WATER SUPPLY REGULATOR.—Dated Dec. 22, 1868; reissue 3,316—G. P. Nutting, Chicago, Ill.
79,395.—VENTILATOR.—Dated June 30, 1868; reissue 3,317.—E. L. Roberts, New York city.
73,524.—MACHINE FOR DRESSING MILLSTONES.—Dated January 21, 1868; reissue 3,318.—H. B. Sears, Liverpool, England, assignee of Samuel Golay.
36,161.—VELOCIPEDE.—Dated August 12, 1862; reissue 3,319.—S. W. Smith, New York city, assignee of P. W. MacKenzie.
44,130.—APPARATUS FOR CONCENTRATING METALLIC ORES.—Dated September 6, 1864; reissue 3,320.—Zenas Wheeler, San Francisco, Cal.
47,834.—FRUIT JAR.—Dated May 23, 1865; antedated Dec. 6, 1864; reissue 3,321.—S. B. Rowley, Philadelphia, Pa., assignee, by mesne assignments, of Chas. G. Imlay.

DESIGNS.

3,392. and 3,393.—STOCKING FABRIC.—Conyers Button, Philadelphia, Pa. Two patents.
3,394.—BUCKLE LOOP.—Edward N. Crane, Newark, N. J.
3,395.—TRADE MARK.—D. F. Packer, Mystic River, Conn.
3,396.—PICTURE FRAME.—W. H. Sadler, Baltimore, Md.
3,397. and 3,398.—LEG OF A STOCKING.—Charles Spencer, Philadelphia, Pa. Two patents.
3,399.—BLOWER CASE.—B. F. Sturtevant, Boston, Mass.
3,400.—BOOT.—Amelia Strang, Oakland, Cal.
3,401.—FLOWER POT.—William Sutherland and Thos. I. Lewellen, Philadelphia, Pa.
3,402.—SPOON OR FORK HANDLE.—William K. Vanderslece and Lucius Thompson, San Francisco, Cal.
3,403.—FLOOR OIL-CLOTH PATTERN.—John T. Webster, New York city.

NEW PUBLICATIONS.

A DICTIONARY OF DYEING AND CALICO PRINTING. Containa brief Account of all the Substances and Processes in Use in the Arts of Dyeing and Printing Textile Fabrics; with Practical Receipts and Scientific Information. By Charles O'Neill, Analytical Chemist, Fellow of the Chemical Society of London, etc., etc. To which is added an Essay on Coal Tar Colors, and their Application to Dyeing and Calico Printing. By A. A. Fesquet, with an Appendix on Dyeing, as shown at the Exposition of 1867. Philadelphia: Henry Carey Baird, 406 Walnut street.

This is a reprint of a well-known and valuable treatise on dyeing and calico printing, with such additions as bring the work fully up to the present state of these arts. The extent and value of these additions will be appreciated by those familiar with the English editions of the work, and the wonderful advances that have been recently made in the art of dyeing. The style in which the work is printed, as well as the treatment of the subject matter, alike recommend it to the technical reader, to whom we can commend as a first-class work.

We have received the "Almanac" of the *British Journal of Photography* for 1869. It is replete with interesting information and many valuable formulas pertaining to the beautiful art.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

3,158.—MANUFACTURE OF WATER AND DRAIN PIPES.—J. E. Hughes and I. S. Church, San Francisco, Cal. October 15, 1868.

370.—PUDDLING AND OTHER FURNACES.—Samuel Danks, Cincinnati, Ohio February 6, 1869.

384.—STEAM ENGINE GOVERNORS.—William Bellis, Richmond, Ind. Feb. 8, 1869.

386.—PUDDLING AND OTHER FURNACES.—Samuel Danks, Cincinnati, Ohio. February 8, 1869.

Facts for the Ladies.

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U. S. PATENT OFFICE,
Washington, D. C., Feb. 24, 1869.

George W. La Baw, of Jersey City, N. J., having petitioned for the extension of a patent granted to himon the 29th day of May, 1855, for an improvement in Miter Machine, it is ordered that said petition be heard at this office on the 10th day of May next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
Washington, D. C., Feb. 26th, 1869.

E. W. Goodale, of Clinton, Iowa, having petitioned for the extension of a patent granted him on the 29th day of May, 1855, for an improvement in Machine for Making Paper Bags, it is ordered that said petition be heard at this office on the 10th day of May next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
Washington, D. C., Feb. 26, 1869.

Henry Boynton, of New York city, having petitioned for the extension of a patent granted him on the 19th day of June, 1855, for an improvement in Reciprocating Railway Propeller, it is ordered that said petition be heard at this office on the 24th day of May next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

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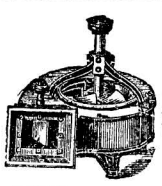

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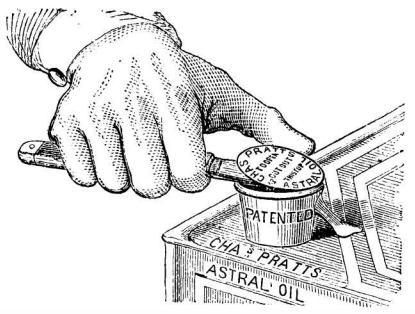

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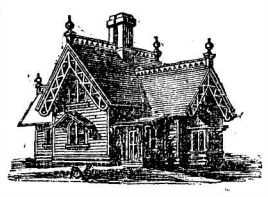

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