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THE OLD MOLDER.

Down on his knees in the sand, his grizzly beard and hair soiled with grime, with keen eyes intent upon his work, he does not notice your approach. When he, at last, sees you, and hears your salutation, what a hearty good-morning issues from that crater-like looking breathing hole of his! Full of manly independence is your old molder. Though your clothes be fine, and a solitaire sparkles in your shirt front, he feels himself just as good in his smutted clothes as you do in your finery.

A dry joker—ten to one he asks you to extinguish your cigar, in so bland and natural a way that you do so at once; then wondering what necessity there can possibly be for such a prohibition in a foundery, you catch a sly gleam in his eye, which instantly tells you of the inward laugh he is enjoying at your expense.

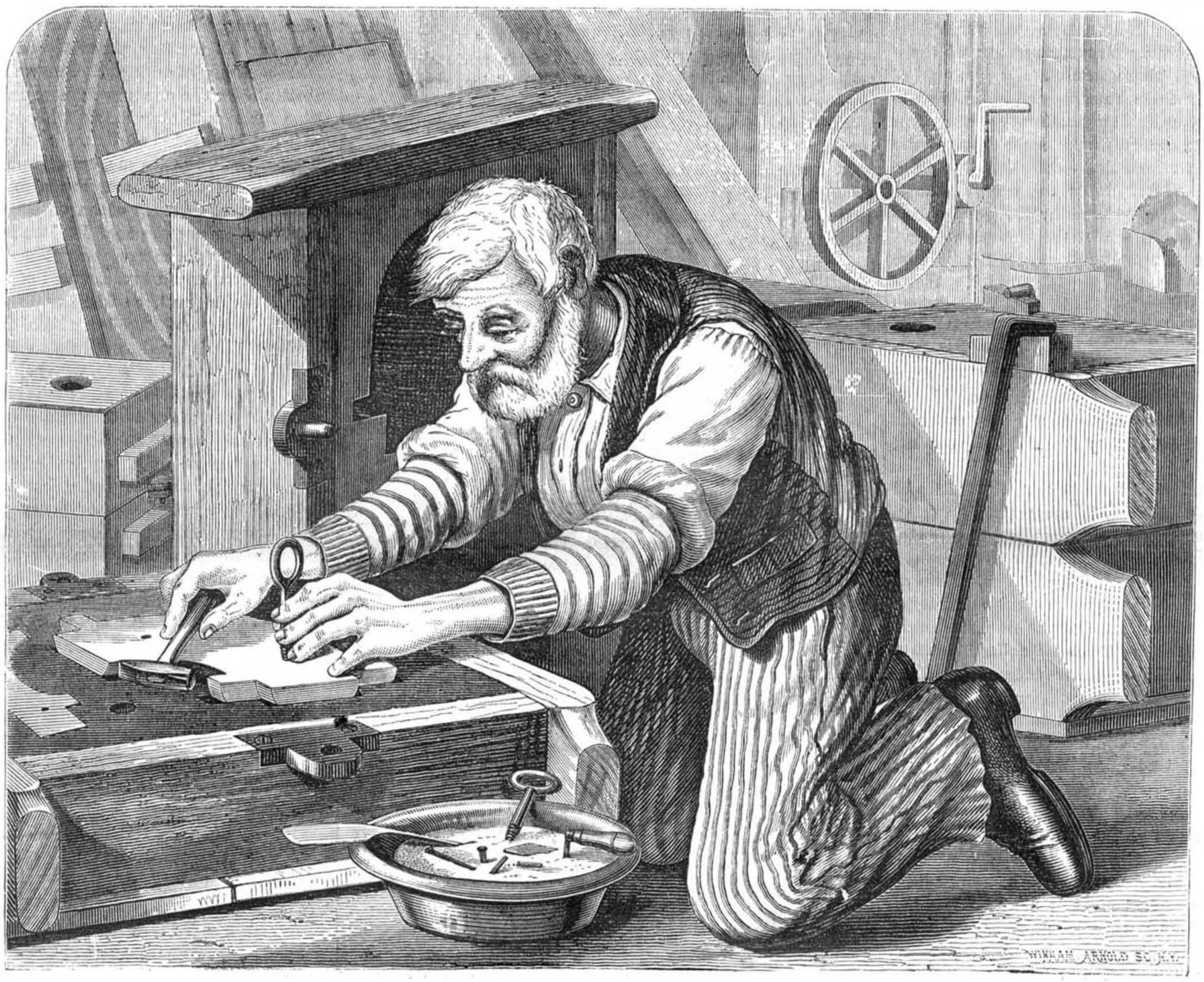
Now take a seat on that empty cope and watch him, as in the tractable sand he shapes beautiful, curious, and difficult forms. We promise you that if delicate manipulation, and ever varying ingenuity delight your style of intellect, you shall spend an hour profitably and pleasantly. Queer stuff that sand—is it not? As susceptible to impressions as a child's heart and mind, but not so retentive. That obstinate corner will break down in spite of the dainty skill with which our old molder's practiced hands— steady as a rock, though he is three score years old, if a day—lift out the pattern. Now watch him as he builds it up with a trowel that looks like a child's toy. Here is skill of eye as well as of hand. This man might have been a sculptor—he *is* a sculptor in fact, of a most practical and useful sort.

Now the mold is complete. With what accuracy every line, projection, and depression of the pattern has been traced in the yielding sand. So he goes on from one mold to another, preparing sand wombs for their fiery gestation.

Soon resounds, through the massive building, the steady roar of the blast, and the furnace grows hotter and hotter under its power. The molten iron settles to the bottom of the cupola ready and eager to leap forth, and undergo its regeneration into forms of beauty and usefulness. Could we follow it back through the ages in which it has undergone the transformations which left it a crude unsightly mass in the side of yonder mountain, from whence human brains and hands have wrested it to its present purpose, we should read a history far more grand and vast than any ever achieved by human dynasty.

No time for such reflections at present; the furnace is tapped and the white hot stream is flowing. Now our old molder is in his glory; the high priest of a temple which glows in every corner of its sooty dome. Dusky forms, lit by a lurid glare, swiftly fill the matrices with incandescent metal. From each inclosure rise clouds of steam, which, mingling together in the dome, are lighted by the glowing metal below, like the smoke which hangs over Mount Vesuvius.

Now the molds are all filled, and the flasks are opened, and the iron shapes come forth glowing. The operations are over for the day, and washing off sweat and grime, the old molder starts for his modest home. Let us hope that there peaceful content, and the warm love of wife and children, and the rewards of patient industry, await him; and, that, when the earth shall finally enfold his shape, he will rise again, like the forms he has fashioned, to a better and nobler existence.



THE OLD MOLDER.

Russian Foods.

The tea in Russia is very different from that used in England and in this country. The strong, black, high flavored congou, from the south of China, used here, is almost unknown in Russia; and when by accident they have it (as by present from a friend), they do not know how to use it. What they use is a light, delicate flavored tea from the North of China. Make the infusion as strong as you like, it would be impossible from it to produce a cup of tea as dark and black as ours. At the strongest theirs never seems to get beyond a light amber color. A cup of tea of the color of senna or coffee would revolt them. Hence, when they have English congou, they regulate the strength of the infusion by the color they are accustomed to see in their own, a standard which, to speak mildly, does not produce strong tea. But looking at their tea, not as ours, but as another species of the same genus, and altering our standard accordingly, then it has merits of its own not possessed by ours. Coming from the colder districts and more mountainous regions of northern China, it has not the strong aroma of that from the less elevated and hotter slopes of the south, but it has, in its place, a peculiar delicacy and refinement of flavor.

The breads resolve themselves practically into different modifications of three chief kinds. Tschernoichleb, black bread made of rye; kalatsch, white bread made of wheat, and of this the best kind comes from Moscow; and saika, white bread enriched with raisins or other accesories, equivalent to our buns or the Scotch "cookies."

Ices are made in great perfection in St. Petersburgh. One, a very good kind, made from or flavored by the hazel-nut; and another still better, a water ice made from the juice of the "clucva" or cranberry (gathered after the berry has been touched by frost), sweetened and slightly flavored with vanilla. In Russia this is much used, and it is well deserving of introduction into this country.

The great vegetable staple of the country is the cabbage, which grows in great perfection, fine, large, solid, white, and crisp. It supplies a chief portion of the subsistence of the people all the year round. At the beginning of winter every family lays in a store. At that time the plants are cut down and chopped up or shred into thin slices. These are packed in barrels with vinegar and salt, and a certain amount of fermentation takes place, when the cabbage becomes a kind of sour crout. From these barrels, a portion is taken as required, and made with meat into a cabbage broth called "shtshi."

This shtshi is the most characteristic national dish in Russia. With the mass of the people it is their daily food. Meat is cheap in St. Petersburgh; only about half the price we pay, and consequently it is much more freely used. All northern nations consume a greater quantity of animal food than more meridianal races. Every meal, every dish at every meal, forces this fact upon the visitor's attention, in St. Petersburg.

The Modern Order of Contractors.

The late Mr. Stephenson stated that—"The Britannia bridge—containing an amount of masonry unheard of before, nearly two millions of cubic feet—was built in three years, without concern on my part in regard to the masonry. It was turned over to a contractor—an intelligent and thoroughly practical, though not a scientific man, and he performed the task. Yes! two millions of cubic feet of masonry were worked from the quarry, dressed, squared, set, and reared into a magnificent edifice in three years. More than this had been one at the Montreal Bridge. There was an indefinite amount of ingenuity in the mere tackle of such a work. And yet they must not permit their own skill and success to blind them to the fact, that, so far as work was concerned, things of almost equal note were achieved in other countries. His experience in Egypt surprised him not a little. During the construction of a railway there, he calculated on much difficulty in regard to the making of embankments, ditches, culverts, and so on. But arrangements were made through the agency of dragomen; and the Egyptians, once at work, much surprised him. He was almost in despair at first; but after they had become familiar with the labor, they performed a quantity of work that was really astonishing.

He mentioned this case as one that stood in strong contrast to the Britannia bridge masonry, which might be regarded as a work where the utmost available amount of science was brought to bear, while the Egyptians' work was one in which an indefinite division of labor was employed and exemplified An embankment was made over the delta of the Nile, extending to about 140 miles, eight feet high and twenty-five feet wide; the whole was now completed. One portion of the work struck him as very remarkable. The Pasha of Egypt had, of course, the power of sending to villages and directing the mayor to cause a certain amount of work to be performed in a certain period. A road was required to one of the Pasha's palaces, and the Pasha ordered it to be made. To be ordered there, is to be done. The road was made thirty miles long, forty feet wide, and eight feet high; and in what time would be supposed? why, in six weeks. In that comparatively barbarous country, then, a work had been accomplished which he had not known equaled in any country however highly civilized."

In a recent discussion at the Odontological Society, the notion was thrown out, that the teeth have a higher office than that commonly assigned to them—namely, that of merely crushing or masticating the food. They are to be regarded as endowed with a tactile sense, a discriminating faculty, correspondent to that possessed by the muscles and nerves of the eye and ear. Teeth, it was remarked, have an extreme delicacy of discernment, both as to whether the objects comminuted be suitable as food, or such as will irritate the delicate lining of the œsophagus. How speedily do the teeth detect the smallest particle of cinder that has found its way into a freshly baked biscuit! And yet both are pulverized with much the same force and sound.

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SEAL FISHING.

A correspondent of the *Evening Post*, writing from St. John's, N. F., gives the following interesting particulars:

On these shores, 146,000 souls are maintained in existence by catching, curing, and exporting seals and codfish. All our institutions, churches, schools, politicians, lawyers, bishops, clergy are created out of seals and cod. Take these away, and we all vanish quickly as the morning cloud and the early dew.

It is a stirring time here, when preparations for the seal fishery commence. For the three weeks that precede the first day of March, the sound of hammers and axes reverberates cheerily. The offices of the merchants are crowded with rough, hardy-looking men, who are eagerly seeking for berths. From the distant "outports" they have arrived, with bundles of spare clothing over their shoulders, slung on the "gaff" or pole seven or eight feet in length, with which the seals are to be struck and dragged over the ice to the side of the vessel. These are the "batmen;" the "gunners," who rank a step higher, carry on their shoulders the long, heavy sealing gun, with which the older seals are to be destroyed. The men are roughly but warmly clad, and wear long, heavy boots, well paved in the soles with "sparables "nd spikes, to enable them to walk securely over the ice.

The men are well fed during the voyage, their diet being chiefly pork, biscuit, tea, and a few vegetables. They also feast on the heart and certain other parts of the young seals, when succesful in capturing a number.

A SEAL HUNT—ITS PERILS AND EXCITEMENTS.

Let us now picture to ourselves sixty or seventy of these stout fellows on board one of these small sealing vessels of 140 or 150 tuns, ready for their hunting excursion on the ocean fields of ice; and let us, in imagination, go with them on their perilous voyage, in order to form some idea of the great "swile hunt,"-as it is vernacularly called. About the middle of February, the seal casts its young on those huge ice fields that are borne along our shores by the great northern current that sets southward out of the Greenland seas. For three or four weeks after birth, the young remain on the ice, fed by their mother's milk, and growing rapidly. At the end of this period they are very fat and in perfect condition; and the object of the hunter is to reach them at this time, as they are then readily taken, and their oil is purer and finer than that of the old ones. For this purpose they sail from our harbors as nearly as possible to the first day of March. Steering northward, they endeavor to keep the open water, if such can be found; but generally they are not long out till they encounter the ice.

At times the scene is terrific; howling night closes in, and the vessel, caught in a vast ice field, is momentarily threatened with destruction. The huge floes come grinding, crushing down upon her; the wind roars through the shrouds, driving on its wings the arrowy sleet and snow, sharp as myriads of needles, before which only men of iron can stand. Thus beset and locked in the embrace of the floe, the luckless vessel is drifted helplessly hundreds of miles, at times past the harbor from which she took her departure. Then suddenly the scene changes. Soft westerly breezes blow, unfolding a lovely sky studded with bright stars, adorned by the presence of the young moon, and brilliant with the flickering aurora. Calmly the vessel makes its way through numberless islets of glittering ice, with shining pinnacle and fantastic forms, realizing all the youthful dreams of fairyland. The scenery on such a night, amid the ice fields, is said to be enchanting.

BLOODY WORK.

Suddenly, however, the enchantment is dissolved by the welcome whimpering of young seals, resembling much the cry of an infant in distress. The vessel has at last touched the seal meadows, and myriads of the "whitecoats" are all around amid the ice hillocks. Now the bloody work begins; not a moment is to be lost, for the wind may shift and the treasure drift far away. If the ice be firm the men eagerly leap on it, armed with "gaff," "towing line," and "sculping knife." If it is broken, the word is given, "Out with the punts (boats)!" and from "pan" to "pan" they pursue their prey. The "slaughter of the innocents" is terrible. The shouts of the hunters, the blows of the "gaffs" as they dispatch their victims with a stroke on the nose, the blood gouts that cover the hands and arms of the murderers and stain the virgin snow, the carcases denuded of skin and fat, and yet palpitating with warm life as they are flung on the ice; the eager, exultant hunters slaying, "sculping," dragging heavy loads of fat and skins towards the vessel—what a scene of death amid these ice solitudes of the ocean, with the bright sun in the heavens lighting up the glittering pinnacles and far-spreading fields of ice!

"SCULPING" AND HAULING.

Meantime, the vessel keeps moving through the ice; the men follow, clearing off the seals on each side as they pass along. Sometimes a dozen seals are found within a space of twenty yards square. At other times they are more widely scattered, and the men have to disperse over the ice in search of them, to a distance of several miles. In skinning, a cut is made through the fat to the flesh, a thickness generally of about three inches, from the throat to the tail. The legs or "flippers," and also the head, are then drawn out from the inside, and the skin is laid out flat and entire, with the layer of fat or blubber adhering to it.; and in this state the skin is called the "pelt" or "sculp." It is generally about three feet long, and two and a half feet wide, and weighs from thirty to fifty pounds. The hunters nick two holes along the edge of each side of the skin, and then lay them one over the other, passing the rope through the nose of each "pelt," and lacing it through the side holes in such a manner that, when pulled tight, it draws them into a compact bundle. Fastening the gaff in this bundle, they then put a rope over the shoulder and haul it over the ice to the vessel. Six pelts are reckoned a heavy load to drag over rough and broken ice, often leaping from "pan" to "pan." Then what a scene the deck of the vessel presents as the seal skins are piled there, previous to being stowed under deck! The men move about knee deep in fat and blood—the deck, with gore, is slippery as glass.' The hunters arrive with their boats, and snatch a hasty moment to drink a bowl of tea or eat a piece of biscuit and butter—their hands and bodies reeking with blood and fat—they then hurry off in search of new victims. The poor mother seals, now cubless, are seen popping their heads up in the small lakes of water and holes among the ice, anxiously looking for their snow-white darlings, and refusing to believe that the bloody carcasses on the ice, stripped of their warm coverings, are all that remain of their tender offspring. With a moan of distress, they plunge into the water, as if anxious to escape from a scene polluted by the ensanguined trail of the hunters.

DANGERS AND DISASTERS.

The seal hunt is full of perils and excitements. Sometimes when the men are a mile or two from their vessel, a blinding snowstorm sets in, or a thick fog envelopes them; and as they stagger along, trying to regain their ship, they fall through a hole in the ice, covered by the treacherous snow, and go down to ocean's depths "unknelled, uncoffined, and unknown." Sometimes, too, the field of ice on which they are at work separates into fragments, and they are floated off to lie down and die on the ice, unless picked up by some passing vessel. Or perhaps a furious nor'easter blows for several days, "rafting" huge blocks of ice, one on the other, all around the imprisoned ship, crushing her at length like a nutshell, and leaving the unhappy sealers shivering and perishing with hunger on a floating ice field. At times their sufferings are very great, and in some seasons there is a serious loss of life. On the whole, however, such are their skill and fortitude in meeting all emergencies, and such their knowledge of the ways and manners of the ice, comparatively few mishaps occur.

SPECIES OF SEALS.

There are four species of seals in our seas. The Bay seal lives on the coast, frequents the mouths of rivers and harbors, and is never found among the ice. The harp seal is so called from having a broad curved line of connected spots proceeding from each shoulder and meeting on the back above the tail, forming a figure like an ancient harp. The old male animal alone has this figuring, and not till his second year. The third variety is the hooded seal, and is much larger than the harp. The male, called the dog-hood, is distinguished from the female by a singular hood or bag of soft flesh on his nose. When attacked or alarmed, he inflates this hood so as to cover the face and eyes, and it resists seal shot. It is impossible to kill one of these creatures, even with a sealing gun, so long as his head or tail is towards you; so that the only way is to aim at the side of the head, so as to strike at the base of the skull. The hoods bring forth their young two or three weeks later than the harps, and keep farther north than the others. The fourth species is the square tipper. It is largest of all, but is rarely taken on the coast. The white coats, the young of the harps, are the most desirable for capture, their oil and skin being the finest.

THE METRIC SYSTEM.

Prof. Chas. E. Davies, of West Point, lately delivered a lecture, in this city, on the metric system, and the probable consequence of its proposed introduction into this country. After explaining the system in detail, he concluded his remarks as follows:

Let us suppose the metric system to be adopted by law, and every other system excluded—for without such exclusion the whole thing would be a perplexity and a farce. What follows? We have blotted out, from the mind of the nation, the foot and all knowledge of every measure into which it enters as a unit. We have expunged the yard, used in connection with the arm more or less in every family; and the pace, the unit and guide of the farmer, for an approximate measure that will not supply the place of either. Every lot of ground 25 feet front by 100 feet deep must be described as follows: 7 meters 6 decimeters and 2 centimeters front, by 30 meters 4 decimeters and 3 centimeters deep. Thus, the description of every such lot will require three different units and six words, instead of one unit and two words. In all conveyances and descriptions of land, the translation from one language to the other would occasion great trouble and difficulty. The old familiar mile of 1,760 paces is also gone, and the distance from Albany to New York, 145 miles, will be known to us, if known at all, as 229,680 meters. Let us see how we shall recognize the earth in its new dimensions. Its diameter, instead of 8,000 miles, in round numbers, will be 12,672,000 meters, and its circumference about 39,810,355 meters and 2 decimeters. The acre is also gone, and with it all its multiples and sub-multiples.

Since the commencement of the present century, the public lands have been surveyed and laid out in townships of 6 miles square, each containing, of course, 36 square miles, or 23,040 acres. The side of each township, by the new system would contain 9,504 meters (instead of 6 miles), and its area 921,600 ares. All the lands from the Ohio river to the Pacific ocean have been surveyed, deeded, and recorded in the units of the square mile and the acre. What will be the labor and the confusion of translating every deed and record into the language of the meter and the are? We should scarcely know our own farms by their new names.

The consequences of these changes to the metric system would be the following:

1. They would strike out from the English language every word and phrase and sentence used in connection with our present units of weights and measures, and would impose the necessity of learning a new language for the one now in use.

2. They would blot out from the knowledge of the nation all apprehensions of distance and area and volume, acquired through the present units, and would render necessary the acquirement of similar knowledge by less convenient units, having different relations to each other, and expressed in a new and unknown language.

3. They would change the records of our entire landed property, requiring them all to be translated into a new and foreign language.

4. We must not forget that prices and currency are dependent upon, and necessarily adjust themselves to, weights and measures; and that all our ideas of cost and value are fixed with reference to our present units. The adoption of the metric system, therefore, would carry with it an entire change in the money values of all articles of commerce and manufactures, and of all agricultural productions; for these values would have to be re-adjusted to the new units, and to be expressed in the new language. Hence, the changes would extinguish all knowledge of money values, now so familiar to the entire population in their daily purchases and sales and barters, for those values are all adjusted with reference to the units of weights and measures.

5. Can we afford to make these changes for the very small gain of changing our present yard from 36 inches to 39 inches and $\frac{37}{100}$ of an inch? Can we accept any system as a substitute for the one now in use, unless it makes some provision for maintaining the unit 1 foot?

All our knowledge of distances, the yard, the rod, the furlong, the mile, the league, come from it. The square rod or perch, the rood, the acre, are also derived from it. Can we change the survey of an entire continent, with the description of every piece of land upon it, from the unit, one acre, to the unit, one are, forty times less? Can we change, without great confusion, the unit of volume, the cubic foot and the cubic yard, so familiar to every schoolboy? and, above all, can we change our unit of weight, the pound avoirdupois, which is equal in weight to sixteen of the 1,000 equal parts of a cubic foot of rain water?

6. Can we abandon, as a mere question of language, these short, sharp Saxon words, for their equivalents expressed in a foreign language? Besides, the foreign language which we introduce has no exact equivalents to these words, which have almost become things, and which now form a part of the mind and knowledge of every people who speak the English tongue, or are connected with American commerce. These are the great questions now discussed and considered by the American people. They affect directly the interests of all classes. They affect our systems of public instruction, our trade, our commerce, and the mechanic arts, in all their development and in all their applications. Let us then approach these questions with a deep sense of their importance. Let no hurried action embarrass us. Let us remember that time is a necessary element in the accomplishment of everything that is truly great, and that these questions can only be rightly and permanently settled by the enlightened and aggregated judgment of mankind. Let the discussion, therefore, be full and complete.

160,000,000 Needles a Month.

Sewing needles are almost wholly of English manufacture, but a few German goods under English brands reach the American market. In England, the manufacture has been systematized and simplified to such a degree that English labor always has a monopoly of the needle trade. A needle passes through 120 operations, and a child can control the machinery and turn the eyes of 4,000 needles per hour.

The introduction of sewing machines restricts the increase in the sale of sewing needles, though they seem to hold to a very steady yearly increase, in the United States, of about three per cent. The statistics published from Commissioner Young's Bureau, in Washington, do not specify the importation of specific items of small wares, all goods going under a general classification of the product they originate in. Hence the actual consumption of needles is something difficult to determine. The agents of the two leading makers in Boston, report the aggregate sold in Boston, New York, and Philadelphia, as about one hundred and sixty million of needles per month, running from 75 cents to $2 dollars per thousand. The sales chiefly are on the numbers from 5 to 10, while seven eights of these orders take the numbers of 7 and 8. Knitting and darning needles, that twenty-five years ago were sold in amount over double the sales of sewing needles, have dwindled to a very insignificant item of stock. They can hardly be said to sell now at one twentieth of their former amounts. Crochet needles have a very large sale, and have taken the place made vacant in stocks by the disuse of the darning and knitting needles.

PROFESSOR GOULD, who has gone to superintend a new observatory, founded by the government of the Argentine Republic, at Cordova, in his remarks about the climate, gives a few particulars which exemplify its extreme dryness. "A bowl of water," he says, "left uncovered in the morning is dry at night; ink vanishes from the inkstand, and becomes thick almost by magic; the bodies of animals, left exposed, dry up instead of decomposing; and neither active exercise, nor exposure to the sun's rays, causes perceptible perspiration."

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VINCENT'S PROCESS OF PREPARING LINSEED OIL.

[Condensed from the English Mechanic.]

Various methods have from time to time been adopted to accelerate and increase the natural siccative action and properties of linseed oil.

This is generally accomplished by boiling the oil; but a method of preparing it in a cold state has long been known and practised. It consists in agitating the oil, to which a small quantity of litharge has been added, with a solution of vinegar of lead (tribasic acetate) in soft water. This operation is carried on in a warm place with frequent stirrings, till a whitish precipitate is thrown down, and the oil is of a pale straw color. By a process of filtration and exposure to the sunlight it may be obtained almost as clear as water. This is the vehicle for the pigments used by decorators and painters in the finer descriptions of work, and where the purity of the tints is a matter of importance, although it does not dry quite so rapidly as the boiled oil. [This vehicle has not met with the favor in America which, as we are led to suppose by this paragraph, it receives in England.—EDS. SCI. AM.

The process, by which the ordinary dark-colored vehicle used by painters in common work is produced, consists in boiling the raw linseed oil with a larger or smaller proportion of litharge, which, by some chemical action not thoroughly understood, increases the drying properties of the oil. Magnesia and the oxides of zinc and manganese have also been employed for this purpose, but oxide, or some other salt of lead, is in more general use, with the addition, in some cases, of a small quantity of resin.

According to Liebig, the mucilage and vegetable albumen in the raw oil prevent or impair its natural siccative action, and the boiling with litharge in some way removes these substances, and permits the oil to more readily absorb oxygen from the air. M. Chevreul, however, expressed an opinion some years ago, that it was not necessary to boil the oil at all; that a temperature far below boiling point (about 600° Fah.) had an equally good effect, and that in fact it was possible to boil the oil too much.

Of late years, a method of preparing the raw oil by employing steam has been adopted on the Continent and by some English makers, in which the temperature is rarely raised above 228° Fah. An account of this process, as discovered and worked by himself was recently given before the Society of Arts, by Mr. Vincent. The process destroys the pungent odors and intensely disagreeable smells of the older process. The apparatus used consists of a pan, constructed preferably of copper, with a depth about equal to the diameter, and with an iron jacket, for the lower half, forming a space for the steam, and capable of standing a pressure of 40 pounds to the inch. To the top of the pan a dome provided with a manhole is riveted, and proceeding from this dome is a pipe to convey the vapors into the ash pit, and consequently through the fire. In the center of the dome is a stuffing box, through which two shafts, the one working inside the other, are passed. These shafts bear fans, which, rotating in opposite directions within the pan, by the violent agitation set up, cause a complete mixture of its contents. The oil to be boiled is placed in a large tank, through which passes a coil of pipe conveying the waste steam from the jacket, thus raising the temperature of the oil to about 95° Fah., and facilitating the separation of mucilage and accidental impurities before the boiling operation is commenced. When the previous charge has been run off, about two tuns of oil are pumped into the pan from the tank, the steam turned on, and the fans started. When the pressure of the steam has reached 35 pounds, air is forced into the already agitated and churning liquid through an inch pipe fixed in the bottom of the pan. The dryers, about three quarters of a pound to the cwt. of oil, are added as soon as the oil is heated through, being ground to a fine powder, mixed with oil, and passed through a funnel and stop cock into the pan. After the introduction of the dryers, it is only necessary to keep the fans and the air pump at work; and at the expiration of about four hours the oil is fit for removing into tanks, where it remains till the dryers have settled, and the clear oil is then drawn off into the vessels used for storing. In practice, Mr. Vincent says it is advisable to add about 20 per cent of raw oil to each barrel of the prepared liquid intended for exportation.

No information as to the name of the dryers employed is given in the paper. They part with some of their oxygen to the oil, and, coming in contact with the oxygen of the air forced into the pan, become reoxidized, and again contribute oxygen to the heated oil. The accomplishment of this reoxidization of the dryers necessitated the employment of blowing engines for the boiling oil, when the discovery, that under this treatment the oil rapidly acquired body, gave rise to the method of treating it we have described above, a process by which the absorptive powers of the oil for oxygen are enormously increased and permanently retained.

What these dryers really are remains a trade secret; but many years ago, Faraday suggested the employment of binoxide of manganese in order to hasten the drying of printing inks; while it has been asserted that a very small quantity of borate of manganese is sufficient to cause any of the drying oils with which it is mixed to rapidly dessicate. Hitherto it has been a common belief among manufacturers that oils would not show their impurities until a temperature of some 500° was reached; but if the article prepared by Mr. Vincent's process be as good as that produced by the old method, there can be no doubt that a great step in the right direction has been taken, and the disagreeable odors, with the unavoidable danger from fire, those usual attendants on oil and varnish works, should rapidly become things of the past.

[This process was patented in America about two years since. There is no secret here about the dryer used; it is simply red lead. The oil produced by the process does not dry well, but remains tacky for a considerable period. Experts inform us that it is an inferior article. There seems to be, however, room for improvement upon the process, and in the hands of those competent to experiment with it, it might develop into something of greater importance than it appears to be at present.—EDS. SCI. AM.

Poison in Bread.

It seems, says the *English Mechanic*, that in some metropolitan districts, our "staff of fe" contains a most insidious poison. Our readers are doubtless aware that alum is extensively used by bakers to render flour of a low quality serviceable, and the bread made from it whiter than it otherwise would be. By retarding the transformation of the starch into gum, sugar, and lactic acid, it renders the bread more nutritious and prevents it turning sour. But if alum has its advantages, it also has disadvantages. Dr. Dauglish read a paper before the Society of Arts, some time since, in which he stated that the effect of alum on the system is that of a topical astringent on the surface of the alimentary canal, producing constipation, and deranging the process of absorption; but it also neutralizes in a great measure the action of the digestive solvents. So that while it prevents solution at a time when it is not needed, namely, when the bread is being prepared, it continues its effects when taken into the stomach, and the consequence is that a large portion of the gluten and other valuable constituents of flour are never thoroughly dissolved, but pass through the alimentary canal without affording any nourishment whatever.

Other medical men assert that the amount of alum in bread is not in any way injurious; but, however opinions may differ on this subject, there can be no question of the deleterious influence on the human economy of another "whitener" found in bread.

The *Food Journal* publishes an account of an examination of twenty samples of bread purchased in districts of London south of the Thames, from which we find that an undoubtedly dangerous poison exists in baker's bread to an extent that is far from pleasant. Sulphate of copper, commonly called blue vitriol, is in extensive favor with Belgian bakers; but hitherto its action as a "whitener" was supposed to be unknown to their metropolitan brethren. According to our cotemporary, out of the twenty samples, only three were positively genuine, and while five contained alum in quantities ranging from 22 to 88 grains per 4-pound loaf, no fewer than sixteen contained sulphate of copper, varying in amount from 0·43 to 1·82 grain per 4-pound loaf.

It would be advisable to discover who mixes this dangerous poison with our bread—the miller or the baker—and we shall look anxiously for the promised settlement of the doubt. To all appearances, not even those who make their own "household" are secured against the effects of a most subtle and dangerous poison.

Manufacture of Needles.

Most of the small needles of the German make are of very inferior workmanship; some faults are so palpable that it is obvious that neither manufacturer nor artisan could know the qualities necessary to constitute a good needle; the eyes are not central, nor pressed out clearly, and have a burr or sharp edge left on the inner surface, that would cut the thread; very irregular in temper, with in no instance that elasticity of texture which characterizes the best English needles; in numerous instances the heads are not ground, nor the eyes burnished, and what is worthy of notice is, that all the best Prussian needles have gilt eyes; a process which, although applied to some best English made needles, as a rule is most generally allotted to lower class goods.

There are two methods of producing "steel London" needles in English manufactories: one, to use inferior material, and employ corresponding workmanship; the other, to put up needles intended in the onset for best, but which have proved defective in one or other of the manufacturing stages, and they are sold as "steel London." In the scouring mill alone millions are annually reduced from best goods to "steel London."

The "hardening," too, is another uncertain process, but, judging from results, is better, though slower, than the German system, yet still open to much improvement. It is on the combined success of these two processes ("hardening" and "scouring") that the temper of the needle depends, and which, from a combination of circumstances, too frequently fails. The Germans employ machinery successfully for many processes of which the English know nothing. They use a "pointing" machine, by which all their needles are pointed, and this, too, in a country where labor is cheaper that it is in England. George Printz, one of the German manufacturers, has obtained a gold medal for "scouring" and other machinery now in use in most of their needle mills, with which they claim to scour more needles, by four fifths, in forty hours, than the English system will in seven days; and (as they assert) avoid the danger of overheating, and thereby spoiling the temper of the needles. They have a machine for "cutting," which leaves the wires straight without the aid of fire, so that the rubbing process is altogether dispensed with; and also a "blueing machine, worked by two little girls, doing the work which in the English system would employ five women. "Tempering" and "cheek filing" are also done by means of machinery,

There should be as much certainty in making a "packet" of needles to any required quality as there is in making a watch, or building a house; but there is not. Still, it might be done, if two obstacles could be removed. One of them is the frequent irregularity found in the quality of steel, and the uncertainty of obtaining the better quality at the higher price: the other is, the required temper should always be obtained in the tempering shop, and no after process should, under any circumstances, be allowed to alter that temper. The "hardener," then, would be solely responsible, and would seldom fail.

From late improvements in the art of steel making, even these last few months, there is good reason to hope that the first difficulty is fast being removed. The investigations and discoveries of Bessemer, Richardson, Calvert, and others, who have carried science into the workshops, must, if persevered in, eventually end in the quality of this most important material being no longer a question of guess, but one of certainty. Even now the ingredients of steel are not known; the chemical action of some of the gases on steel, when in a heated state—hydrogen, for instance—is still an open question; and as the steel is, with some little exception, heated for hardening in carbureted hydrogen, if the small size of the needle be considered, it seems of importance that this should be known even by the workmen. It is either from undervaluing the importance of good steel, or not being able to obtain it, or, when obtained, spoiling it in firing, that the German small needles are so inferior in temper.

Bringing down the temper of needles, after leaving the tempering shop, is the rock upon which needle manufacturers of all times have been splitting. The "hardener" or "scourer" both work according to rule, but the rule is defective, involving considerable loss and inconvenience.

There is considerable difficulty in obtaining friction without heat, and needles, after they are tempered, undergo an immense amount of friction, and under this process they are likely to sustain injury. It requires a temperature of 400° to effect in any way the temper of the mildest needle steel, and, consequently, if in "scouring," needles could be kept under, say, 300°, they would leave the scouring mill with the temper exactly as it left the tempering shop.

Earths and Alkalies Used in Pottery, etc.

Terra di Sienna: deep brown or coffee color, fine, compact, very light, very smooth and glossy, does not color the hands; when wetted, marks a fine yellow upon paper; burns to a pale brownish red color, but does not harden; comes from Italy, and an inferior sort from Wycombe.

Burnt *terra di sienna* is used as a paint.

London blue clay: dark blueish; used for luting vessels in distilling acids, but requires another luting over it to keep it moist and to prevent its cracking; it is also used for pottery, for lining ponds, and for modeling.

Devonshire blue clay is fat, tough, makes white solid pottery, but is expensive.

Devonshire black clay makes cream ware.

Devonshire cracking clay is gray, burns to a beautiful white, but is apt to crack in the firing. Common clay, used for artificial stones, as bricks, etc., and common pottery.

Fuller's earth is grayish brown, but varies greatly; hard, very compact, rough, but scraping glossy, does not color, burns hard and yellowish brown, being very fine, and absorbs grease very readily; used to full woolens.

Rotten stone is ash brown, very light, moderately hard, dry, coloring, burns to a deep ash color, but not harder; used as a color, and to give a polishing powder for metals; is to be found in Derbyshire.

Umber is fine, pale brown, close, very light, dry, coloring, burns deep reddish brown, but no harder; used as a color, and to give porcelain the shining ground called *écaille;* comes from Turkey.

Burnt umber is used for paint, makes a good shade for gold; both these umbers are excellent shades or dead colors, having a good body.

Windsor loam, Hedgerly loam, is yellowish brown, very hard, heavy, harsh, coloring slightly, burns very hard, and to a fine deep red; used for setting bricks of wind furnaces, glasshouse furnaces, also for luting, and coating glass and earthen vessels to be exposed to a strong fire.

Bath bricks from Windsor loam made into bricks; used for a coarse polishing powder.

Founder's clay or penny earth is dusky brown, very hard, heavy, harsh, not coloring; found at Woolwich and in Northamptonshire; used for molds in large foundries.

Cheam clay is of light ash color, nearly white and very hard; used for the body of glazed gallypots.

Bohemian tripoli is of light ash color, heavy, moderately hard, open, harsh, dusty, but not coloring, not altered by burning; used for polishing and plate powder.

Terre verte is deep blueish green, very heavy, hard, smooth, glossy, not coloring, but marking a green line, taste coppery, burns very hard and to a dusky brown; found near Rome, also near Woolwich; used as a lasting, but not bright, green paint.

Argile de Saveigne is blue, very tough, sandy; used to make the French pottery *degrês* or stoneware.

Argile des Forges-les-eaux is blue; used to make glasshouse pots and stoneware.

Welsh clay: used to make Welsh fire clumps for building the fire rooms of steam engine furnaces.

French chalk is greenish, semi-transparent, compact, smooth, unctuous, glossy, not coloring, scrapes white, marks an unctuous silvery line, burns very hard and white; used to mark cloth, to take out grease, and cause boots to slip on easily; it is frequently confounded with Spanish chalk.

Myrsen meerschaum is pale grayish green, resembling tallow dropped upon brass, close, heavy, smooth, unctuous, glossy, not coloring, burning extremely hard and pale white; used as soap, and to make the large German tobacco pipes, or rather the bowls of them.—*Professor Dembinsky, in Mechanics' Magazine.*

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THE UNITED STATES STORM SIGNAL SERVICE WEATHER CHARTS AND REPORTS.

Many were inclined to regard the establishment of the Storm Signal Service as an unnecessary and useless measure. It was imperfectly comprehended how it could be of any service to the country at large. That telegraphic messages could travel faster than thieves, had been fully demonstrated. That they could also travel faster than storms, was generally believed; but storms were generally supposed to be so erratic in their movements, that people were slow to believe that a report of a storm raging at Leavenworth, Kansas, could be of any practical benefit to New York; or that the knowledge of the state of the weather in Maine could be of any service to the inhabitants of Florida.

STORM MAP.

The reports are, however, daily demonstrating their value. The usual courses of storms are becoming better and better defined; their average rates of progress are now practically determined; and the predictions based upon the study of the daily weather charts are generally correct. The weather reports now form one of the most interesting and valuable features of the daily newspapers, and are looked for with eagerness by all classes of intelligent readers.

As an instance of the practical value of these reports, which, however, hardly needs any further testimony, we may cite the following from the *Carson* (Nevada) *Register*. That journal says, "on the 19th of April, a terrific storm originated in the Rocky Mountains, starting southward; but on reaching Corinne, Utah, it turned eastward. Its course, as it varied, was reported by telegraph all over the country. The signal stations on telegraph lines are all furnished with the weather instruments heretofore alluded to, so that when the storm raged north of Corinne, and was reported by telegraph at Omaha, the report was sent no further, as the instrument at that point gave no sign of its approach. The moment it turned east from Utah, the barometer at Omaha told, more surely than the telegraph, that the storm was coming, and it was telegraphed on to the lakes, where the shipping was put in readiness to receive it forty-eight hours before it arrived. Thus did this admirable system save life and property by its timely warning."

For the benefit of our readers who are not fully acquainted with the method of constructing the weather charts, we append an engraving of a portion of the chart for April 1, 1871, as made out from the reports, at 7.35 A. M., in the War Department at Washington, and for which we are indebted to Dr. J. Mauran, of this city. These reports are transmitted over the wires of the Franklin and Western Union Telegraph Companies. Around such stations as report "clear," an open circle is printed, upon a map previously printed upon tissue paper. If the station report "fair," a ring with a transverse bar is used to indicate it. "Cloudy" is indicated by a black circle. "Rain" by a white circle, with the letter R within the circumference. "Snow" by a white circle containing the letter S. An arrow crossing the circle indicates the direction of the wind, its head pointing in the direction toward which the wind is blowing, at the time the report is telegraphed to the department.

Figures are also printed at the respective stations, the first group in order showing the temperature of the air in degrees Fah., the second group showing the hight of the barometrical column, in inches and hundredths of an inch, and the third group indicating the velocity of the wind in miles per hour. The absence of the arrow indicates "calm."

The maps are drawn to scale, and by use of transfer paper, a large number of charts may be simultaneously prepared.

We have indicated only a portion of the stations from which daily reports are received, but have given a sufficient number to explain the method.

One of the most important stations from which reports are sent to the Department, is that on Mount Washington. Three reports are sent daily from this station, to the War Department, and three made for the use of the Smithsonian Institute, the latter, however, being transmitted monthly. Only one of these daily reports is published in the public prints.

A correspondent of the Boston *Journal*, who has visited the station, and investigated its workings, speaks of the value of the observations, as follows:

"The general newspaper reader finds, perhaps, the most interest in the figures relating to the temperature and to the velocity of the wind, the state of the elements in this exposed position often producing most remarkable results in those connections, such as are never reached upon a lower plane.

"To the purely scientific mind, however, other observations, more especially those relating to the humidity of the atmosphere, and to the barometrical changes, are of far greater value, although the reports of temperature and wind velocity also possess a certain importance beyond their mere phenomenal nature. The hygrometer is perhaps less understood by the mass of the public than any other meteorological instrument, yet it is destined to be of the greatest general use. By showing the relative amount of moisture in the atmosphere, the probabilities of rain are denoted, and in connection with the hygrometric observations, the barometric variations, which are governed by well ascertained natural laws, become of value in determining the approach of storms. The figures in the daily reports concerning the humidity of the atmosphere, express the ratio which the amount of vapor actually present in the air bears to the amount which the air would contain if it were saturated, the point of saturation, when the atmosphere can no longer sustain the moisture, being taken in all observations as 100. Thus, when a high percentage of moisture is indicated, reference being had to the previous condition of the atmosphere, and to the hight of the barometer, the probabilities of rain or snow are surely estimated.

"The correct result is obtained by noting the difference of temperature between the dry bulb and wet bulb thermometers, which are hung side by side, and applying simple tables of calculation. The hygrometer, when used understandingly, could be made of daily practical benefit to ninety-nine persons out of a hundred—to all, in fact, whose business or pleasure depend in any measure on the state of the weather.

"The Mount Washington observations, during the past winter, have established the fact that periods of cold and storm are indicated, at this altitude, hours in advance of their arrival at the lower plane. They are regarded with great importance by the Signal Service Department, although in the daily predictions through the press direct reference may not be made to them. A series of observations, extending for several years, in connection with other similar observations at other elevated points, may be necessary to establish their true value, but that they have already an important bearing is clearly shown."

Portland Cement.

At a recent meeting of the London Institution of Civil Engineers, Mr. John Grant read a paper on the above subject, in which he observed that concrete made of broken stone or broken pottery was much stronger than that made of gravel, due, no doubt, partly to the greater proportion of cement absorbed in the latter case, in cementing the finer particles of sand, and partly to the want of angularity in the gravel. Compression and an increase in the proportion of cement alike increased strength. In making concrete bricks of moderate size, compression might be applied with advantage; but with large masses of concrete, it would be difficult to do so, without running the risk of interrupting the process of crystallization or setting, which commenced immediately on the application of moisture. The cost of labor so applied would therefore be better employed in a larger admixture of cement.

The different modes of using Portland cement in the construction of sewers were described; in some cases only as a foundation or as a backing for brickwork; in others sewers, 4 feet 6 inches by 3 feet of concrete, were lined with half brickwork; and in other instances sewers were formed entirely of concrete, in the proportions of one of cement to six of sand. The cost of this concrete was less than half that of brickwork, but, if rendered inside with cement, it was about the same as if lined with half brick—perhaps the cheapest form of sewer combining strength with soundness. Sewers and culverts of almost any size might be made on this principle. Sewers made of concrete, and not rendered inside, though somewhat cheaper, had one practical disadvantage in busy thoroughfares, inasmuch as they required a long length of centering, on account of the slow setting of the concrete, and it was therefore necessary that about double the length of trench should be open at one time. The cost of a concrete sewer, 4 feet by 2 feet 8 inches was 10s. per lineal foot, exclusive of excavation. Under the same contract, a brick sewer of the same size 9 inches thick, cost 16s. 6d. Another concrete sewer 7 feet 1 inch in diameter, cost 16s., or, inclusive of earthworks, side entrances, junctions, etc., about 23s. per lineal foot. This sewer was in some respects exceptional, inasmuch as it consisted of little more than an arch over a previously existing invert; the lower half was, however, rendered with cement or sand, in equal proportions, one inch thick. Everything being taken into consideration, the most economical combination was 4½ inches of brickwork in cement and the rest in concrete. Another sewer, 9 feet by 9 feet, of concrete, with a lining of 4½ inches brick in cement was mentioned.

In the construction of the Albert or Southern Thames embankment, it was originally intended to form the wall of brickwork, with a granite facing; but after about a fourth part of the work had been executed, 14,335 cubic yards of Portland cement concrete, made in the proportions of six to one, at 11s. per cubic yard, were substituted for an equal quantity of brickwork, at 30s. per cubic yard.

From the experience already gained in the use of Portland cement concrete, there would seem to be hardly any limit to the purposes to which it might be applied. It was gradually being brought into use in the construction of dwelling houses in different parts of the country, and there was no doubt it would be still more extensively employed in the construction of docks, piers, breakwaters, and other massive engineering works.

Many experiments had been made in the manufacture of bricks of different proportions of Portland cement and sand, and these were equal in strength and appearance to most kinds of clay bricks. Where concrete should be used in a mass, it was cheaper than when used in the form of blocks, and still cheaper than in the form of bricks. In 1867, a number of arches were formed with *bétons agglomérés*, by M. Coignet, under the steps leading from Westminster Bridge to the Albert embankment; also about 40 feet of sewer, 4 feet by 2 feet by 8 inches, in the Camberwell road. Similar arches and sewers were constructed of Portland cement concrete, and the general result was that the Portland cement concrete was both stronger and cheaper than the *béton*.

Roman cement, though, from its quick setting property, very valuable for many purposes, deteriorated by exposure to the air before use; and was about double the cost of Portland cement, if measured by strength. In making cement concrete it would from this seem desirable to spend no more time than was absolutely necessary to effect a thorough admixture of the cement with the sand and gravel.

UNDER the name of palm wool, there is collected in Western Australia, a downy substance, which is used for stuffing mattresses. The plant, erroneously called a palm, is a zamia. From the deep cavity formed by the peculiar growth of the axilla of its leaves, which bears, outwardly, a strong resemblance to the shape of the hot-house pine, wool is got in very great quantities, and of a sort so soft and springy, that the beds which are stuffed with it may vie with French mattresses for their comfortable and somniferous qualities, especially if the French custom be likewise pursued, of yearly unpicking the beds, and restoring the elasticity by turning over and separating the wool where it may have become matted by use

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Manufacture and Consumption of Sulphuric Acid in Connecticut.

We had the pleasure of visiting the Bridgeport Copper and Sulphuric Acid Works, near Black Rock, the other day, says the Bridgeport, Conn., *Standard*, and of examining their mode of construction and the process of manufacturing this important article of commerce. The works consist of one large building, containing the furnaces and condensing chamber, another which we will call the refinery, and a third where the steam boiler is located. The first building contains 22 kilns, or furnaces, and an immense lead tank 130 feet long, 30 feet wide, and 23 feet high. The sheet lead of which it is made cost about $13,000.

The materials from which the acid is distilled are sulphuret ores of iron and copper, from Canada. This ore is broken into pieces about the size of stove coal, and thrown into the furnaces, where, with two and a half per cent of the nitrate of soda added, it is roasted, and the sulphur, together with all the volatile substances contained in the ore, is carried through a large pipe into the immense lead tank where dry steam is added, and the vapor is condensed into "chamber acid," having a specific gravity of 44 degrees. From thence it is carried by a pipe, underground, to the refinery, where it is first floated through a series of shallow lead tanks, moderately heated, then passed through a succession of glass retorts, where, by exposure to intense heat, it is brought to the required standard of 66 degrees specific gravity, and is ready for the market.

Not being previously acquainted with the process, we were greatly pleased with its unexpected simplicity. These works are so situated on a side hill that the acid runs down from one building to the other, and clear to the last tank, whence it is run into the carboys, thus dispensing with the necessity of pumping, lifting, or dipping.

Mr. Adams, the President of the Company, informs us that by the use of this ore instead of sulphur, he gains a pecuniary advantage over other manufacturers of the acid. The ore is dug from a mine in Canada, loaded on the cars at the mines, brought down the Connecticut Valley road through Springfield, and, by means of a short side track, into the factory.

It costs $10 a tun, landed here, for tariff and freight, besides the cost of mining, and after being roasted, it is worth about $12 per tun for the copper it contains. The capacity of these works is five tuns of acid per day. Mr. Adams is also the principal owner of three other acid works, one in Boston, one in Quebec, and one in London, Canada, and in those two last named factories nearly all the sulphuric acid used in Canada is manufactured, the whole product of one of them, about four tuns per day, being taken by the kerosene oil makers.

The amount of this acid used in the arts is truly astonishing. One factory in this city consumes from fifteen to eighteen tuns per month, another nearly the same quantity; and if we add what is used by all the iron founderies, the druggists, the manufacturers of phosphates, others, and it is computed that about 1,500 tuns is now used annually in Bridgeport. Waterbury uses about the same quantity. Ansonia about 900 tuns, and 140 tuns daily are used in refining kerosene oil. From these data, some idea may be formed of the immense quantity of sulphuric acid annually required in the whole country.

This company also manufactures that valuable fertilizer known as the superphosphate of lime. It is made of ground bones, phosphate of lime, guano, potash, and soda salts. These articles are thoroughly commingled, and then about one third of their weight of sulphuric acid is added, after which the whole mass is dried, sifted fine, and put into bags for market.

This company was organized in July, 1870, with $85,000 capital. It has ever since, as we are informed, done a lucrative business, and recently increased its capital stock to $125,000, when it commenced the manufacture of superphosphate, as there is said to be a decided advantage in combining the two manufactures.

Kaieteur Waterfall, Demarara.

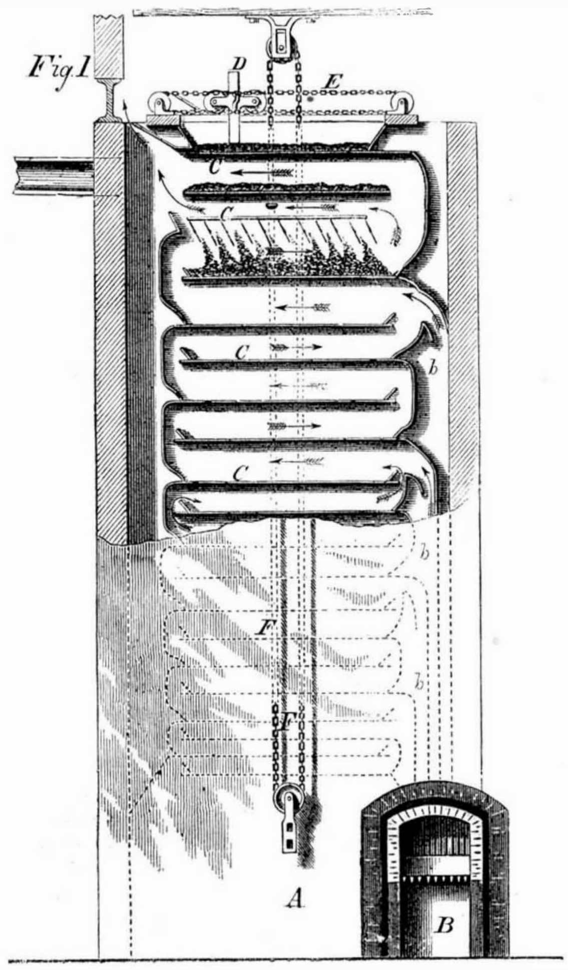
The great Kaieteur fall, recently discovered by Mr. Brown, has a clear descent, according to barometrical observations taken simultaneously by Mr. Brown at the bottom, and by Mr. Mitchell at the top, of 750 feet, Above, the Potaro glides smoothly, in a slight depression of the table of conglomerate sandstone, and disappears over the edge in a body, which is estimated at eighty yards in width, and of depth uncertain in the center, but shallowing rapidly towards either bank. When the fall was discovered in April last, the rocky channel was completely covered, and the stream must have had a width of at least 100 yards. During the summer it diminishes in volume, and, as the Indians state that it continues to do so till October, only the central and deeper portion, about one third of the whole, then remains. The best time, therefore, for a visit, is in the spring, at the end of what appears to be the rainy season of this elevated tract.

As seen by the exploring party who discovered it, nothing can be imagined more beautiful than the fall. The central portion, which is never dry, forms a small horseshoe or reentering angle, and the water in this part preserves its consistency for a short distance from the edge. But everywhere else, and here, also, at a few feet from the top, all semblance of water disappears; it breaks up, or blossoms, into fine foam or spray, which descends in the well known rocket-like forms of the Staubbach, and similar waterfalls, but multiplied a thousand times, into a small dark pool, over a semicircular curtain.

The cavern behind the fall is the home of thousands of swallows, which issue from it in the morning, and may be seen returning in their multitude at night. The fall itself is one vast descending column, of a fine, dry looking, snow white substance, bearing a resemblance in color and consistency to the snow of an avalanche, but surpassing all avalanches in size and in the beauty of the forms taken by the material as it falls. Rainbows of great splendor were observed; one from the front of the fall, in the morning, one from the summit in the afternoon: but this last reverted, from forming a colored loop or ring, into which the whole mass seemed to precipitate itself, and to disappear and dart out underneath, black and foaming, at the gorge and outlet of the pool.—*Nature.*

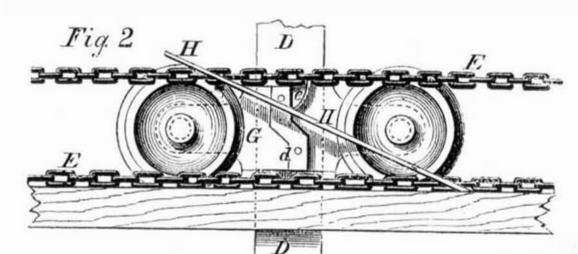
GECMEN'S IMPROVED MALT KILN.

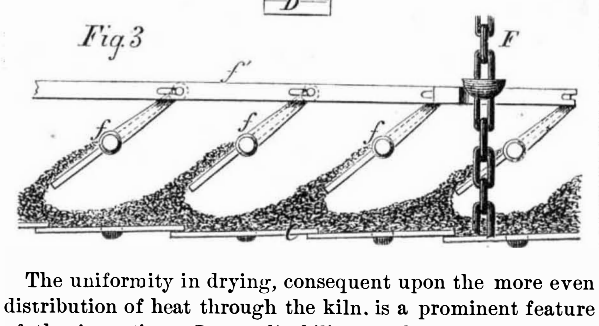
In the manufacture of malt by the old process, there are three things which it is very desirable to obviate, namely, the danger of fire attending the method, the life-killing labor undergone by the men in stirring the malt, and the large extent of flooring required, which, in cities where buildings are expensive and rents are high, becomes a large item of expense to the manufacturer.



The kiln illustrated herewith not only obviates large floors, danger of fire, and the exhausting labor of malting by the old system, but produces a much better and more uniformly dried article of malt, with a large saving of fuel. The crushing of the malt in handling and stepping about over it is entirely obviated, and it is delivered in the best condition for the subsequent processes of crushing and mashing.

To dry 350 bushels of good malt it requires, with this kiln, one man's labor for one hour and a quarter, while with the old kiln, it require the labor of four men for eleven hours.





The uniformity in drying, consequent upon the more even distribution of heat through the kiln, is a prominent feature of the invention. Its applicability to the drying of many other kinds of materials, such as fruits, phosphates, etc., will become apparent from the detailed description, of its parts and operation, which follows. As a grain drier, an Illinois grain merchant attests that he has used it for drying many thousand bushels of grain with the most entire satisfaction, and we are informed that it dries perfectly 1,000 bushels of grain per day when working continuously.

An elevation of the kiln is shown in Fig. 1. The grain or malt to be dried is loaded into a car, D, which is moved by an endless chain, E, on suitable ways, The car is provided with a vertical chute, extending down to three inches from the upper one of a series of horizontal floors subsequently to be described. The grain passing through the chute is by this means distributed evenly over the upper floor to a depth of three inches.

The floors, C, are made of iron slats; in fact, the entire kiln contains nothing but iron and brickwork. The slats constituting the respective floors are connected by a bar or rod, like ordinary blind slats, and they mutually overlap enough to make the floor continuous when closed. The entire series of slat floors is worked by an endless chain, F, in such a manner that they are dumped and closed again, one after the other, from bottom to top, and from top to bottom again, the slats of each floor turning in opposite direction to that of the slats of the preceding one, so that whenever one floor is opened, the next below is closed to receive the grain or malt which is dumped upon it. The dumping mechanism is more fully shown in Fig. 2, where *f* is the slat rod, F, the dumping chain, and C, the slats constituting the floors.

The heated gases of combustion (anthracite fuel being used) are led along over and under the floors, as indicated by the arrows; but as they become charged with moisture, additional increments of dry heat direct from the furnace are admitted through flues, *b*, the number of such admissions being adjusted to the number of flues in the kiln, but being generally four or more.

To operate the kiln, the upper floor is charged by the car The chain, with the dog, on running up, turns each floor from the bottom upward, and, consequently, discharges the upper floor load, and loads the second below. The loaded car distributes the malt over the upper floor as it passes along; and the chain, running up, discharges the contents of the second floor on to the third. The second floor being now empty, the chain discharges the contents of the first floor on to the second, and then passes on, and so on until all but the lower three floors are loaded. The malt then remains undisturbed for three or four hours, to dry, after which the chain runs through once, dumping the malt from one floor to the other, successively, turning it over at the same time. As it reaches the two last floors the malt is allowed to remain undisturbed for three or four hours, when it is finally discharged perfectly dry.

The kilns might be worked continuously, could the grain be grown on the growing floors fast enough to supply them. To facilitate the growing, the manufacturers of the kilns have patented and manufactured an apparatus, working on the same general principle as the kiln with slat floors, dumping in a similar manner, which saves a large area of flooring

In drying grain, all the floors are first filled, and then the kiln is worked continuously, the lower floor being dumped as often as the upper one is filled.

Small sizes of those kilns, for farmers' use, are made, whereby farmers may dry their own grain, thereby preventing mould and growing of damp grain, and often saving much loss.

We are told that grain can be dried upon this kiln for seed as well as for exportation.

A kiln for grain is working in August Schiffer's grain drying establishment at Monee, Ill. One for malt is running at John A. Boppe's Brewery, Newark, N. J. Another has just been erected at J. F. Barklay's Mill, 99 and 100 North Moore street, New York. Those interested may inspect its working at either of the places named. The invention is covered by two patents, March 13, and Nov. 13, 1866. Small portable kilns are made on the same plan, for various drying purposes. Manufactured by the Holske Machine Company, 528 Water street, New York, whom address for further information.

Co-operative Butter Making.

We have investigated and watched the system of co-operative butter making with a great deal of interest, and in every instance, so far as we know, it has proven eminently successful. There are, however, sundry difficulties to be overcome in some districts. As yet no really practicable method of determining the relative value of milk has been hit upon, and in nearly every community there are more or less careless feeders. Both quality and quantity of butter are affected by this circumstance, much more sensibly than is the case with cheese. The profitable disposal of the skimmed milk is a matter of serious import. Near large cities having a large foreign population, a considerable sale of skimmed milk may, by proper effort, be established; but as yet the greater proportion of it has been worked up into skimmed cheese, for which there is but a limited demand; indeed the present supply is believed to be quite sufficient to meet the demand at profitable rates.

The butter factory at Elgin, Illinois, made sales of unpressed curds last season to parties in Chicago, who were experimenting upon their use in the arts, but with what special application, or to what extent successfully, we are not informed. All things considered, there seems but one course to be pursued with the article, and that is to carry it back to the farm, and feed it out to calves or pigs. And to the farmer who is not wedded to the absurd theory that he may carry off his crops indefinitely without making any restitution, this ought not to afford any discouragement, for we know from actual experiment that veal or young beef or pork may be profitably made from skimmed milk and grain, while a very considerable amount of manure may be produced for an increased production of butter, veal, and pork next year, a result even more desirable ultimately than any mere increase of cash income.—*O. H. Bliss, Georgia, Vt.*

IT frequently happens that painters splash plate, or other glass windows when they are painting the sills. When this is the case, melt some soda in very hot water and wash them with it, using a soft flannel. It will entirely remove paint.

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Correspondence.

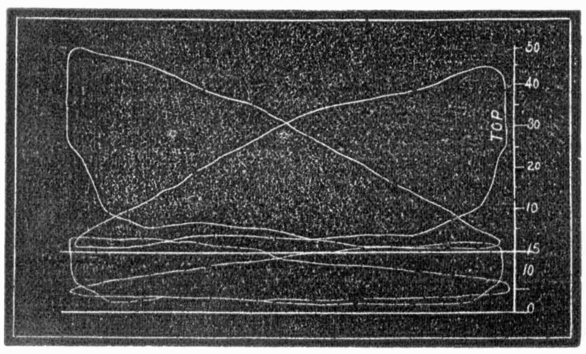
The Editors are not responsible for the opinions expressed by their Correspondents.

Compound Engines.

MESSRS. EDITORS:—So far as I have seen, none of the writers on the subject of compound engines in this country seem to have had opportunities of applying tests of their efficiency when in actual work; and having had some experience with this class of engine, and opportunities of applying the usual tests, I propose to lay before you some of the results thereof.

The steamship *Magellan* runs between Liverpool and Valparaiso, touching at Rio and Montevideo. She is 334 feet long, and 41 feet beam on the water line, with a mean draft of water amidships, of 19 feet. The engine is of Randolph and Elder's patent, and is arranged with the two cylinders standing over the cranks, which are at right angles to each other, the general appearance being that of the ordinary double engine, with inverted overhead cylinders. There are three boilers, having cylindric shells of $\frac{3}{4}''$ iron, 11 feet diameter, with two furnaces at each end, the aggregate grate surface being 275 square feet.

The steam is thoroughly dried or superheated to a small amount, and passes to the first valve chest, and through the small cylinder, which is 60 inches diameter; it then exhausts into a belt surrounding the small cylinder, which, with the second valve chest, makes a reservoir for the second cylinder. 96 inches diameter, to draw from, and also preserves the symmetrical appearance of the engine, as the small cylinder with its belt is of the same external diameter as the large one. Between this belt and the small cylinder is the hot steam jacket, filled with steam of the boiler pressure; the large cylinder is not jacketed, as the loss of heat to the cooler steam in that cylinder would more than compensate for its advantages.



After finishing its work in the large cylinder, the steam passes to the condenser in the usual way. The stroke of the pistons is 3 feet 9 inches; diameter of piston rods, 6 inches; and pitch of screw 25 feet, with a diameter of 17 feet.

The accompanying figure is the diagram taken from the two cylinders, having the atmospheric line marked 15 common to both parts; and is an average for the 24 hours. The boiler pressure is 54 pounds; the vacuum 27 inches; revolutions, 56 per minute; coal burned per hour 33 cwt., or 3,696 pounds; mean unbalanced pressure on piston, 23·8 pounds per square inch; area of piston minus half its rod, 2,813 square inches. Then $\frac{23{\cdot}8 \times 2813 \times 7{\cdot}5 \times 56}{33000} = 852{\cdot}5$ I.H.P. for the small cylinder. Then in the large cylinder we have mean pressure 10·17 pounds per square inch. Area of piston, minus half its rod, 7224: then $\frac{10{\cdot}17 \times 7224 \times 7{\cdot}5 \times 56}{33000} = 935$ I.H. P and $935 + 852{\cdot}5 = 1787{\cdot}5$, total I.H.P. So $\frac{3696}{1787{\cdot}5} = 2{\cdot}07$ poundscoal. per hour per I.H.P. which is a very good result, so far as indicated power is concerned.

It will be seen by examining the steam and expansion lines of the high pressure diagram, that the steam is wire drawn, and is cut off at about half the stroke, which condtions correspond with those in the average of the sea going engines; and if we were to exhaust this small cylinder direct to the condenser, we would expect to get a back pressure line corresponding with that shown for the low pressure cylinder. Considering that as done, and measuring our card, from the steam line of the high pressure to the back pressure line of the low pressure cylinder, we get a mean balanced pressure of 40 pounds per square inch; and $\frac{40 \times 2813 \times 7{\cdot}5 \times 56}{33000} = 1431{\cdot}5$, I.H.P. obtained from the small cylinder alone; and $1787{\cdot}5 - 1431{\cdot}5 = 356$ I. H. P., gain by the addition of the large cylinder.

In regard to the gain in actual power as applied to the cranks, there must be made a deduction for the friction of the pistons, rods, and valve gearing; and if we assume 1 pound per square inch to be the pressure required to overcome this, we must deduct 35·8 H. P. for the small cylinder, and 91·9 for the large; total, 127·7 H. P. Thus, $1787{\cdot}5 - 127{\cdot}7 = 1659{\cdot}8$, the H. P. obtained from both cylinders. In case the small cylinder alone is used, we have $1431{\cdot}5 - 35{\cdot}8 = 1395{\cdot}7$ H.P. These results appear to be comparable, as the friction due to the load varies as that load, being a certain percentage of it; and so we have $1659{\cdot}8 - 1395{\cdot}7 = 264{\cdot}1$ H.P., equal to 19 per cent gain by the addition of the large cylinder. This is not so great a gain as has been often claimed for these engines in this country, and it must be borne in mind that these engines are from one of the best shops in Scotland, where special attention has been given to their production; and when the estimate for economy of coal is considered, that in this case we were using the best Cardiff coal, which is far superior to anything we have in this country that is used at sea. WM H. HARRISON.

Boston, Mass.

Motive Power for Farmers, etc.

MESSRS. EDITORS:—We have been so much impressed with the truthfulness of the article, "What Women Want," in your issue of May 6, that we cannot help telling "Betsy" how much we have felt the force of her clear, sharp article.

Many times we have noticed that "dumb pathetic patience with which the household workers toil and wear out." Our "better half" does her own housework, but with the assistance of sewing machines, washing machines, and all machines that can aid, and some that do not, that we know of, housework is still a never ending and never completed task; and, as far as we at present see, without a remedy.

Now, if "Betsy" could arrange the details (and we feel sure she could), we think the power hinted at might easily be made forthcoming, from that same restless wind that old dame Nature has furnished so bountifully.

For the last ten years we have been carrying on a manufacturing business, with no other power but those of hand and foot. In building anew, after the Medina conflagration last year, we put into execution a long cherished hobby of ours. A seventeen feet modern windmill (Continental Windmill Co. make) was placed on a tower twenty-five feet above our building, to the great astonishment, alarm, and, in some cases, bitter remonstrance, of people in this vicinity, that we should waste so much money ($500) on so foolish a project, that was old and exploded and sure to fail. Well, Messrs. Editors, that same windmill runs (almost every day in the week) three rolling mills, two polishing lathes, ten emery machines, three turning lathes, small buzz saw, blower, machine for washing finished work, and drills an artesian well (another hobby of ours); and, in short, does everything we ever gave it a chance to do, and has never cost twenty-five cents for repairs.

Of course, we have occasionally a day when it will not run, but it is seldom: and, on the other hand, the mill is always ready, so much so that we often start it to grind a tool or to polish a single ring. It starts in a second, be it day or night, and costs nothing, unless it be for oil.

Why are they not used more, and what more can farmers want in the way of a motive power? The motion is perhaps too unsteady for many purposes, but answers for our use admirably.

Before closing, we feel that we must give the old SCIENTIFIC AMERICAN its due as follows: we get our power from the perpendicular shaft by a quarter twist belt, and to remedy the difficulty (discussed last winter), we thought of a perpendicular shaft as an "idler pulley" to keep the belt upon the slack side. Then "Young Mechanic" gave us his plan, namely, twisting one side of the belt.

It was nearly nine o'clock, one Saturday night, when we read it, but down went our paper, and up went we to the belt, and in two minutes more it went "one side out and then t'other," and the money we saved in those two minutes we are going to send for the SCIENTIFIC AMERICAN.

Medina, Ohio. NOVICE.

Potato Diggers.

MESSRS. EDITORS:—The articles upon potato digging machines, in late numbers of the SCIENTIFIC AMERICAN, found your humble servant employed in planting several acres of the tubers. Having had considerable experience in the arduous work of both planting and digging, and having given the subject some thought, I wish to give a few hints to the inventors who are experimenting upon machines to accomplish the task.

The successful potato digger must raise the potatoes from the ground, detach them from the vines, weeds, stones, and dirt, and deposit them in a proper receptacle.

The first operation for the machine to perform is to get the potatoes from the ground. Potatoes are generally planted in hills, about two or two and one half feet apart, each way. In commencing to dig a row of potatoes, we have before us a series of hills or clusters, with accompanying vines, etc., occupying about a square foot of space. Between each hill are weeds and stones.

In digging by hand, we devote our strength exclusively to the hill; while the machine is so constructed as to tear through not only the hill, but through the intervening spaces, containing weeds and stones. It must be evident that a great deal of power is wasted by this method, and an unnecessary amount of weeds and stones is taken up by the machine.

A machine that would uproot each hill separately, and detach the vines, could be made very light, and easy to manage. To use such a machine, it would be necessary to plant the hills with precision. This, I think, could also be accomplished by machinery. Potato planters are known at present only as failures. The seed, when prepared for the ground, is a very irregular mass—whole potatoes of various sizes halves, quarters, etc. The machines heretofore invented are intended to get the seed out at the bottom of the receptacle, and it clogs very easily. The seed must be taken from the top of the receptacle, I think; a very simple movement could accomplish this.

Another obstacle to be overcome in potato planting and digging machinery, is the weight of the potato itself. One bushel weighs sixty-five pounds, and but very few bushels can be carried on the machine. If a digger could be constructed which would put about one hundred pounds in a bag and leave it to be taken up by a wagon, it would approach as near perfection as possible.

Harvesting potatoes is now the most laborious operation on the farm, and every intelligent farmer would hail the introduction of a successful potato digger or planter with as much delight as he now does the mowing machine or horse pitchfork. I trust you will excuse me for occupying so much of your time with my crude ideas But the many backaches I have endured while harvesting potatoes, make me very anxious that the potato digger shall not be written down a failure. J. H. M.

Traction Engine.

MESSRS. EDITORS:—In your article entitled "Traction Engine," in your issue of April 29, 1871, your writer cannot certainly understand the principles of the working of the road steamer, *G. H. Craft*, of our city, or he would not have claimed that surmounting an obstruction, on an inclination of one in four, would give the machine the power to go further up of itself. Such a road steamer would too much resemble that "marvelous duck." I have carefully watched the development of this traction engine, and think it has some merit; but, after close observation, think with you that the power exerted in mounting an obstruction is lost, and cannot be saved in any part after it has been used for that purpose. In the performance of this road steamer there is but little shock, arising from the fact that the propelling power has a lifting influence on the body of the machine. There are, under the machine, eight pushing legs, hanging at an angle of forty degrees, attached two to each of four slides. These slides are moved backwards and forwards. That they can force the machine further forward, without power being used, is incomprehensible to me.

I believe the device would be a success as a canal boat propeller, although the inventor laughs at the idea; it would be a true steam pushing force, adjusting itself to every inequality, and would propel a canal boat with great economy of power. E. MCKENZIE.

New Albany.

Unsafe Oils Again.

MESSRS. EDITORS:—Can you give any reliable manner of testing kerosene oil, besides the lighting with a match? I have had two explosions in my office of late. I obtained the best oil I could find in the city, but all would light and burn by the application of a match in an open dish. I sent for, and have just received, ten gallons of Pratt's astral oil, which has been highly recommended by you, but I find this oil in the patent can burns just as readily without a wick, and by application of the match, as oils supposed to be far inferior. Now one thing is certain, either the oils are all adulterated, or this is not a sure test.

Please give us light on the subject (without explosion) if possible. G. W. FORD.

Rockford, Ill.

[There is a great want for a simple and reliable oil-testing apparatus that can be used with care and certainty by consumers. The match test is undoubtedly an indication of an unsafe oil, when the oil ignites as our correspondent describes; but an oil may not ignite in the manner specified and still be unsafe. We have given from time to time methods of testing oils, but most of them are not suited to the wants of consumers. The best is, probably, to place the oil in a small tin vessel, and float this on a bath of water heated to about 115° Fah. If the oil will generate, at 110°, a gas that will flash, we consider it an unsafe oil to use in lamps.—EDS.

Explosion of an Emery Wheel.

MESSRS. EDITORS:—On the 17th of May, 1870, a young man, James Licke, was killed instantly, at the works of Messrs. Dodge, Kimball & Austin, at Kalamazoo, Mich., by the bursting of a Tanite emery wheel.

The wheel was 16 inches diameter, $1\frac{1}{2}$ inch face, making 2,615 revolutions per minute, which is 1,265 revolutions faster than the circular calls for. The wheel was held in the mandrel by 9-inch cast iron collars, with faces perfectly true, and bearing on the wheel with the whole surface. The wheel was perfectly balanced, being used to grind the edge on steel plows, in a way to form a lever on the wheel.

Mr. G. Dodge, of the firm, claims that if the foreman had put leather between the collars and the wheel, the wheel would not have burst. The foreman answered to his recommendation to reduce the speed to 1,350 revolutions, "we won't do it just now." He told him then, if anything should happen he should not blame him for it, and Mr. G. Dodge answered that he would risk it. Two days after the man was killed. The wheel ran about 15 minutes, and the moment the work was put to it, it burst to pieces.

Please give your opinion whether the leather between the collars would have made the wheel stronger or not?

Kalamazoo, Mich. G. J. BREMER.

[We do not think it would.—EDS.

No Life Without Phosphorus.

Dr. Frankland has been making some experiments upon the development of fungus growth in potable water; and, as a result of his labors, arrives at the following conclusions:

"1. Potable waters mixed with sewage, urine, albumen, and certain other matters, or brought into contact with animal charcoal, subsequently develop fungoid growths, and other organisms, when small quantities of sugar are dissolved in them, and they are exposed to a summer temperature.

"2. The germs of these organisms are present in the atmosphere, and every water contains them after momentary contact with the air.

"3. The development of these germs cannot take place without the presence of phosphoric acid, or a phosphate, or phosphorus in some form of combination. Water, however much contaminated, if free from phosphorus, does not produce them. A German philosopher has said, 'without phosphorus, no thought,' which may now be changed to 'without phosphorus, no life.'"

DR. JOHNSON says: "The chains of habit are generally too small to be felt till they are too strong to be broken."

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FLYING SPIDERS.

[By J. H. Emerton, in the American Naturalist.]

One of the most curious habits of spiders is that of flying, as it is often called. This has no resemblance to the flight of birds or butterflies, for spiders have no wings nor any organs that could answer the purpose of wings. Their ability to rise in the atmosphere depends entirely upon currents of air acting upon their bodies, or upon threads of cobwebs attached to them. By this means they are blown about like the down of thistles or any light objects, rising sometimes to a great hight, and again, upon a change of weather, falling, often far from the place whence they rose.

In the autumn of 1870 I received a letter from an officer on one of the United States vessels, in which he stated that one day while at anchor near Montevideo, after a strong wind, the rigging was filled with cobwebs, and little spiders dropped down on all parts of the deck.

Mr. Darwin, when in the same region during the voyage of the Beagle, several times noticed the same occurrence.

In Temple's Travels in Peru it is mentioned that, when sailing up the river Plate, "the rigging of the ship, from top to bottom, was literally covered with long, fine cobwebs that had been blown off the shore, having attached to them their insect manufacturers, who dispersed themselves in thousands over the deck."

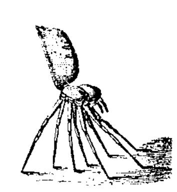
Such showers of cobwebs are common in Europe, especially in the autumn. They are said to be usually preceded by a great quantity of web on the ground, which afterwards rises, and when the wind changes, or the sun begins to go down, falls again.

Mr. Blackwall, who has devoted many years to the study of English spiders, gives the following interesting account of one of these showers of gossamer:

"A little before noon on the 1st of October, 1826, which was a remarkably calm, sunny day, the thermometer in the shade ranging from 55° to 64°, I observed that the fields and hedges in the neighborhood of Manchester were covered over, by the united labors of a multitude of spiders, with a profusion of fine glossy lines, intersecting one another at every angle, and forming a confused kind of network. So extremely numerous are these slender filaments, that in walking across a small pasture, my feet and ankles were thickly coated with them. It was evident, however, notwithstanding their great abundance, that they must have been produced in a very short space of time, as early in the morning they were not sufficiently conspicuous to attract my notice, and on the 30th of September they could not have existed at all; for, on referring to my meteorological journal, I find that a strong gale from the south prevailed during the greater part of the day. A circumstance so extraordinary could not fail to excite curiosity; but what more particularly arrested my attention was the ascent of an amazing quantity of webs of an irregular, complicated structure, resembling raveled silk of the finest quality and clearest white. They were of various shapes and dimensions, some of the longest measuring upwards of five feet in length and several inches in breadth in the widest part; while others are almost as broad as long, presenting an area of a few square inches only. These webs, it was quickly perceived, were not formed in the air, as is generally believed, but at the earth's surface. The lines of which they were composed, being brought into contact by the mechanical action of gentle airs, adhered together till, by continual additions, they were accumulated into flakes or masses of considerable magnitude, on which the ascending current, occasioned by the rarefaction of the air contiguous to the heated ground, acted with so much force as to separate them from the objects to which they were attached, raising them into the atmosphere to a perpendicular hight of at least several hundred feet. I collected a number of these webs about midday, as they rose, and again in the afternoon, when the upward current had ceased to support them, and they were falling; but scarcely one in twenty contained a spider, though on minute inspection, I found small winged insects, chiefly aphides, entangled in most of them.

"From contemplating this unusual display of gossamer, my thoughts were naturally directed to the animals which produced it; and the countless myriads in which they swarmed created almost as much surprise as the singular occupation that engrossed them. Apparently actuated by the same impulse, all were intent upon traversing the region of air; accordingly, after gaining the summits of various objects, as blades of grass, stubble, rails, gates, etc., by the slow and laborious process of climbing, they raised themselves still higher by straightening their limbs, and, elevating the abdomen by bringing it from the usual horizontal position into one almost perpendicular, they emitted from their spinning apparatus a small quantity of the glutinous secretion with which they fabricate their silken tissues. This viscid substance being drawn out, by the ascending current of rarefied air, into fine lines several feet in length, was carried upwards, until the spiders, feeling themselves acted upon with sufficient force in that direction, quitted their hold of the objects on which they stood, and commenced their journey by mounting aloft. Whenever the lines became inadequate to the purpose for which they were intended, by adhering to any fixed object, they were immediately detached from the spinners by means of the last pair of legs and became converted into terrestrial gossamer, and the proceeding just described was repeated."

I do not know of any published account of similar flights of cobwebs in this country, but on almost any fine morning in summer, the grass and shrubs may be found covered with threads connecting the extremities of the twigs and leaves in every direction, and floating horizontally from them sometimes to a distance of several yards. I have often seen the short grass in the Salem pasture so covered that every leaf seemed to have several threads passing from it. One morning in June, 1868, I noticed some little spiders, about one tenth of an inch long, rambling about on the top of a low fence, partly shaded by horse chestnuts and apple trees. At intervals they would stop, raise the back part of their bodies, and straighten their legs until they stood on tiptoe in the ridiculous position shown in the figure. After a few seconds, they would retake their customary position and travel on. I went to the same fence and watched them on several successive mornings, and finally saw one, on the edge of the fence cap, raise itself as in the figure, and immediately after a thread extended upward from its spinners. In a few seconds, the thread increased to nearly a yard in length, when spider and all rose slowly upward until the thread became entangled in the branches of an apple tree above, which were already connected together by numerous threads and occupied by several spiders of the same kind. This took place soon after sunrise, on a warm and apparently perfectly calm morning.



At another time, on one of the first warm days in March, I saw a little crab spider running about on the ends of a barberry bush and dropping from twig to twig, until it hung from a projecting branch by a thread of about a foot long. It swung back and forth for some minutes, when a gust of wind blew it away so quickly that I could not follow it with my eyes. It had, however, spun a thread, as it went, which passed from a bush to the juniper about six feet off.

Mr. R. P. Whitfield, of Albany, N. Y., tells me that once when passing through a field of oak stubble on a warm day in autumn, he observed great numbers of threads floating upwards in the air, the lower extremity being attached to the upper ends of the stubble; and on examining some of the stalks, he found numbers of small spiders busily running up and down them. When a suitable place was found, the spider would attach a thread to the upper end of the stalk, and then descend one or two inches and return, allowing the air to carry upward the loose thread. At the same time, it elevated its abdomen, and the current, acting on the loop already formed, drew out the thread from the spinnerets until a sufficient quantity had passed, when it broke off the end attached to the stalk and floated away with the web. In this way, he observed several individuals ascend. At the time there was no perceptible current in the atmosphere except the upward current caused by rarefaction.

Is the Brain the Origin of Thought, Intellect, or Mind?

This is a most interesting question, well worthy the study of the psychologist. There is, indeed, much to prove that it is the origin of the mind, or as some psychologists put it, the brain secretes thought somewhat in the same manner as any gland in the body performs its functions of secretion, regarding the gray cells of the brain in the light of secreting gland cells, their function being to secrete thought. But here a difficulty at once presents itself, namely: whence do they gather or from what element do they eliminate the constituents of thought, so as to produce mind or intellect? For, if the analogy hold good, there must be some element from which these cells gather the constituents of thought. We know, says the London *Medical Press and Circular*, the kidneys eliminate urea from the blood, and the liver, bile; the salivary glands their peculiar secretion, and so of all the glands of the body. But we see that these several secretions and excretions pre-existed in the living blood; it may be in a different form, but, nevertheless, their constituents were there, and were only brought together and eliminated thence by these glands. So, when we say the liver forms bile; the kidneys, urea, etc., we do not mean that they eliminate them from the blood. So, following out the analogy that the brain cells secrete thought, we again put the question: "Whence do they gather the elements of that thought?" Some will at once reply, from the immaterial principle of the mind. This brings us to what we believe is the generally received opinion, namely: that mind is an immaterial principle; but if it be an immaterial principle, how is it that you cannot destroy the brain without destroying the intellect as well? Thus, in apoplexy, or any case where there is an effusion of blood, or other fluid, to any great extent, the individual becomes unconscious. You may object that this is owing to the shock to the animal life, and not specially referable to the brain. Well, we have stronger proofs. Look at a man intoxicated with alcohol. The first effects are to quicken the imagination, and induce a freer flow of thought. As the man takes more he becomes dull and heavy, and if he takes more still he becomes entirely unconscious. He appears to have lost all power of thought and intellect. Does this not show that the alcohol acting on the material brain affects the mind—in the end seeming to destroy it? And that it is the alcohol acting on the brain is proved beyond a doubt, by examining the brain of those poisoned with whisky and brandy, or in the experiments performed on dogs by giving them a couple of drachms of pure alcohol, which kills th m instantaneously, and immediately opening the head and examining the brain. The pure alcohol can be distilled therefrom, showing what an affinity it has for the brain, and how quickly it is absorbed by the stomach. We have a still stronger proof of the brain being the originator of thought, in the pathological condition of softening of that organ, and which, at the same time, also proves the exact part of the brain which is the seat of intellect, comfirming other proofs deduced from experiments made on animals, birds, and reptiles, which it would be quite superfluous to go into.

From these experiments it is clearly shown that the cortical or gray structure on the outside of the brain is the seat of thought. We say, is "the seat of thought," assuming the brain to be so for the present. Well, now pursuing this thread of the subject, we find where softening commences in the central white substance of the cerebrum that the intellect is in no way disturbed at first; but we may have, and if the disease progress to any considerable extent, will have, paralysis—hemiplegia most likely. If the softening proceed downward, and attack the cerebellum and medulla oblongata, the patient may die without his intellect being at all affected; but if the disease proceed upward, and extend to the cortical or gray structure, the intellect becomes very soon engaged. On the other hand, if the disease commence in the cortical portion, the intellect becomes affected at once, prior to any symptoms of paralysis.

When we use the word softening, we mean chronic softening, as contradistinguished from acute inflammatory softening, in which these effects are not so distinct and clear, though they can be perceived by close observation. We have a patient just now in care who, we consider, has chronic softening of the brain, involving principally the cortical portion, and he presents symptoms in accordance with the above. He complains of dull, aching pain in his head, loss of memory, an inability to fix the mind vigorously upon any subject, or to pursue any lengthened train of thought, the intellect becoming, as it were, wearied, and seemingly unable to sustain any great mental exertions. Yet he has no paralysis of either sensation or motion, except some symptoms of amaurosis, indicating involvment of the optic disks. Now, does not all this go to prove that the cortical portion of the brain is the origin of intellect? You may still reply, no; it only proves that the brain cells, being disorganized or destroyed, are no longer capable of performing their function of secreting thought from the immaterial mind, which is there as perfect as ever, and unharmed by disease of the material substance.

If the mind be an immaterial principle, then we may look upon the brain as the medium or instrument through which it is rendered manifest to the external world. This is the view Watson and many others take of it. People also generally regard the mind and soul as identical. If they were, then of course that would settle the question as to the brain being the origin of mind. It could not be, for then it must be the origin of the soul. But that is impossible, as the brain is destroyed at death, but the soul lives on forever. That which is mortal could not be the origin of that which is immortal.

Hydrate of Chloral.

Chloral proper is made by passing dry chlorine gas through pure alcohol, heated with sulphuric acid, the crude chloral that is separated being rectified over lime; the chlorine takes the place of the hydrogen in the alcohol and forms, also, hydrochloric acid; this, by a further decomposition, becomes chloral. It is in this state an oily, colorless liquid, having an odor very much like that of a ripe melon. The hydrate which is ordinarily used is formed by the addition of water, in which the chloral crystallizes in snow-white needles. It is in the mode of administration that the difficulty lies, there being no means of determining what constitutes a proper quantity to take at any given time. When taken into the system, either through the mouth or by injection under the skin, the moment that the chloral comes in contact with the alkali in the blood it decomposes, and forms chloroform; this instantly carbonizes the blood, or in other words, changes the fresh arterial, into dead venous blood, which, spreading throughout the body, slowly dulls the senses and creates a more or less complete anæsthesia. But how is this to be regulated? The exact mode by which chloroform or chloral produces death, is as yet unknown, almost every physician having a special theory on the subject. How, then, is it possible to tell what quantity would produce sleep, and what death? Its effects are very different with different individuals. There are examples where the patient had taken only four grains of the drug, yet death ensued. In other cases, 260 grains have been administered without injurious effect.

A reporter of the New York *Times* lately visited several of the prominent physicians of this city to learn their experiences with the drug. They all testify that its use requires the utmost caution, and some of them are of opinion that its employment is only justifiable in cases of *delirium tremens*.

Our Pins.

There are eight pin factories in the United States, whose annual production is 2,000,000 packs, each pack containing 3,360 pins, a total of 6,720,000,000 pins. One manufacturer's agent in Boston, says the *Bulletin*, sells every six months from 700 to 1,000 cases of pins, each case containing 672,000 pins. The factory he represents turns out eight tons of pins per week. Hair pins are jobbed by the cask. There is but one factory that produces them. It turns out fifty tons per month. The machine that cuts and bends the wire makes 360 hair pins per minute, ready for japanning. Yankee pins are saleable in nearly every city of the world, and the production and consumption increases each year about ten per cent. A very large per centage of the hair pins in general use are imported. The tariff does not protect this item of American industry, hence the public pay for them just about one third more than they are worth. Yankee enterprise is now seeking to develop a more rapid manufacture and a more desirable metal or substance, and in this way successfully compete with foreign makes and cut down the cost.

NINE large cotton mills are planned, or in course of construction, at Fall River. There are already seventeen in full work.

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RUNK'S BELT TIGHTENER.

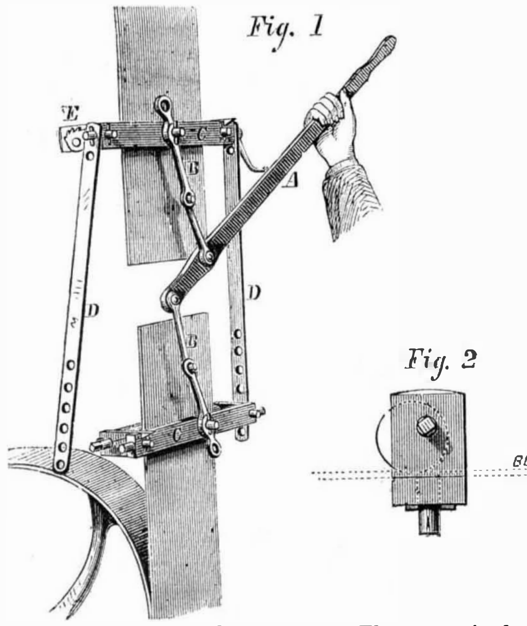
Our engraving shows a new belt tightener, invented and patented by Geo. W. Runk, of Franklin, La., and designed to afford a ready means of stretching and tightening belts, without removing them from the pulleys.

It consists of a double clamp and a tightening device, the parts and operation of which will be understood by reference to the accompanying engraving, in which A represents a lever acting through toggles, B, to draw the clamps, C, towards each other. When they are drawn as nearly together as may be requisite, they are held by the bars or link, D, until the belt is laced or riveted.

The clamping is effected by means of an eccentric roller bar, a end view of which is shown in Fig. 2. This, being turned by a winch and held by a ratchet and pawl, E, clamps the belt between the eccentric and the bent bar on the other side of the belt.

The rollers have pivoted bearings at one end, so that, when it is desired to place the clamps upon the belt, they are swung around on the pivots to allow the belt to be inserted between the flat bar and the eccentric. The eccentric then being turned so as to clamp the belt, the turning of the lever, A, draws the belt tight, so that it can be properly cut and riveted.

Fig. 1 Fig. 2



Patented, through the Scientific American Patent Agency, Jan. 24, 1871, by Geo. W. Runk, whom address for further information, Franklin, La.

Gas Wells in Ohio.

A gas well was recently sunk at Painesville, Ohio, which, according to the *Telegraph* of that place, is quite a marvel. The editor says:

At a depth of 550 feet, a large vein was struck, of such force and power as to stop the work. Indeed there was no occasion for drilling deeper. The volume of gas is so great, it is estimated by good judges, that it would light the entire city of Cleveland. It comes up through the pipe from "the great deep" below with a rush and a roar and a grandeur which one must witness to appreciate. The farm of Mr. Jennings, on which this well is located, is on the east bank of the river, nearly opposite the Geauga furnace, on high ground, and about two miles from the lake shore.

The complete success of this experiment is destined to work an entire revolution in the gas business of Painesville. Citizens in different parts of the town are discussing the project of sinking wells to accommodate several families in the same neighborhood, in all of which cases it is intended to use gas for heating as well as lighting.

For this new "light" in the prosperity of our town and the comfort of our citizens, we are indebted to Gen. Casement. The General had faith that there was as much gas below as above the earth's surface, and the enterprise to bring it to light. All rejoice at his success.

Heating by Water.

"Having to draw up some remarks upon the circulation of water in hot water pipes," says Mr. Alfred Smee, "it occurred to me that the flow and return might be managed by the use of a single pipe, instead of two, as now universally adopted. I directed the experiment to be tried by affixing, to the socket end of a four-inch pipe, an inch supply pipe from an ordinary boiler, and a second pipe communicating with the bottom of the four inch pipe and the bottom of the boiler.

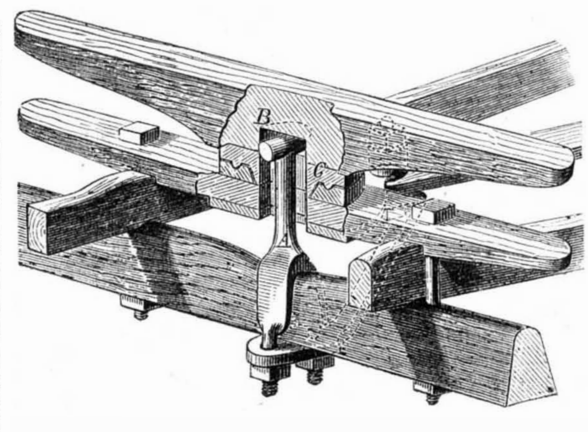
As I expected, the circulation was most perfect and rapid, the hot water flowing along the upper surface of the pipe, and the cold water returning along the lower surface. Two currents in opposite directions were created in the pipe, and the action was so perfect that I ordered, to be fitted up forthwith, a frame, which has been in operation ever since. This mode of heating by a single pipe may be, no doubt, of frequent use, and manifestly, from the simple and portable nature of the apparatus, the arrangement will commend itself to the attention of horticulturists."

THE annual tobacco fair in the State of Virginia will be held this year at Petersburg.

SWARTWOUT'S FRONT RUNNING GEAR FOR WAGONS.

Our engraving is a perspective view of an improved front running gear for wagons, patented through the Scientific American Patent Agency, April 11, 1871, by Lee T. Swartwout, of Locke, N. Y.

The invention is designed to secure greater strength by avoiding perforations, in the axle and bolster, for the passage of the kingbolt.

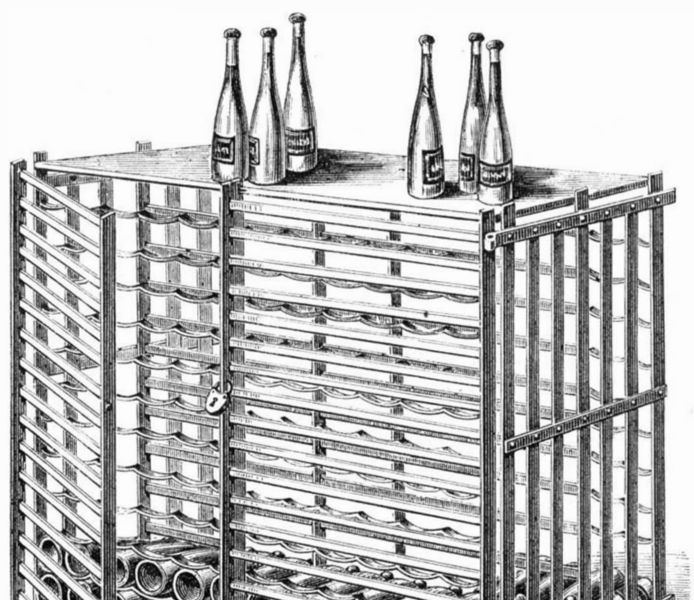


The kingbolt, shown at A, is formed with a clip at its lower end, which embraces the axle. The bolster is recessed at B, as shown, for the reception of the upper end of the kingbolt, which is formed with a T head, as shown. The head is confined in the recess by means of a plate, C, slotted in the direction of the length of the bolster, so that when the bolster is turned across the axle at right angles to it, the head will enter through the slot into the recess; and when the bolster is turned into its proper position, the ends of the T engage the plate. This plate rests upon a suitable plate on the sand board, which forms a seat for it. A boss on its under side enters the lower plate, and forms a long bearing for the kingbolt. The hole in which the boss of the upper plate turns, also admits of putting the plate on the kingbolt over the T head.

The sand board has a slot for the T head to pass through, and on its lower side is attached a plate having a rearward projection for the support of the pivot bolt of the reach. For the support of this bolt at the lower end, the inner end of the clip box, on the bottom of the kingbolt, is extended back, and forms a brace, indicated by dotted lines, which engages the lower end of the pivot bolt. This gives a firm support to the bolt and prevents, to a great extent, vertical oscillation of the axle. Address the patentee for further information.

SUBSTITUTE FOR WINE CELLARS.

Our engraving illustrates an iron wine rack or safe, called by the manufacturers—Hydes & Wigfull, of Sheffield, England—"Peg Wedge Wine Cellar Fittings," on account of the peculiar method of putting them together.



The peg wedges, as they are called, are wedges driven from the inside out through the mortices in the corner posts. They are pegged or riveted to the seats, and the points are bent up on the outside, so that the whole rack is held together in a substantial manner without welding, while, at the same time, it occupies no more space in transportation than is necessary to pack away the straight and bent bars of which it is composed.

The bottles are placed on bent rack bars, as shown, and doors, constructed like the other parts of the safe, give access to the contents, and are fastened by a stout padlock.

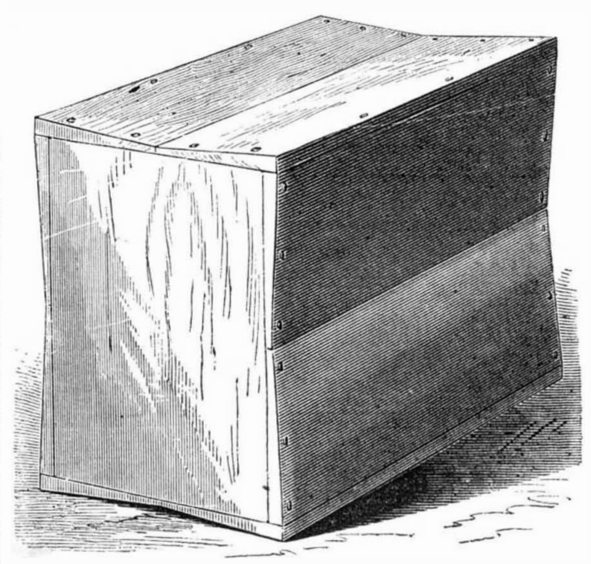
The racks are made of various sizes, to hold from four dozen to fifty dozen, and being constructed of light plates, they are portable, so that they may be readily moved from one part of the cellar to another, or transferred from cellar to attic. Their use entirely dispenses with brick vaults, usual in modern houses for storing wines, and dispenses with wine rooms, which are now necessary adjuncts to our first class hotels.

The English devote a great deal of attention to the manufacture of convenient articles of iron, of which this wine safe is an example. There is no doubt such minor manufactures might be extended in this country with profit. The article illustrated would doubtless, if made light and strong, and put into market here, meet with ready and extensive demand.

PATENT PACKING BOX.

The amount of lumber consumed in the manufacture of packing boxes is enormous; probably more is used for this purpose than almost any other. An improvement by which a large percentage of this can be saved will at once be recognized as important to both box makers and consumers. A large proportion of the boxes used are made from resawn lumber, and in order to get a sufficient thickness of edge to receive the nails without splitting, it has been necessary to use lumber thicker than otherwise required. To obtain half inch or five eighths thickness, one and a quarter and one half inch plank have to be used.

The accompanying illustration shows how the desired



thickness may be had from one inch boards resawn, thus saving from one fourth to one third the lumber.

This style of box is particularly adapted to casing cans of kerosene, sirup, varnishes, etc., not only on account of economy of material (and consequent lightness) but the peculiar outside form of the boxes permits ventilation and free circulation about them when piled up in store, or in shipping. This allows the dampness from imperfectly seasoned lumber to pass off without rusting the cans. These results are obtained by resawing the boards diagonally, making one edge thicker than the other, as required, and placing the thick edges outward to receive the nails. If more than two pieces are required to form the side of a box, the space is to be filled by a third strip, sawn parallel. The illustration shows the method so plainly as to need no further explanation.

When we state that one firm in New York uses over one million cases per annum for two five-gallon cans each, and the saving in lumber in the same is over one million feet, worth $20,000 or more, the importance of this device is apparent.

A patent for this design of packing box was obtained April 11, 1871, through the Scientific American Patent Agency, for A. H. Mershon, East Saginaw, Mich., of whom any further information may be had.

Origin of Vaccination.

It happened that while Jenner was pursuing his professional education with Mr. Ludlow, of Sudbury, a young woman chanced to be in the surgery, and hearing mention made of smallpox, she remarked that she could not take that disease, as she had already had the cow pox. On inquiry, Jenner found it to be a popular notion in the district that those who had once had cow pox were never attacked by smallpox. It appeared that, in Dorsetshire, a pustular eruption, showing itself on the hands of those who milked cows similarly diseased, had already attracted the attention of Sir George Baker; but he, at that time, was in the heat of controversy respecting the endemial colic of Devonshire and did not pursue the subject.

Jenner, in one of his note books, dated 1799, says that he can find no direct allusion to the cow pox disease in any ancient writer, though the following, Jenner thought, bore some relation to it: "When the Duchess of Cleveland was taunted by her companions, Lady Mary Davis and others, that she might soon have to deplore the loss of that beauty which was then her boast, as virulent smallpox was raging in London, she made reply that she had had a disorder which would prevent her from even catching the smallpox."

IT is recommended by a writer to place the legs of work benches in coppersmith shops on india-rubber cushions. It is said to deaden the sound so that occupants underneath such manufacturers are not annoyed by the hammering. The same idea may be practiced in other works.

ENORMOUS flights of wild pigeons are destroying the crops in Nebraska.

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NEW YORK, SATURDAY, MAY 27, 1871.

Contents:

(Illustrated articles are marked with an asterisk.)

Importance of Advertising.

The value of advertising is so well understood by old established business firms, that a hint to them is unnecessary; but to persons establishing a new business, or having for sale a new article, or wishing to sell a patent, or find a manufacturer to work it: upon such a class, we would impress the importance of advertising. The next thing to be considered is the medium through which to do it.

In this matter, discretion is to be used at first; but experience will soon determine that papers or magazines having the largest circulation among the class of persons most likely to be interested in the article for sale, will be the cheapest, and bring the quickest returns. To the manufacturer of all kinds of machinery, and to the venders of any new article in the mechanical line, we believe there is no other source from which the advertiser can get as speedy returns as through the advertising columns of the SCIENTIFIC AMERICAN.

We do not make these suggestions merely to increase our advertising patonage, but to direct persons how to increase their own business.

The SCIENTIFIC AMERICAN has a circulation of from 25,000 to 30,000 copies per week larger than any other paper of its class in the world, and nearly as large as the combined circulation of all the other papers of its kind published.

IMMIGRATION---REPORT OF EDWARD YOUNG, CHIEF OF THE BUREAU OF STATISTICS.

The "Special Report on Immigration," by the Chief of the Bureau of Statistics, has been on our table for some time, but pressure of other matters has, until now, precluded a summary or a review of its contents. The relation which immigration sustains to the future prosperity of the country, and its influence upon the industries of the United States, render the subject of sufficient importance to merit more space than we can assign to it.

The total number of aliens that have been added by immigration to the population of this country since its government was formed, has been nearly eight millions; but the indirect increase by subsequent births has probably been greater.

As regards nationalities, the report of Mr. Young states that more than one half of the above total have been British, or have come from some portion of the British Possessions. Next in number, comprising nearly two thirds of the remainder, is the German element. The Scandinavian element is making considerable accessions to its numbers in the Northwest. The Asiatic element has never yet reached 15,000 for a single year, and of these not more than seven per cent are females. From the latter fact, Mr. Young infers the improbability of any large permanent increase of this element in the United States.

In regard to the industrial value of this immigration, Mr. Young remarks:

"Deducting the women and children, who pursue no occupation, about 46 per cent of the whole immigration have been trained to various pursuits. Nearly half of these are skilled laborers and workmen, who have acquired their trades under the rigorous system which prevails in the Old World, and come here to give us the benefit of their training and skill without repayment of the cost of such education. Nor are the farm laborers and servants destitute of the necessary training to fit them for their several duties, while those classed as common or unskilled laborers are well qualified to perform the labor required, especially in the construction of works of internal improvement. Nearly 10 per cent consists of merchants and traders, who doubtless bring with them considerable capital as well as mercantile experience, while the smaller number of professional men and artists, embracing architects, engineers, inventors, men of thorough training and a high order of talent, contribute to our widely extended community not only material, but artistic, æsthetic, intellectual, and moral wealth."

Sixty per cent of the immigrants are of ages ranging from 15 to 40 years, and less than 15 per cent are over 40 years. Of the Irish immigration, over forty-five per cent are females, but in the aggregate the male immigration largely preponderates.

Mr. Young, in discussing the industrial value of this immigration, makes the following remark: "The son of a rich man, whose rearing and education cost $20,000, if not trained to usefulness, is worth far less to the community than the son of a mechanic of small income, whose whole cost has not exceeded $2,000, if the latter be a well-instructed and skilled artisan." This is a text upon which much might be said, but we leave our readers to draw, from its suggestiveness, such logical conclusions as bear directly upon a social system, "where wealth accumulates, and men decay."

The net immigration for the year ending 1870, and which entered the country with the intention of permanently residing here, was 356,303 persons.

In concluding his report, Mr. Young wisely recommends that the "passenger act" of 1855, be amended, or that other more stringent enactments be framed, which shall protect in greater measure steerage passengers from the discomfort, suffering, and immorality to which they are at present exposed.

STEAM TOWAGE FOR THE ERIE CANAL.

Practically, the prize offered by the New York Legislature is for steam towage, as there does not yet exist even the immediate prospect of an electro motor, or a caloric engine, adapted to supply power for this purpose. Let us consider, then, in the present article, the question of steam towage, pure and simple, as limited by the provisions of the enactment.

The rapid transport of freight depends upon speed as well as capacity. With boats of present capacity and model, three miles per hour is as high a speed as can be practically maintained without injury to the banks. We may set it down, then, that any higher rate of speed must involve either a modification of the form of the boats, or an alteration in the construction of the canal, so that side swells may not act injuriously upon the banks. In regard to the latter, it has been suggested that the lining of the banks with hydraulic cement would render them of sufficient resisting power to protect them from damage by swells. But another point must not be overlooked. The increase of swells by higher speed will lessen the depth of water in the middle of the canal, and if this speed is obtained by means of a stern screw, or paddle wheel, the sterns of large boats would drag, if loaded to their full capacity. To use stern screws or paddle wheels, the canal will either require to be deepened, or the boats must carry lighter loads.

There is no question that the largest boats now employed on the Erie canal, carrying as they do 240 tuns, are out of proportion to the depth and width of the channel. The passage afforded by the cross section of channel is now 70×7, measured on lines of greatest width and depth.

These boats are made just as large as they can be and get through the locks, and they often wedge in entering, absorbing much more time for locking them through than smaller boats, this being a large item in the aggregate of time required to make the passage between Albany and Buffalo. Even if the boat does not wedge, it so nearly fills the lock that it takes a long time to displace the water through the narrow spaces left between the sides of the boat and the sides of the locks. We may, therefore, make a second point, namely, that the size of the boats is out of proportion to the size of the locks, and here is another probable alteration required before the canal can develop its full carrying power, or rather the carrying power desired for it.

The suggestion of rendering the present walls, which line the banks, impermeable by the use of cement, seems to us a good one. If this were done, and the locks enlarged so as to permit the rapid passage of boats through them, the application of steam might result in a rate of 5 or 6 miles per hour, provided the bows of the boats were made sharper, and their lines otherwise altered to adapt them to such a rate of speed, and also such a mode of propulsion adopted, as would not let down the stern and cause the after part of the boats to drag on the bottom.

THE NECESSITIES OF LIFE.

There is, perhaps, no term in general use that conveys a more varied and indefinite meaning than the phrase which heads the present article. To one, it means the simplest food, clothing, and shelter, requisite to keep the vital flame burning; to another, it means unlimited wine, cigars, fast horses, boxes at the opera, etc.; others will fix their standard somewhere between these extremes; but few, very few, form a just estimation of the real material necessities of mankind.

Now, no true comprehension of material wealth can be obtained without first comprehending the real wants of the human family; for material wealth is that which supplies these wants. That which is hurtful to man, or which, being harmless, does not in any way benefit him, is not wealth, in any just sense of the term.

We think that not only those things may be called necessities of life which are required to support existence, but also those which are required to support existence in its highest and best condition, physically, mentally, and morally. Thus not only food and drink are demanded, but the best food and drink—that which enables man to develop and maintain the highest degree of bodily health and vigor for the longest period possible. Books, pictures, statuary, a reasonable amount of ornamentation in dwellings, furniture, and dress, tasteful decoration of public resorts, streets, and private grounds, proper amusements, etc., are also necessities which minister to the well being of body, mind, and morals. And all these are to be good after their kind, for if any are hurtful in their tendency, or incapable of ministering to better living they cannot be classed among real wants; they are superfluities.

Superfluities are, in most census returns and statistics of wealth, classed as real wealth, and we have only to look at any such document, and check off and foot up such items as in the judgment of any candid mind, will be pronounced superfluous, to see that a very large proportion of the world's work is engaged in the production of things that mankind might not only dispense with, without loss of any kind, but many of which might cease to be used, and all mankind be direct or indirect gainers.

A horse is in general an useful animal, and as such is an element of wealth; but when he has acquired the habit of kicking, so that he endangers the lives of all who approach him he becomes a source of direct loss to his owner. The sooner he is converted into such articles of commercial value as modern industry is able to extract from the carcass of a dead horse, the better for all. It matters not whether he can be sold for a money valuation or not; so long as he goes on destroying by his heels more than he earns over and above his keep, he is an unprofitable servant, and not an element of wealth. So explosive oils, used for illumination, which endanger and destroy life and property, are not wealth; they are destroyers of wealth. So alcoholic liquors, used as beverages, and tobacco in all its forms, though they represent a large money value in the industry and commerce of the world, are not wealth; they are destroyers of wealth. Shoes that pinch people's feet out of shape, such as are making the rising generation a race of cripples, are not wealth; they are destroyers of wealth. And so we might go on to show that articles wrested from their proper purpose almost invariably cease to be wealth in the true sense of the term, and almost invariably become the destroyers of wealth. For the material wealth of the human race consists in its ability to enjoy, to the greatest extent, its highest possible good; and only those things which, subtracted, would lessen this ability, are proper to be called wealth.

Were this rule strictly applied, how the aggregate of the world's wealth, as estimated by the statisticians, would be diminished! Were those things, which we would all be the richer for discarding, abandoned forever, how much would the real wealth of the world be swelled by industry turned into beneficial channels! It is a fallacy to suppose that the manufacture of superfluities—that is, things which in no way contribute to the welfare or happiness of mankind, or which diminish it—are to be credited with the benefits of paid employment to those engaged in their production. Who would think of benefiting the paupers of this city by employing them to teach horses to kick? or by paying them wages to dip up water from, and pour it back into, the East river? Money paid for the first labor would be worse than thrown away, and in the last instance they might be fed and clothed more cheaply when doing nothing, than when expending energy in work that benefits nobody. Those who can produce nothing of real value, had better be supported unemployed; and any system of political economy that does not embrace the regulation of industry so as to confine it to the production of real wealth, is radically imperfect.

GRAPE SUGAR.

The manufacture of grape sugar has become one of the most important industries of the country, and it is well to consider some of the improvements that have recently been introduced.

It has been found that the addition of a small quantity of nitric acid greatly facilitates the transformation of the starch into sugar. If, for example, 3,300 pounds of fresh and wet starch are to be converted into sirup, as soon as the sulphuric acid is weighed, add two ounces of concentrated nitric acid for every pound of the sulphuric. For sirup, one pound of sulphuric acid is usually taken for every 110 pounds of starch. We require for 3,300 pounds of starch, 30 pounds sulphuric acid and 4 pounds of nitric acid. The nitric acid is mixed at once with the sulphuric, and the mixture poured into the reducing kettles. After boiling for three quarters of an hour, the iodine test is applied, to see if all the starch is decomposed; and this test is repeated every five minutes, until the entire contents of the boiler are changed to grape sugar. Great importance is attached to making the iodine test. The boiling must be continued until the tincture of iodine is no longer violet or red, but shows the true iodine color. If the boiling be superseded too soon, the sirup has a tendency to ferment; and if it be continued ten or fifteen minutes too long, the sirup crystallizes; and in both cases, the sirup obtained is not easily sold. In order to give the sirup a clear color, after filtering through bone black, it is well to bleach with sulphurous acid, and this acid also prevents fermentation, in case the sirup was not boiled sufficiently long. The sulphurous acid is introduced as follows: After the acids have been neutralized by chalk, and the requisite quantity of bone black has been added, for 3,300 pounds original starch mixture, 15 pounds of an aqueous solution of sulphurous acid is poured in, and the whole well agitated; to assist the escape of the acid fumes, an ounce of crystallized soda, dissolved in a pint of water, is added for every pound of acid.

Where it is desired to make sugar instead of sirup, the proportions of acid to be employed are different, 45 pounds of sulphuric acid and 6 pounds of nitric acid being taken to reduce the 3,300 pounds of starch. Before the use of nitric acid was discovered, the boiling required four hours; it can now be accom-

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plished in less than two hours. After boiling three quarters of an hour, it is well to begin the iodine tests, and after it is ripe for sirup, to continue the operation some time longer, until, on cooling, sugar will readily crystallize. It is one thing to make sirup, and another to produce sugar, the proportions of acid and the time being different in each case.

After shutting off the steam and suspending the boiling, 15 pounds of bone black must be strewn in, and the liquid set to boil for five minutes. It is then ready to run into the neutralizing vats.

After neutralization, 30 pounds of bone black must be added, under constant agitation, and 15 pounds sulphurous acid and one pound crystallized soda, as before, and the whole left 6 to 8 hours to settle. The clear sweet liquid can be introduced into the vacuum apparatus for concentration. It can be boiled down in open vessels by steam, but is not so white and pure as when the vacuum pan is employed. As soon as the sirup shows 36°, it is filtered, and run into suitable crystallizing vessels. On the filter will be collected the gypsum produced by the neutralization; and as it contains considerable sugar, it must be pressed out and washed. In Germany, the filter consists of strong cloth placed inside of a conical basket, fitted to a suitable barrel. The liquid runs through perfectly clear, and requires three or four days for its crystallization; to hasten the crystallization, some farina sugar can be stirred in. When nearly dry, it is poured into boxes of a suitable size for transportation. The solid grape sugar is extensively employed in breweries, in the manufacture of wines, for distillation, and in candy. The price of the sugar is higher than for sirup, and it is not liable to deteriorate, if it be properly prepared.

The form of the boiler has been considerably modified. Instead of performing the reduction by steam under pressure, a coil of copper pipe, in the bottom of the wooden vessels, serves to convey the heat for boiling the mixture. The dilution of the liquid by the condensation of the steam in the vat, and the necessity of boilers that could resist several atmospheres of pressure, are avoided. There is also less liability to explosion. The employment of nitric acid is a new feature, and the use of sulphurous acid, for the double purpose of bleaching the sirup and preventing fermentation, ought not to be overlooked.

Pure starch sirup resembles honey so closely that few could detect any difference. It is fast becoming a substitute for molasses and sirup from cane, and as the syrup resulting from the beet root sugar is only suited to fermentation and the recovery of potash, the starch sirup must fast grow in favor.

Grape sugar can also be made from shavings, rags, saw dust, and any kind of cellulose, but the cheapest material is the starch from corn and grain. To insure a good quality, attention must be paid to removing all traces of the lime and soda used in neutralizing, and to a proper bleaching by bone black and sulphurous acid. With these precautions, and by aid of improved machinery, there is no reason why the industry should not be made a profitable one to all who are disposed to invest in it.

SULPHUR IN LOUISIANA.

Sulphur beds of great extent, remarkable purity, and apparently of immense value, were discovered accidentally, some three years ago, in the parish of Calcasieu, southeastern corner of Louisiana, near the Calcasieu river, a navigable steam emptying into the lake of the same name, which communicates with the gulf; the mines are not far distant from the line of the Chattanooga railroad. The discovery was made during the boring of a well for petroleum. Oil in paying quantities was not found, but something better, in the shape of this sulphur bed. From a recent pamphlet issued by the American Sulphur Mining Company, of New Orleans, we gather the interesting particulars which follow.

This company (having a capital stock of $600,000) and the Calcasieu Sulphur Mining Company are at work in the development of the sulphurous treasures, and the indications are that this country will ere long cease to be an importer and become an exporter of this valuable commodity.

The Louisiana bed, or layer of sulphur, commences at a depth of 428 feet from the surface of the ground, and terminates at 540 feet, the bed having thus a thickness of 112 feet. The proportion of sulphur is 60 per cent at the top of the bed, the proportion increasing rapidly as we descend, being 90 per cent at a depth of 486 feet. The proportion then gradually diminishes.

The sulphur appears in compact and amorphous masses, of a pale color, interspersed, here and there, with yellow crystals. It is surrounded by a calcareous, crystalline matrix, of whitish color, and rather considerable hardness, but which, nevertheless, is easily reduced to powder under the stroke of the hammer. The general analysis of the deposit yields 77 per cent of pure sulphur.

As for the working of the sulphur bed itself, it will not present the slightest difficulty; for the rock, without being too hard to disintegrate, is yet sufficiently compact and resisting to sustain, without any wooden scaffolding or coating, all the galleries to be constructed.

HOW SULPHUR IS MINED IN SICILY.

In Sicily, pre-eminently a sulphur producing country, the art of working mines is yet in its infancy.

The sulphur strata are met at average depths of 120 to 150 feet below the surface, and are reached by means of sloping galleries, supplied with steps dug in the soil itself.

All the mineral extracted by the miners is brought up to light by children from twelve to sixteen years of age. They take upon their shoulders one or two stones, which they bring up with much trouble to the surface, after overcoming untold obstacles in ascending the steps, always roughly made and partly crumbling. Having reached daylight, they lay down their load, and at once descend again to the bottom of the mine to repeat the same operation.

The proportion of sulphur in the mineral is from 20 to 30 per cent, or an average of 25 per cent. Of this 25 per cent, the Sicilians scarcely extract from 10 to 14 per cent of sulphur; for, owing to the lack of fuel, they are compelled to use the sulphur itself to operate the melting; in other words to burn one half in order to melt the other half, obtaining thereby a very impure product, which has to be manipulated again and refined before being delivered for consumption.

Last year, we published in the SCIENTIFIC AMERICAN an account of the sulphur mines of California, at Clear Lake, which are being worked to great advantage, and are capable of more than supplying all the sulphur needed on the Pacific Coast. The Clear Lake mineral contains fifty per cent of pure sulphur. It is, therefore, not so rich as the Louisiana deposits.

COAL TAR PRODUCTS.

Mr. Anthon Pubetz, director of extensive dye works in Bohemia, has published a short review of the preparation and properties of the principal coal tar products, from which we gather some important facts. Among the thirty-five bodies, partly solid, partly liquid, which are found in the tar, only five, namely: benzine, tuluene, naphthalin, carbolic acid, and cresylic acid are of much importance in the arts.

BENZINE.

Benzine is a light, mobile, colorless liquid, very volatile, and possessing, when pure, an agreeable odor. Its specific gravity is 0·85. It freezes at 0° C, and boils at 80° C.; is insoluble in water but soluble in wood spirit, alcohol, ether, or acetone. It dissolves small quantities of sulphur, phosphorus, iodine, shellac, and copal; and dissolves readily the fats, etherial oils, camphor, wax, india-rubber, gutta-percha, quinine, morphine, strychnine, but not cinchonine. From benzine are prepared a large number of acids, and nitrogen, chlorine, and bromine compounds.

TULUEN, OR TOLUOL.

By the fractional distillation of coal tar we obtain an oily, mobile, volatile liquid, specific gravity, 0·87, and boiling at 110° to 111° C. It odor resembles benzine, it is insoluble in water, slightly soluble in alcohol, but easily soluble in ether. There are numerous products of its decomposition, as of benzine.

NAPHTHALIN.

Naphthalin is one of the principal constituents of coal tar. It is solid at ordinary temperature, fuses at 79° C., boils at 220° C.; and its specific gravity is 1·048. It can be easily sublimed into thin, white, rhombic scales of tarry odor and aromatic taste. Impure naphthalin turns brown in the air. It crystallizes, from its solution in ether, in large prisms, which remain unaltered in the air. It can be ignited with difficulty, and burns with a smoky flame, even in pure oxygen. Water does not dissolve it, but it is very soluble in alcohol, ether, in the fat and essential oils. It is used as a substitute for camphor in the destruction of moths, and also in the preparation of colors.

CARBOLIC ACID.

Carbolic acid crystallizes in long, colorless needles, possessing a penetrating odor resembling creosote. Chemically pure carbolic acid, entirely free from cresylic acid, fuses at 41° C., and boils at 182° C. Its specific gravity is 1·065. It does not turn blue litmus red, and, when ignited, burns with a smoky flame. Water only dissolves two per cent of carbolic acid. Alcohol and ether dissolve it in all proportions. It is also soluble in acetic acid, in the carbonate and caustic alkalies, and does not enter into combination with ammonia. Solutions of carbolic acid coagulate albumen and destroy insects. It is used for the preservation of animal matter, and as a disinfectant. A pine shaving, previously moistened with hydrochloric acid, is changed by carbolic acid to a beautiful blue color on exposure to the sunlight. A numerous class of bodies has been prepared from it by chemists, and it is now extensively employed in the arts.

CRESYLIC ACID.

Cresylic acid is constantly associated with carbolic acid, and it is very difficult to separate them. It is a transparent oil, possessing a smoky odor, with a bitter, burning, caustic taste. Its specific gravity is 1·037 to 1·04; it boils at 203° C., remains liquid at 27° C., and in other respects closely resembles carbolic acid.

NITRO-BENZINE.

Nitro-benzine, called also nitro-benzole and essence of mirbane, is a yellow liquid, possessing a sweet taste, and the odor of bitter almonds. It is used in perfumery instead of bitter almonds, but its chief consumption is in the preparation of aniline. It is insoluble in water, but can be mixed in all proportions with alcohol and ether. It freezes at —3° C., in crystalline needles, boils at 213° C., and can be sublimed unchanged. It is easily manufactured by the action of nitric acid upon benzine. A similar compound is made by the action of nitric acid on toluol, from which aniline can be prepared.

ANILINE.

Aniline was discovered in 1826, in the distillation of indigo. It is now almost universally prepared by the deoxidation of nitro-benzole, by means of nascent hydrogen evolved by iron filings and acetic acid. Aniline is a colorless, oily liquid, which turns brown in the light, possessing a vinous aromatic odor, and a bitter, burning taste. Its specific gravity is 1·028. It is slightly soluble in water, but is dissolved in all proportions in alcohol, ether, or fatty oils. It remains liquid at 20° C., boils at 182° C., and combines with acids to form crystallizable salts, which are soluble in water and alcohol. The faintest trace of aniline can be detected by the deep purple violet color which it imparts to a solution of bleaching powders.

Aniline and the solutions of its salts color oak wood an intense yellow. Aniline is said to be the only poison the salts of which are not also poisons. Aniline salts are innocuous; they stain the skin, nails, and mouth violet, but the color soon disappears. Aniline itself is a violent poison, and must be handled with care. The principal salts of aniline are the chloride, sulphate, nitrate, phosphate, and oxalate, some of which are used in the preparation of colors.

ROSANILINE.

In 1862, Professor Hofmann isolated the base rosaniline in the form of small white crystals, which rapidly turn red in the air by the absorption of carbonic acid. Heated to 130° C. it is decomposed into aniline and carbon. Rosaniline is prepared by the action of chloride of zinc, also arsenious acid on aniline containing toluidine. Combined with acids, it yields salts which have a metallic luster, and are extensively employed in dyeing under various trade names, such as fuchsin, azalein, magenta, solferino, imperial ruby, rosein, anilein, rouge, and neuroth.

HOFMANN'S VIOLET.

Hofmann's violet differs from rosaniline in containing more carbon and hydrogen. It is prepared by heating together equal parts of iodide of ethyl, rosaniline, and caustic soda, and dissolving the product in ten or fifteen parts of alcohol. The special value of this color is that it is a pure violet, without a red or blue tinge. It is one of the most highly prized of the aniline products. There are other colors which have been added from time to time, a detailed account of which can be sought in recent works on dyeing. They are Perkins' violet, geranosine, cyanine, picric acid, corallin, and azulin. The order of discovery of the aniline colors is said to be as follows:

Aniline purple discovered in.................	1856
" magenta " "	1859
" blue " "	1861
Hofmann's violet " "	1863
Britannia violet " "	1865

It is estimated that 10,000 pounds of aniline oil are manufactured daily in Europe, to be converted into the various dyes mentioned above. Such is the unprecedented growth of an industry that had no existence fifteen years ago.

MANUFACTURE OF SILK.---SILK WORM EGGS.

Although, for many years, the manufacture of sewing silk has been one of the recognized industries of this country, still it is only within the past five years that the silk manufacture has assumed any very important proportions. It is now rapidly extending, and ere long the United States will occupy a leading place in the supply of every description of silk goods.

In Paterson, N. J., there are some thirty establishments for manufacturing silk, employing about six hundred persons, and making nearly all kinds of goods. Of ribbon factories, the largest in the United States are there, two of them employing from three to four hundred hands, though the leading specialty is silk dress goods, chiefly blacks. A large business is also done in pongee silks, or handkerchiefs, which are sold plain to New York merchants, by whom they are sent to various print works on Staten Island for a finish.

Most noticeable of all, is the large establishment of the Dale Manufacturing Company, engaged in serges, braids, cords, dress trimmings, etc., in great variety. This concern, like others, does a heavy business in manufacturing trams and organzines (warp and filling) for silk establishments throughout the country. Another factory employs numerous hands exclusively on ladies' trimmings, gimps, and fringes. Several others are making sewing silk, hat bands, etc.

To show the importance acquired by some of these minor items, we may state that a single small concern in New York city consumes weekly hundreds of pounds of silk in making the tiny tassels for umbrellas.

Mention might be made of the large works of the Cheney Manufacturing Company, near Hartford, Conn., which is said to turn out stuff to the amount of two or three million dollars per annum.

At Hoboken is another factory, for weaving, and in Massachusetts and Connecticut there are various concerns which have been making silks and twists for the last twenty years.

Enough has been said to show that the silk manufacturing interest is having a rapid development. This appears from the simple statement that five years ago, within a radius of fifty miles of New York, there were not fifty looms running on broad silk. Today, there are not less than 1,000 in New Jersey alone, and in Connecticut and other places, 2,000 or 3,000 more—among these one at Green Point, L. I., should be included. The direct importation of raw silk overland from China and Japan, brings the crop quickly into market, which is a decided advantage.

The importation of silk worm eggs from Japan appears to have already reached a considerable magnitude. A shipment of 100 boxes of eggs, valued at half a million of dollars, lately arrived at San Francisco. They were to go by rail to New York, thence to France, Italy, and Turkey.

OFFICIAL reports from India, state that the coal fields in the district of Berar are much more extensive than had been supposed, and are at a moderate depth below the surface. In one place, a bed of coal, more than thirty feet thick, was struck at a depth of not more than seventy-seven feet. The Damuda field has an area of 149 miles, with an average thickness of forty feet. And in other districts, beds of iron ore from nine feet to seventeen feet thick have been discovered.

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THE BATHOMETER, AND OTHER INSTRUMENTS FOR EXPLORING, MEASURING, AND UTILIZING THE SEA.

At a recent meeting of the New York Association for the Advancement of Science and Art, the above subject was presented, accompanied by some novel and interesting experiments, by Mr. G. Livingston Morse.

The lecturer first explained the unreliability of deep sea soundings by the common lead weight and some other instruments. He stated that it was well known that, when a common lead weight with line was used in a depth of three miles or more, the weight would not reach the bottom, but would remain suspended in the water by the friction of the water on the line, which friction would counterbalance the weight.

The problem in deep sea sounding consisted: first, in constructing an instrument which will accurately record any depth, and be of sufficient strength to resist the pressure of the water at any great depth; and second, in arranging the instrument so that it will bring up a sample of the bottom, in order that its character may be determined.

Among the most recent devices invented for this purpose was one consisting of a small tube or quill, attached to the end of a line; a lead weight was attached to the tube, in such a manner that the moment the lower extremity of the tube struck bottom, it would bury itself in the ooze, while the lead weight would be at once detached, thus leaving the line with the tube free to be raised to the surface, with a sample of the bottom.

While the lecturer regarded this as an ingenious device, he said: In practice, the weight sometimes failed to become detached, thereby diminishing the certainty of its action; and when the weight was detached in depths of from one to two miles, from five to six hours were required to raise the line and tube, on account of the friction of the water against the line.

Another instrument was explained, consisting of a weight within which the line was coiled, so that the line would unwind in descending, and be left behind in the form of a trail, thus avoiding the friction of the water against a moving line; but the chief obstacle of its success was in determining the proper amount of line to be coiled in the machine.

It was estimated that the pressure upon a body at a depth of seven miles below the surface of the ocean amounted to two tuns on the square inch; and in order to construct an instrument to indicate such a depth, it should be able to resist that pressure.

The discovery that a thin hollow glass sphere, about three inches in diameter, would resist a greater pressure than two tuns on the square inch, when tested in a hydraulic press, led the lecturer to invent an instrument, which would record accurately and quickly, any depth. A brass sphere was exhibited, similar in size to the glass spheres; the brass sphere, which had been subjected to the pressure above mentioned, was crushed in at several places.

The lecturer's device consisted in arranging several glass spheres, one above the other, within a casing of hemp or leather, the case tapered at both extremities, and containing at its lower portion a small flexible mercurial reservoir, so constructed that, on receiving pressure, the mercury will be forced from the reservoir into another vessel.

When the instrument descends in the water, the quantity of mercury forced by the pressure from the reservoir into the receiving vessel determines the precise pressure, and indicates the exact depth of the water. A freezing mixture is intended to surround the mercury, and keep it at an even temperature.

A weight is fastened to the instrument, which weight is detached when it strikes bottom, and then the instrument immediately rises to the surface. No line is used with this instrument.

The lecturer then proceeded to show by experiment the operation of the instrument, a model of which he immersed in an upright tank of water six feet high; it sank to the bottom, the weight detached itself, and the instrument instantly ascended to the surface of the water.

Other interesting experiments were made, illustrating the various uses to which the device could be adapted.

Soundings had been made with this instrument in Lake Seneca, N. Y., to a depth of 500 feet with perfect success, the instrument always working with uniform accuracy and certainty; but as yet it had not been tested in the deep sea. The time consumed in taking the above soundings was only from ten to fifteen minutes.

This instrument was considered superior to others, in that it gave an accurate record of any depth to which it might be sunk, and also performed the work more expeditiously and with less labor.

The lecturer concluded by expressing the hope that the arts in the future might be able to make a hollow glass sphere large enough for a man to step into and descend with an electric light, so that he could explore for himself the bottom of the great ocean.

The lecturer believed cylinders could be constructed, so as to ascend through the water at the rate of sixty miles per hour.

He further thought it possible to construct machines that could be sunk to the bottom of the ocean, and raise to the surface quantities of the ooze—a tun at a time—which might be valuable for fertilizing purposes.

The lecture was exceedingly interesting, and at its conclusion the lecturer received many compliments.

A CORRESPONDENT recommends three thicknesses of Canton flannel, cut to required width and overcast at the edges, and states that they are better than lamp wicks obtained at the shops. The idea is old, but easily tried.

Louis Bonard.

A few weeks ago, deceased in this city an old man named Louis Bonard, whom the papers seem to take pleasure in denouncing as a miser, apparently because he adopted a very economical style of living. His diet was frugal and his apartment bare; but how very far he was from being a miser, in the ordinary acceptation of that word, is shown by the fact that he bequeathed the whole of his property, amounting to nearly two hundred thousand dollars, to one of the noblest charities in the city, the Society for the Prevention of Cruelty to Animals. If this man were a miser, it is a great pity that there are not more like him in the world.

In addition to being a "miser," it appears that Bonard was also a student, had scientific and mechanical tastes, and other qualities that more pretentious people might cultivate with advantage. A *Times* reporter, who lately visited the shop or laboratory of the deceased, thus describes its appearance and contents:

It is reached by a very narrow flight of stone steps, and was formerly used as a cellar. A stout door, secured with a strong lock and a patent spring, gives admittance. The shop is about eighteen feet long by twelve wide, and is fitted up with racks and shelves in a thorough workmanlike manner. Under a grating, through which daylight is obtained, is fitted a solid wooden bench, with iron vise, etc., complete. On the shelves are brushes, paint pots, and plumbers', glaziers' and carpenters' tools in endless variety. Half-finished window sashes with patent iron partitions, invented by Bonard himself, barrels of various cements, etc,, and bricklayers' and plasterers' tools also form part of the collection. A wooden stool stood by the bench, and an unfinished piece of woodwork lay on the bench just where the dead man had left it. The place was very dark and quite underground, the ceiling being level with the paved yard. Here this extraordinary man would perform all the work and odd jobs necessary for his different houses.

He did everything himself, from putting in a pane of glass to the repairing of a brick wall. He sometimes employed a laborer to assist him in his work. In this shop Bonard made the models of the hat machine, the brick-making machine, and the machine for casting iron, all of which he patented.

D. Clifford, the agent, said that Bonard was of a kind and generous disposition, and especially towards his poor tenants. He would frequently forgive a poor man or woman his or her rent, if they were pressed or out of work, and never turned out a good tenant for a month's rent. Clifford had known him for six years, during which time he had collected the rents and acted as his agent for the houses in Mulberry street. He denies that Bonard was a miser, and says he merely lived in a very humble manner, and saved his money in order to carry out his desire to benefit the dumb creation, as shown by his will. He always evinced a great fondness for animals, and any act of cruelty to any dumb creature al ways aroused his indignation.

Death of Sir John F. W. Herschel.

We regret to find, in our European exchanges, the news of the death of this eminent astronomer. The name of Herschel has been famous for over a century, the father of the subject of this memoir being the British Astronomer Royal, famed for his learning and diligence in research, and for his discovery of the planet Uranus, often called Herschel. John Frederick William Herschel was born at Slough, Buckinghamshire, England, in the year 1792, and was educated at St. John's, Cambridge, a college which has the highest reputation of any in England for the attainments of its mathematicians. Many years of Herschel's life were devoted to the investigation of the nebulæ and the double and triple stars, and he has given the world catalogues and measurements of at least a thousand, whose positions and distances had never before been fixed.

Four years of his life were spent at the Cape of Good Hope, and astronomers are thereby indebted to him for a vast amount of knowledge of the phenomena of the southern heavens. He refused to receive the amount of his expenses on this expedition, although Lord Melbourne, the then prime minister, offered it to him, and his services to science were recognized by the conferring a baronetcy on him by the Queen. He afterwards became Astronomer Royal and Master of the Mint. His works are numerous and profound, and his social reputation was as great as his scientific renown. He was in his eightieth year.

Infringement Trial.---Holcomb's Patent Fruit Jar.

Judge McKennan, in the United States Circuit Court, at Pittsburg, Pa., recently delivered an opinion in the case of McCully & Co., *vs.* Cunningham & Ihmsen and Lorenz & Wightman. It was a proceeding in equity, in which the complainants asked an injunction, restraining respondents from infringing upon a patent issued for a fruit can, and also to get an account. The complainants are the exclusive assignees of D. Irving Holcomb, to whom letters patent, dated March 14, 1869, for an improvement in fruit jars, was granted. Respondents admitted that from about the 1st of August, 1868, they manufactured fruit jars, in all essential features of construction and combination like the fruit jar patented to Holcomb. They denied, however, that Holcomb originated the jar.

Judge McKennan, in his opinion, decides in favor of the complainants, as follows: "It is scarcely necessary to support the conclusion arrived at, by a restatement of the familiar principle that a combination, all the elements of which are old, is patentable if a new or improved result is thereby obtained, or that a combination, all the elements of which, except a single one, have been before used together, is also the subject of a patent. The whole combination is to be regarded as an unit, and if all its essential elements have not before been embodied and employed together, it is to be taken as an original invention.

"While, therefore, it is apparent that fruit-preserving jars were made, and in use before, with a shoulder bed in which an India rubber gasket rested, and with a metal cap which was pressed upon the gasket and held down by a wire yoke, yet it does not appear that the patentee's device to secure more effective sealing—the vital function of the whole mechanism—by the exclusive circumferential pressure was employed in any one of them. His claim is therefore a combination, of which this device constitutes an essential and valuable part, embodies a new and original invention, and is entitled to protection against infringement. A decree will accordingly be entered for an injunction and an account."

Tunnel at Nusquehoning, Pennsylvania.

The engineers of the Lehigh Coal and Navigation Company are now engaged in tunneling a hill near Summit, Pa., and the work is being prosecuted with great vigor and skill. The labor is commenced at both ends, and is now progressing, through a hard conglomerate into the red shale, at the rate of thirty-five feet per week. The blowing engines are ready to work at the north end, and, when in operation, sixty feet progress per week may be calculated on; and this speed will finish the tunnel in about four months from this time. It is a continuance of a disused mining tunnel, driven 1,500 feet into the Mammoth vein; and recently, the work of hand drilling being too slow in execution, the Burleigh drill has been used. This was in March last, and the engineers hope to have the road laid and ready for train-running next January.

AMERICAN NEWSPAPERS.—Colonel John W. Forney said, at a dinner given in his honor: "In 1870 we count fifty-five hundred news periodicals of all degrees, with a probable annual circulation of not less than seven hundred and twenty-five millions. Of these, four hundred and seventy-five are dailies, circulating nearly two millions of copies every twenty-four hours, one hundred and sixty are agricultural journals, circulating over half a million; and about three hundred religious periodicals, circulating over two and a half millions of copies of each edition—an aggregate, without counting our monthly literature, larger than the rest of the civilized world. In fifty years, when our population shall have attained, on the present ratio of increase, to one hundred and fifty millions, the boy of seventeen to-day will have a far dif ferent story to tell."

TO CLEAN PAINT.—We have published the following recipe before; but, this being house cleaning season, some good housewife will thank us for giving it again. To clean paint, provide a plate with some of the best whiting to be had; have ready some clean warm water and a piece of flannel, which dip into the water and squeeze nearly dry; then take as much whiting as will adhere to it, and apply it to the painted surface, when a little rubbing will instantly remove any dirt or grease. After which, wash the part well with clean water, rubbing it dry with a soft chamois. Paint thus cleaned looks as well as when first laid on, without any injury to the most delicate colors. It is far better than using soap, and does not require more than half the time and labor.

IN IOWA, the planting and cultivation of forest trees is encouraged by the offer of handsome premiums, and the result is that the good work is progressing with vigor. One gentleman of Sioux city, it is stated, will plant two hundred thousand trees on his farm this year; another has commenced planting two hundred and fifty thousand trees in Lyon county, and still another is planting thirty thousand trees—chestnut, larch, maple, and cottonwood—in Ida county. At this rate, Iowa will soon become a timber State. We wish that a similar movement could be inaugurated in some of the Eastern States. In New England, the soil has been rendered more arid, and the streams reduced in volume, by the cutting down of the forests.

DETECTION OF SUBSTANCES BY THE FORMATION OF MICROSCOPIC CRYSTALS WITH THE BLOWPIPE.—Dr. Wunden, of the Polytechnic School of Chemistry, has published a set of photographs of the crystals that can be produced by means of the blowpipe and the use of borax beads, with the salts of magnesia, lime, baryta, strontia, alumina, glucina, zirconia, ceria, and tungstic acid. A magnifying power of from eighty to one hundred diameters is necessary to the examination of the crystals, and a little skill and practice will soon enable the chemist to make a qualitative examination, by this method, with the blowpipe.

TREES OUT OF PLACE.—Trees are out of place (says a writer in the *Farmer*) when they overshadow the roof of a house, or darken its windows, or shut out a fine prospect. It is the testimony of eminent physicians that no small part of the sickness of families is attributable to the shading of dwellings by overhanging trees and thick clustering vines. Our bodies need light, pure sunlight, and a great deal of it, and our spirits need it none the less; and he who shuts out this genial dispenser of health makes a great mistake, and does a great wrong.

AN undergraduate at Cambridge, who found among the questions on his examination paper this: "Why will not a pin stand upon its point?" elaborately explained the point thus: 1. A pin will not stand on its head, much less is it possible that it should stand on its point. 2. A point, according to Euclid, is that which has no parts and no magnitude. A pin cannot stand on that which has no parts and no magnitude, and therefore a pin cannot stand on its point. 3. It will if you stick it in.

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Supposed Ancient Chemical Works.

A correspondent of the Boston *Advertiser*, writing from Rome, describes the following remains, found near that city, and supposed to have been chemical works:

There is a round, shallow cistern; from it, a pipe hole leads into a row of five shallow basins, about the size of hand basins. At the fifth basin is a groove leading to a parallel row of similar basins, a little lower in the level than the first row. At the last of these is another pipe groove leading to a third row of basins, also lower than the second. Thus the liquid flowed from the cistern down the first row, back through the second, and then into the third; from thence by a large pipe hole somewhere into a place which is not yet excavated.

This curious place has been hidden for centuries, only covered with a light layer of soil, with cattle grazing and horsemen dashing over it; and here, by some chance turning of the spade, made to go a trifle deeper by the indolent Campagna laborer, it has come to light, and will furnish a fresh subject of speculation to archæologists. The basins have a slight crust of reddish brown on their surface. At each end of the whole machine are blocks of stone with small square cavities cut in them; these may have been the places for the furnaces.

Rather Late in the Day.

Abbé Moigno's journal, *Les Mondes*, for September 8, 1870, has just arrived. It was too heavy to be sent by balloon, and had to come from Paris during the lucid interval that obtained after the evacuation by the Germans, and before the unfortunate civil war. It is to be hoped that the abbé has not shared the fate of many of the clergy, and that his valuable scientific journal has not been suppressed. The present number contains considerable interesting matter; among other items, it is pleasant to read a kindly notice of the recovery of Baron Liebig: "It is with the greatest pleasure that we announce that one of our English friends has just received an autograph letter from Liebig, in which he says that although still very feeble, he is able to pass a few minutes every day in his garden; and he if his health continues to improve, he proposes to go in three weeks to the Engadine, where he hopes for speedy recovery."

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.

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Wanted.—A situation by a competent Mechanical Draftsman of 12 years' experience. Can design from a sketch. Address I. C. Russell, Hartford, Ct.

Improved mode of Graining Wood, pat. July 5, '70, by J. J. Callow, Cleveland, O. See illustrated S. A., Dec. 17, '70. Send stamp for circular.

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The Philadelphia Scientific Mechanics' Circle will answer any mechanical question for 25 cts. Address as above, 125 N. 7th st., Philadelphia.

$25,000 will furnish an energetic party with the exclusive control and right to manufacture a staple article, supplying a want long experienced by ladies throughout the whole country. Apply to Mrs. A. H. Graton, Lawrence, Kansas.

Wanted.—The address of Manufacturers of Fine Foot Punching Presses. W. S. Hammond, Lewisberry, York Co., Pa.

We want descriptive circulars and price lists of the best Machine for Sawing Laths for plastering. Stewart & Co., Union Springs, Ala.

For Sale.—A first class Stereopticon, complete. 125 Views. Address B. Adriance, 45 Ann st., New York city.

Electrical Instruments, Models, etc., made to order, and Gear Wheels and Pinions cut, by W. Hockhausen, 113 Nassau st., Room 10, N. Y.

The Kansas Brick Molder and Off-bearer is like a cart, with a mold drum under it, which molds and leaves the brick on the yard. It will make 4,000 brick per day. For Rights or Agency apply to John Whiteford, Kansas City, Mo., Lock box 2165.

Wanted.—New or secondhand Cartwheel Borer, Axle Lathe, double head preferred; Wheel Press and Centering Lathe. Address, with description, maker's name, and price, Michigan Car Co., Detroit.

Diamond Carbon, of all sizes and shapes furnished for drilling rock, sawing and turning stone, conglomerates, or other hard substances, also Glazier's Diamonds, by John Dickinson, 64 Nassau st., New York.

Peck's Patent Drop Press. Milo Peck & Co., New Haven, Ct.

Experimental Machinery and Models, all sizes of Turned Shafting, Paper Box, Paper Collar, and Bosom Plaiting Machines, Self-operating Spinning Jack Attachments. W. H. Tolhurst, Machine Shop, Troy, N. Y.

Wanted.—A Mechanic competent to build and adjust the Wheeler & Wilson Sewing Machine, to take charge of a shop. Address Sewing Machine Works, St. Catharines, Ontario, Box 169.

$1,500 for a valuable Patent, or will be sold in State Rights. Can be cast. J. F. Ronan, at Chickering's Factory, Boston, Mass.

Best Scales.—Fair Prices. Jones, Binghamton, N. Y.

Steam Watch Case Manufactory, J. C. Dueber, Cincinnati, Ohio. Every style of case on hand, and made to special order.

Agents Wanted—on a new plan—to sell a patent Collar Stud. Send for Circular. S. E. Williams, Hartford, Conn.

L. & J. W. Feuchtwanger, Chemists, 55 Cedar st., New York, manufacturers of Silicates of Soda and Potash, and Soluble Glass.

For Hydraulic Jacks, Punches, or Presses, write for circular to E. Lyon, 470 Grand st., New York.

Wanted.—A responsible dealer in every town in the United States, to sell "The Tanite Co.'s" Emery Wheels and Emery Grinders. Extra inducements from May 1st. Send for terms to "The Tanite Co.," Stroudsburg, Pa.

"American Manufacturer's Review," Pittsburgh, goes over the whole country. Subscription, $4. Advertisements, 15c. per line. Try it 1 year.

The new Stem Winding (and Stem Setting) Movements of E. Howard & Co., Boston, are acknowledged to be, in all respects, the most desirable Stem Winding Watch yet offered, either of European or American manufacture. Office, 15 Maiden Lane, New York.

Belting that is Belting.—Always send for the Best Philadelphia Oak-Tanned, to C. W. Arny, Manufacturer, 301 Cherry st., Phil'a.

Send your address to Howard & Co., No. 865 Broadway, New York, and by return mail you will receive their Descriptive Price List of Waltham Watches. All prices reduced since February 1st.

Ashcroft's Low Water Detector, $15; thousands in use; can be applied for less than $1. Names of corporations having thirty in use can be given. Send for circular. E. H. Ashcroft, Boston, Mass.

To Cotton Pressers, Storage Men, and Freighters.—35-horse, Engine and Boiler, with two Hydraulic Cotton Presses, capable of pressing 35 bales an hour. Machinery first class. Price extremely low. Wm. D. Andrews & Bro., 414 Water st. New York.

Tin Presses & Hardware Drills. Ferracute Works, Bridgton, N. J.

Brown's Coalyard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W. D. Andrews & Bro, 414 Water st., N. Y.

American Boiler Powder Co., P. O. Box 315, Pittsburgh, Pa.

Carpenters wanted—$10 per day—to sell the Burglar Proof Sash Lock. Address G. S. Lacey, 27 Park Row, New York.

Manufacturers' and Patentees' Agencies, for the sale of manufactured goods on the Pacific coast, wanted by Nathan Joseph & Co., 619 Washington street, San Francisco, who are already acting for several firms in the United States and Europe, to whom they can give references.

All parties wanting a water wheel will learn something of interest by addressing P. H. Wait, Sandy Hill, N. Y., for a free circular of his Hudson River Champion Turbine.

For mining, wrecking, pumping, drainage, and irrigating machinery, see advertisement of Andrews' Patents in another column.

A. G. Bissell & Co. manufacture packing boxes in shooks at East Saginaw, Mich.

Twelve-horse Engine and Boiler, Paint Grinding Machinery Feed Pumps, two Martin Boilers, suitable for Fish Factory. Wm. D. Andrews & Bro., 414 Water st., New York.

Improved Foot Lathes. Many a reader of this paper has one of them. Selling in all parts of the country, Canada Europe, etc. Catalogue free. N. H. Baldwin, Laconia, N. H.

Cold Rolled-Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlins, Pittsburgh, Pa.

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

The Merriman Bolt Cutter—the best made. Send for circulars. H. B. Brown & Co., 25 Whitney ave., New Haven, Conn.

Glynn's Anti-Incrustator for Steam Boilers—The only reliable preventive. No foaming, and does not attack metals of boilers. Price 25 cents per lb. C. D. Fredricks, 587 Broadway, New York.

For Fruit-Can Tools, Presses, Dies for all Metals, apply to Bliss & Williams, successor to May & Bliss, 118, 120, and 122 Plymouth st., Brooklyn, N. Y. Send for catalogue.

Presses, Dies, and Tinners' Tools. Conor & Mays, late Mays & Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N. Y.

English and American Cotton Machinery and Yarns, Beam Warps and Machine Tools. Thos. Pray, Jr., 57 Weybosset st. Providence, R. I.

Taft's Portable Hot Air, Vapor and Shower Bathing Apparatus. Address Portable Bath Co., Sag Harbor, N. Y. (Send for Circular.)

Winans' Boiler Powder.—15 years' practical use proves this a cheap, efficient, safe prevention of Incrustations. 11 Wall st., New York.

To Ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's Manufacturing News of the United States. Terms $4 00 a year.

Nearly Every Advertiser,

Who makes advertising pay, contracts through a responsible Agency, experience having taught them to avail themselves of the services of those who have made the business a study. The Agency of Geo. P. Rowell & Co., No. 40 Park Row, New York, is the most competent in the country, and many o the largest advertisers make all their contracts through them.

Answers to Correspondents.

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 advertisements at 1·00 a line, under the head of "Business and Personal."

ALL reference to back numbers must be by volume and page.

BRITTLENESS IN WIRE.—To the 3d querist in No. 18, SCIENTIFIC AMERICAN, I may be able to give some light, by stating that:—It was in the summer of 1864, at about noon, a heavy thunder storm passed over our city, the lightning striking (so to say) at my house, of which all my family, five in number, felt the shock very heavily. It seemed to pass without doing any other damage, but when the first visitor tried to ring the bell, of which the wire runs nearly from south to north, about 60 feet in length, the bell did not answer, and on examining the cause, it was found that the wire was broken into a number of pieces, from 4 inches to 1½ foot in length, and scattered all along, on the ground, some ends of such pieces having the appearance of being burnt. Others again broken shorter still. On examining the wire, I found it was perfectly good steel. Whether this wire was steel originally, or became converted from iron into steel by the electric current, is more than I am able to assert. [The electric current cannot convert iron into steel—EDS.] There is no lightning rod on my house. It seems to me that the same cause that broke my iron or steel wire, may have partly melted J. H.'s brass wire. Either the electric current was not strong enough to break it, or else the brass offered a greater resistance than iron or steel wire to the destructive force of the current.—I. I. H.

J. P. C., of Ohio.—To tin iron, clean the surface with dilute sulphuric acid—scratch-brushing if necessary—until the entire surface is bright. Take it from the acid, and dip in a bath of hot lime water, and rub dry with bran or sawdust. Then dip it in melted tin, having upon its surface a stratum of melted tallow. To copper iron without a battery, clean in a similar manner, and dip in a solution of sulphate of copper. This method of coppering does not give a good permanent coating, and it is much better to use a battery.

H. S. S.—Small rubber-insulated copper wire will perhaps answer your purpose. Rubber springs are quite durable, if properly made. For the books, consult our advertising pages.

TURBINES.—Your correspondents, L. P. and B., ask if turbine wheels with draft tubes are as good as the same wheel immersed in back water. I answer, No. The draft tube is theoretically right, but practically wrong. If the draft tube were made of iron, and as large as the penstock (the horizontal area of which ought to be 100 times the discharge opening in the wheel) and perfectly air tight, with an air pump to extract the air before starting, it might be about as good as immersion. But as they are generally made too small in diameter (thus increasing the friction) and entirely too temporary to make or maintain anything like a vacuum, the consequence is that when the wheel is stopped, the water drops down the wheel and gets in; and if it stands any length of time, will rust and soon wear out. The best wheel makers are now making their wheels in such a way as to require a hole, 5 inches longer than the wheel proper, to be cut through the planking. The frame timbers are set back from the edge of this hole 3 inches, and the wheel immersed so as to insure the bucket being always full of back water. This will prevent all squirting of the water with fractional gates, and give a true reaction. Reduce friction to its minimum, give the whole power of the fall, and preserv your wheel. See that the pit below the wheel be large enough, and if there be a piece of draft tube cast on the wheel, get it cut off before putting your wheel down.—J. W. H., of Del.

ELECTRO COPPERING.—Your correspondent, F. R. A., wishes a receipt for a solution for electro-coppering. He can easily copper in this way: Make a strong solution of sulphate of copper (boiling water will dissolve the most) and strain it. Connect to the wire from the zinc pole of the battery, a clean plate of copper, and place it in the solution. Suspend from a rod across the top of the bath, by means of wire, the articles to be coppered, care being taken that they do not touch each other, and connect this rod with the other pole of the battery. Smee's battery and the electropoion battery are the best for this kind of work. I have used a battery of 14 one gallon cups (electropoion battery, 15 pound zincs and find it will deposit a large amount of copper in a short time.—E. C. of N. J.

TURNBULL'S BLUE.—Your correspondent, "J. B.," wishes a receipt for making "Turnbull's Prussian blue" (sesquiferrocyanide of iron). Ferrocyanide of potassium, 10 ounces; solution tersulphate of iron, 1 pint; water, 3 pints. Dissolve the ferrocyanide of potassium in two parts of water, and add the solution, gradually, to the solution of tersulphate of iron previously diluted with the remainder of the water, stirring the mixture during the addition. Then filter the liquid, and wash the precipitate on the filter with boiling water until the washings pass nearly tasteless. Lastly, dry it, and rub it into fine powder.—E. C., of N. J.

TURNBULL'S BLUE.—Turnbull's blue is prepared by adding a solution of potassium ferricyanide (red prussiate of potash) to a solution of any ferrous salt. Perhaps green vitriol is the most convenient.—C. T. R. S., D. C.

PERMANENT INK FOR USE WITH STAMPS OR TYPE.—No. 1. Equal parts of black oxide of manganese and hydrate of potash are mixed, heated to redness, rubbed, with an equal quantity of smooth white clay, into a paste, water being added for the purpose. No. 2. Sulphate of manganese, 2 drams; lampblack, 1 dram; powdered loaf sugar, 4 drams; rubbed into paste with water. After stamping, dry the linen, etc., and wash well in water.—D. B., of N. Y.

GRAFTING WAX.—I use a grafting wax which I think is better than one, the recipe of which was given a short time since in this column. This is the recipe: 1 pound tallow, 2 pounds beeswax, 4 pounds rosin. Melt the rosin first, and be sure it is well melted before adding the wax and tallow. If this be not done, the grafting wax will be full of lumps. When melted, pour it into cold water, and work it by hand into rolls of convenient size. In cold weather, soften the wax by putting it into warm water before using.—E. C. P., of Vt.

C. H. G., of M.—Experience has shown that for pipes or tanks designed to supply water for domestic use, zinc coatings are apt to contaminate the water. We do not advise their employment for this purpose.

G. M. D. asks in your number, of December 3, 1870, for a carriage that might be propelled by hand. Such a carriage, made to hold one or two persons, has lately been patented here by a man of Montreal, named Noel Bigavuette, a French Canadian. I cannot say whether his invention is a success or a failure, having only seen the model.—T. G. C. Ottawa.

R. X. T. asks in your number of March 25, 1871, what is the best cement for China ware? According to my own experience, I find that the best and neatest way to mend crockery or China ware, or glass ware, is to tie the pieces together, when the fracture is still fresh, and to boil the article in sweet milk, for ten or fifteen minutes. The crack will not be seen and the cementing is durable.—T. G. C., of Ottawa.

J. C. M., of Ga.—The corrosion of your boiler is evidently due to the presence of some substance in the water which oxidizes it very rapidly. What this is we cannot undertake to say without an examination of a specimen of the water. The specimen sent is red oxide of iron.

J. M. M., of Pa.—We do not know of any authorities on the subject of narrow gage railways. The question of narrow or wide gages is only one of policy, in our opinion, and must be individually considered by each company for itself. There has been much controversy on the question in the leading engineering papers at home and abroad, but little that is of much value has been said or written.

W. E. H., of Conn.—You cannot communicate permanent magnetism to anything except steel. The armature is composed of soft iron, and that is the reason it does not retain the magnetism.

W. H. C., of Pa.—The specimen sent is mica, in the usual laminated form in which it is found, and in which it is used for stove doors.

W. M. M., of Mich.—The mere weight of valve and lever is not enough to deduct from the counterpoise, in calculating the distance from fulcrum to weight, etc., on safety valves. There is the leverage to be taken into account.

E. C. P., of Vt.—The plan suggested by you for canal boat propulsion has been, in its essential features, already tried. It may be, however, that you have modified its details, so as to remove some of its practical difficulties.

H. B. of Ontario.—The article referred to does not state that carrots have not been a long time used for coloring butter. It describes a method of extracting the coloring matter by a chemical process, so that it can be made an article of commerce.

NEW BOOKS AND PUBLICATIONS.

LITHOGRAPHIC PLANS AND STEREOSCOPIC VIEWS OF A MODEL HOUSE. Descriptive Circular and Price List, sent free by George L. Colby, Architect, Waterbury, Vt.

These plans and views give a complete representation of a house symmetrical in form, economical in construction, convenient in arrangement, and beautiful in appearance, embracing the latest modern improvements. It will be of service to any contemplating the erection of a dwelling house.

WE are in receipt, from the Department of State, of a set of six volumes of the Reports of the United States Commissioners to the Paris Universal Exposition, 1867. For these most valuable and interesting documents, the Department will please accept our acknowledgments.

A. J. BICKNELL & Co., architectural book publishers, formerly at Troy N. Y., and Springfield, Ill., have removed to 27 Warren street New York.

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Recent American and Foreign Patents.

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

FIFTH WHEEL FOR CARRIAGES.—This improvement is designed to avoid the weakening of parts by the cutting away of the same, when the ordinary kingbolt connection is used. To a top pivot plate, a ball is attached, which is inserted into a socket formed in the bottom plate. The ball is held in its socket by slides, which are inserted in dovetailed grooves in the bottom plate, the slides being secured by bolts. The arrangement allows a socket movement of forty-five degrees in cramping th e vehicle. In the attachment to wagons, where very little rock is required, the ball is flattened on its vertical axis, and notched upon its sides, similar notches being made in the edge of the socket, so that by turning the plate a quarter of the way around, the ball will enter the socket, and *vice versa*. Invented by Peter S. Eastman, of Washington Mills, New York.

CLOTHES DRYER AND TOWEL RACK.—Thomas H. Chubb and William G. Marston, of Post Mills, Vt.—This consists of a large and small drying frame, pivoted together in such a way, that when extended they, in connection with another supporting frame from a dryer that gives large extent of holding capacity, may be placed upon the floor, or suspended from the walls of a room, to be used for the purpose specified.

POTATO DIGGER.—Clark Cooney, of Columbus, Nebraska, has invented a potato digger, in which a vine scraper, made of sheet metal in the form of a V-shaped plow, is attached to the front of a frame. The frame is carried on two forward truck wheels and two caster wheels at the rear. It carries a scraper for scooping up the potatoes and earth. From the scraper the earth and potatoes pass on to inclined sifting bars, and thence on to an inclined way having an open bed of wire for the further separation of the earth. From this way the potatoes pass to an elevator, which delivers them into a conveyer or screw in a trough, which forces them in a horizontal direction, and delivers them into the body of a cart or wagon, which is drawn along with the machine to receive them. The elevator and conveyor receive motion through gearing actuated by the truck wheels.

HORSE POWER.—Theophilus Harrison and William C. Buchanan, of Belleville, Illinois.—The object of this invention is to construct a mounted horse power, which has its power-conveying shaft low enough to connect directly with the tumbling rod, without requiring inclined or other inconvenient connections, and in which the said conveying shaft and appendages can be elevated sufficiently high from the ground to clear stumps and stones, while the machine is being moved to and from the place of operation. This is an excellent invention, and will prove of great service where horse powers are required for sawing on rough land.

FRINGE TWISTER.—Hiland Howard, of Leeds, N. Y., assignor to himself, James Fowks, and George Howard, of the same place. This invention consists of a novel combination of apparatus for separating the threads and twisting fingers, whereby, the shawl or other article being stretched between the cloth beams or rollers, the threads will be separated uniformly for forming the strands, and the strands will be twisted separately, then doubled and twisted together simultaneously throughout the whole breadth of the shawl.

COMBINED RECTIFIER AND FILTER.—In this invention, patented by John C. Schnell, of Cincinnati, Ohio, assignor to himself and Eberhard Cammerer, of the same piece, the fluid to be filtered, or filtered and rectified, flows from a superposed reservoir down into a cylinder containing two concentric annular chambers, and a central cylindrical chamber. The fluid enters the central chamber first, which chamber contains wool, cotton, or other filtering material. The liquor passes out through perforations near the bottom of the central chamber, and then passes up through the annular chamber which surrounds the inner one. This cylinder is filled with pulverized charcoal. When the liquor reaches the top of the latter chamber, it flows through perforations into the outer annular chamber, which is also filled with charcoal. Thence the fluid passes downward, and escapes through a perforated false bottom into a chamber, whence it is drawn as required.

MEDICAL COMPOUND FOR CURE OF RHEUMATISM.—Harvey Sawyer, of Wilson, in the county of Wilson and State of North Carolina, has invented a medical compound for the cure of rheumatism, neuralgia, and other complaints, which he specifies as follows: To one quart of molasses I add, of nitric acid, six ounces; muriatic acid, six ounces; and let the composition stand and ferment for the space of three days. I then add half a gallon of strong solution of Castile soap, and half a gallon of spirits of camphor, and one and a half ounces of oil of cubebs. The above-mentioned ingredients, when combined as specified, form a liniment.

MACHINE FOR TENONING SPOKES.—This invention consists chiefly in the arrangement of vertically adjustable supports of the spokes, the same being set by means of sliding wedges, and also in the use of a peculiar elastic clamp, provided with a longitudinally adjustable fulcrum block. It is the invention of Arthur Sherman, of Poughkeepsie, N. Y.

JOINER'S PLANE.—In this plane, the plane iron is set to take the proper cut by means of a set screw, and is held to its place by means of clamping plates which engage the iron on the front edges, the clamping plates being attached to the prongs of a bifurcated rod, which passes from the plates rearward through the wood, and is tightened by means of a thumb nut. This improvement is the invention of James K. P. Smith, of Jeffersonville, Ind., assignor to himself and L. S. Shuler, of the same place.

SECURING COLLARS TO LAMPS, ETC.—E. S. Kennedy, of Birmingham, Pa.—In the outer sides of the neck of the glass lamp, molasses cup, or other article, two or more recesses or notches are formed which receive spring pawls or catches, attached to the inner side of the collar or cap. A rubber band or other suitable packing ring being placed upon the top of the lamp, the cap is pressed on, and the pawls engaging with the upper shoulders of the recesses, hold it firmly to its place, thus obviating the use of cement and its attendant inconveniences.

SNOW PLOW.—Alexander Stutzman, of Somerset, Pa.—This plough consists mainly of an upper and under plate, wedge-shaped at the front end, and joined at the point by a V-shaped plate, while between the plates are laterally moving wings, which thrust the snow from the center outward, being actuated by a lazy-tongs movement, and a pitman impelled by a gear and pinion, the main driving gear being keyed to one of the axles of a truck which carries the plow. The plow is designed for cleaning snow from railways.

PLANING, MOLDING, AND TENONING MACHINE.—Joseph Albright, Midway Tenn.—This invention relates to a machine for planing, molding, and tenoning lumber, by means of cutters, which are all placed at different times upon the same shaft; the carriage that supports the stuff being provided with a peculiar clamping apparatus for holding the lumber while under the action of the cutter, the cutter-shaft being arranged to be raised or lowered to suit the thicknesses of the stuff; and the carriage, that sustains the pieces while the tenons are sawing on them, being arranged to be raised and lowered for the discharge of the sawing function.

LAMP.—Charles B. and Stephen S. Munn, Baltimore, Md.—This invention relates to a connecting drum interposed between the burner and lamp, and having an opening with an inner slide, through which the lamp reservoir may be replenished without removing the burner or chimney, or extinguishing the light, and to a wick chamber or tube made of brass, or other suitable metal, and extending downward into the reservoir or fount; and to outlets in said drum, or in the burner, for the purpose of preventing explosions.

PUDDLING FURNACE.—Simeon Burn, of Belleville, Ill.—This consists in the application of a cooling device to the under side of the bottom plate of puddling furnaces, and in improvements in the arrangement of the chills, placed above the bottom plates for the protection of the latter, and to make them more efficient and durable. To effect this, air is admitted under the bottom plate, and distributed over the surface by means of curved ribs attached to the bottom plate, and the chill for the upper side is effected by means of a forked or branched hollow casting, through which air is also admitted, both air-ways being connected with the chimney, so as to secure a regular and uniform draft to cool the plate.

GRINDING MILL.—Henry Hensley, of Elysianfield, Texas.—The stones both revolve, instead of one being fixed and the other revolving, as has hitherto been the case. To effect this, the upper stone is hung on a spindle, running in bearings attached to the upper part of the frame, and the lower one runs on another spindle, having its bearings and step in the lower part of the frame. Both are driven by an endless belt, which, passing over a drum running on a horizontal shaft, passes around the pulley on the upper spindle, thence back to the drum, thence to the pulley in the lower spindle, and thence back to the drum causing the stones to move in opposite directions, as required.

HORSE DETACHING APPARATUS.—This consists in a sliding bar attached to the whiffletree, or to a secondary whiffletree, to which the one having the horse hitched to it is connected by cock eyes, or rings, in the ends of short traces hooked into studs projecting from the end of the whiffletree, said bar being provided with a holding and tripping spring and ears, through which one of the studs, holding a trace, passes. By the sudden jerk of a cord, one of the short traces is released, and a guard which holds the trace in the other stud is then released, which frees the traces, and thus detaches the horse. Invented by John Linton Hamilton, of St. Joseph, Mo.

COMBINED TOOL.—John W. Currier, Newbury, Vt.—This invention consists of the combination in one instrument of the following tools, namely: a hammer, nail puller, pliers, wrench screw driver, nest of wrenches awl, and eyelet maker.

PIANO VIOLIN.—Elisha D. Blakeman, of Mount Lebanon, N. Y., has invented an instrument which combines the peculiarities of the piano and violin. It consists of a sound box, upon which a string is tuned to a proper pitch. The string being agitated by a bow, is made to give a succession of musical tones by means of keys, which, played by the fingers of the hand unoccupied by the bow, press upon the string, making higher or lower sounds, as the vibrating portion of the string is shortened or lengthened.

COTTON PLANTER AND GUANO DISTRIBUTOR.—This is a new combination of devices, whereby cotton may be planted, or guano distributed, uniformly and rapidly, and so adjusted that more or less of the seed, or fertilizer, may be distributed, as may be desired. A plow tooth opens the furrow for the reception of seed or fertilizer. The plow is followed by a double-bevel edged wheel, which presses out the side of the furrow, so that it shall not close before the seed is dropped. Back of this wheel is a dropping drum, divided in the middle at right angles with its shaft, the two parts being adjustable to or from each other, to regulate the flow of seed from the space left between the two parts. Behind the dropping drum is placed a covering block, in line with the furrow. The dropping drum is rotated by a belt from a pulley on the double-bevel edged wheel above described, the latter having at its outer edge teeth, which engage with the ground and compel it to rotate, as the machine is drawn along by a horse or mule. Invented by James Rafter, of Winona, Miss.

ATTACHMENT FOR SASH WEIGHTS.—In each edge of the sash is placed a slotted plate, sunk in so that its face is flush with the edge of the sash. The slot extends from the upper end of the plate nearly to the lower end. A cord holder made in the form of a rod or plate, and of such shape that its upper part will fit the slot, while its lower part rests behind the slotted plate, having a shoulder which rests upon the slotted plate at the lower end of the slot, is perforated by a conical hole to receive the cord, the knot on the latter entering partially into the hole. The cord holder is grooved on its face to receive the cord. When the sash is put in the frame, the cord holder will be held in its place. As soon, however, as the sash is removed from the frame, the cord holder is released. Invented by Freeman Brady, of Washington, Pa.

FLOCK CUTTING MACHINE.—This is the invention of Monroe Morse and Charles H. Morse, of Franklin, Mass. To construct a machine that will cut flock to any required degree of fineness, is the purpose of this invention. In order to accomplish this desirable result, the inventors adjust the cutting and feeding mechanism to different degrees and materials, by a mechanism which cannot be described in such a notice as the present. The machine is extremely compact, and, we judge, well calculated to secure the end desired. The materials are put into a hopper, from which they feed down into openings in the centers of circular cutter heads, whence they are fed outward between the cutter heads by centrifugal force. The lower cutter head is made vertically adjustable, to regulate the fineness of the cutting. All the parts are strong, and apparently durable, and we think the machine will be likely to meet with the approval of manufacturers.

LUNCH BOX.—This is a rectangular box, formed in halves, hinged together, containing interior vessels, lids, etc., and having exterior handles and support. Invented by Daniel Tuxell, of Newark, N. J. The arrangement of the details of this box renders it a very convenient one.

Queries.

[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers.]

1.—I wish a fluid that I can write with, and have it luminous in the dark, but which contains no phosphorus?—W. H. C.

2.—CLOTH ROLLERS.—I wish to know what is the best substance to use, to put on a cloth roller to weave brown sheetings. Whatever article is named, please give number and mode of putting it on.—R. A. D.

3.—TEMPERING SPIRAL SPRINGS.—Will some one give me some information as to the manner of tempering spiral springs, and some of the preparations used?—S. B. C.

4.—UPRIGHT TUBULAR BOILER.—Will some steam fire engine or other builder inform me, what horse power an upright tubular boiler will probably develop, say 42 inches diameter, 48 inches high to the shoulder or dome base, dome 12 inches high, say total hight 60 inches (to include fire box and ash pit) to drive four cylinders, each 5 inches diameter and 10 inch stroke? Fuel, coal or wood, according to circumstances.—P.

5.—DISSOLVING MICA.—Is there any way to dissolve and hold in solution mica, or, as it is sometimes called, isinglass?—M.

6.—DEEPENING COLOR OF INK.—What acid added to ink, or such dark substance, will make it of a deeper black color?—M.

7.—CRYSTALLIZING TIN PLATE.—I have been using nitro-muriatic acids for crystallizing tin plate for water coolers, but it makes them too dark, and does not bring out the spangles. Please inform me what I must do to obviate the trouble.—C. R.

8.—NEEDLE TELEGRAPH.—Can any one give a remedy for the irregular working of the needle telegraph in tropical climates? During the warm, sultry days it is hardly possible to get a signal through from station to station, on account of the magnetized needles becoming demagnetized, even when there is no actual lightning.—S. F.

9.—LIQUID GLUE.—Can any of your numerous correspondents give me a recipe for preparing a mucilage from glue that will always remain in a liquid state, and still retain its adhesive qualities? I use very fine glue.—S.

10.—WOOL CARDING MACHINES.—How can I prevent the electricity in the rubbers of finisher points of wool carding machines, and also on the railroad head of cotton machines, as the cotton will stick to the plunger and the tin can? Keeping the floor wet helps the matter some, but it is a disagreeable practice. I have often remedied the electricity of the rubber points of woolen machines by putting lamps on the floors under the ends, but there seems so much electricity in our mountain air that it does not seem to do much good here. Steam pipes with jet holes would answer, but it is inconvenient for me to use steam.—X.

11.—A WOMAN'S WANT.—The best thing to kill bed bugs. —HOUSEKEEPER.

12.—LACKER FOR BRASS AND IRON.—What is the best lacker for iron or brass, that can be changed to any color without injuring its adhesive quality, and that will harden by exposure to the air or sun, without putting in the oven? I need something of the kind to finish up lamp bases, etc., and to coat small articles made of tin and brass.

13.—VISE JAWS.—What is the best material to stick leathers to vise jaws, for holding gibs and keys, and other fine work, while finishing? I have tried copal varnish, but it is not satisfactory.—C. A. W

APPLICATIONS FOR EXTENSION OF PATENTS.

INSTRUMENT FOR INDICATING THE DEPTH OF WATER IN SHIPS.—Gideon B. Massey, New York city, has petitioned for an extension of the above patent. Day of hearing, July 26, 1871.

CUPOLA AND OTHER FURNACES.—Philip W. Mackenzie, Blauveltville, N. Y. has petitioned for an extension of the above patent. Day of hearing, Aug. 9, 1871.

RAKING APPARATUS FOR HARVESTERS.—Joseph W. Budd, Midland City Mich., has petitioned for an extension of the above patent. Day of hearing August 2, 1871.

VIBRATING SHEARS.—John Toulmin, Worcester, Mass., has petitioned for an extension of the above patent. Day of hearing, August 9, 1871.

Value of Extended Patents.

Did patentees realize the fact that their inventions are likely to be more productive of profit during the seven years of extension than the first full term for which their patents were granted, we think more would avail themselves of the extension privilege. Patents granted prior to 1861 may be extended for seven years, for the benefit of the inventor, or of his heirs in case of the decease of the former, by due application to the Patent Office, ninety days before the termination of the patent. The extended time inures to the benefit of the inventor, the assignees under the first term having no rights under the extension, except by special agreement. The Government fee for an extension is $100, and it is necessary that good professional service be obtained to conduct the business before the Patent Office. Full information as to extensions may be had by addressing

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MOLD.—J. Demarest and J. L. Mott, Mott Haven, N. Y.
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PLIERS.—N. Thompson, Brooklyn, N. Y.
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114,744.—CARBURETING.—J. Ambuhl, Morristown, Pa.
114,745.—CAR REPLACER.—C. C. Ash, Manor Hill, Pa.
114,746.—HOLDBACK.—W. Baker, Wellington square, Canada.
114,747.—HARVESTER.—J. Barnes, Rockford, Ill.
114,748.—SHUTTER WORKER.—H. H. Barr, Harrisburg, Pa.
114,749.—HARVESTER BINDER.—J. Barta, La Crosse, Wis.
114,750.—PLASTER.—J. C. Battersby, New York city.
114,751.—CARRIAGE TOP.—W. Bauder, Circleville, Ohio.
114,752.—PAPER BOX.—P. Beer, Detroit, Mich.
114,753.—SCREEN.—E. G. Belknap, Philadelphia, Pa.
114,754.—DRILL.—A. Blatchly, San Francisco, Cal.
114,755.—CAR COUPLING.—E. Bolman, G. Clarke, Halifax, N.S
114,756.—LOOM.—S. Boorn, Lowell, Mass.
114,757.—TICKET BOX.—N. C. Burson, J. Robertson, Onargo, Ill.
114,758.—CAR COUPLING.—P. Campbell, Carrolltown, Pa.
114,759.—COMBINED TOOL.—G. J. Capewell, Cheshire, Conn
114,760.—BALE TIE.—W. J. Carroll, Natchez, Miss.
114,761.—CEMENT.—Isaac Charles, Allegheny City, Pa.
114,762.—GRATE.—J. Churchman, Burlington, N. J.
114,763.—GAS RETORT.—D. W. Clark, Chicago, Ill.
114,764.—WASHING MACHINE.—N. G. Clary, Northfield, Minn
114,765.—BLIND STILES.—L. M. Collins, Lebanon, N. H.
114,766.—LAMP SHADE.—[illegible] H. Collins, Chelsea, Mass.
114,767.—CULTIVATOR.—J. H. Conley, Moingona, Iowa.
114,768.—SCROLL SAW.—G. Cooke, Napier, Canada.
115,769.—FIREPROOF ROOFING.—J. B. Cornell, New York city
114,770.—TOOL.—J. W. C[illegible]ier, Newbury, Vt.

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114,771.—Telegraph.—L. C. D'Arlingcourt, Paris, France.
114,772.—Taper.—S. and G. Dare, New York city.
114,773.—Elastic Type.—H. J. Davies, New York city.
114,774.—Furnace.—J. Davis, Pittsburgh, Pa.
114,775.—Fire Extinguisher.—J. C. Davison, Chicago, Ill.
114,776.—Purifier.—G.C.L.Degenhardt,Williamsburgh,N.Y.
114,777.—Chair.—E. Dietz, Philadelphia, Pa.
114,778.—Scroll Saw.—W. H. Dobson, Rochester, N. Y.
114,779.—Plane.—J. E. Donaldsno, Montezuma, Ind.
114,780.—Kiln.—E. P. Eastwick, Baltimore, Md.
114,781.—Spinning Top.—P. Ely, New York city.
114,782.—Door Bolt.—F. Engelbrecht, Memphis, Tenn.
114,783.—Velocipede.—W. Erd, New Ulm, Minn.
114,784.—Compound.—W. P. Fennell, Louisville, Ky.
114,785.—Churn.—J. E. Finley, Memphis, Tenn.
114,786.—Stereotype Block.—J. Fish, Chicago, Ill.
114,787.—Carbureter.—R. B. Fitts, Philadelphia, Pa.
114,788.—Stove.—B. G. Fitzhugh, Frederick, Md.
114,789.—Grain Separater.—P. Flickinger, Hanover, Pa.
114,790.—Telegraph.-T.M.Foote,C.A.Randall,Brooklyn,N.Y.
114,791.—Telegraph.-T.M.Foote,C.A.Randall,Brooklyn,N.Y.
114,792.—Telegraph.-T.M.Foote,C.A.Randall,Brooklyn,N.Y.
114,793.—Telegraph.-T.M.Foote,C.A.Randall,Brooklyn,N.Y.
114,794.—Thrasher.—J. Foreman, Healdsburg, Cal.
114,795.—Stock Car.—G. W. Fox, Laramie, Wyoming Ter.
114,796.—Wagon Brake.—N. Frey, Erie, Pa.
114,797.—Coupling.—E. M. George, Three Rivers, Mich.
114,798.—Compound.—L. C. Gifford, Monticello, Ill.
114,799.—Meat Chopper.—J. L. Good, Elizabethtown, Pa.
114,800.—Clamp.—W. H. Goodchild, Centreville, N. J.
114,801.—Clamp.—W. H. Goodchild, Centreville, N. J.
114,802.—Still.—John Gracie, Pittsburgh, Pa.
114,803.—Still for Oil.—John Gracie, Pittsburgh, Pa.
114,804.—Water Valve.—J. Guild, Buffalo, N. Y.
114,805.—Lamp Burner.—E. J. Hald, Foxcroft, Me.
114,806.—Damper.—E. R. Hall, D. A. Keyes, Norfolk, Conn.
114,807.—Projectile.—E. C. Hancock, New Orleans, La.
114,808.—Wagon Standard.—J. Harding, Ainsworth, Iowa.
114,809.—Scouring Leather.—D. Harrington, Boston, Mass.
114,810.—Compound.—J. Harrison, Castalia, N. C.
114,811.—Sign.—J. Harrison, New York city.
114,812.—Guard.—D. F. Hartman, Charles City, Iowa.
114,813.—Hinge.—D. B. Hawkes, Providence, R. I.
114,814.—Dovetailing.—E. Heath, San Francisco, Cal.
114,815.—Needle Setter.—E. E. Hendrick, Carbondale, Pa.
114,816.—Carriage Jack.—D. Hiestand, Pughtown, Pa.
114,817.—Vise.—Frank Higel, Philadelphia, Pa.
114,818.—Baby's Chair.—Esther Hoare, Dedham, Mass.
114,819.—Bolster.—Jacob Hofmann, Chicago, Ill.
114,820.—Punch.—H. S. Holmes, D. Williams, Boston, Mass.
114,821.—Bolt.—C. G. Holsten, Orebro, Sweden.
114,822.—Plow Colter.—H. S. Hoxie, Raisin Center, Mich.
114,823.—Presser Feet.—Thomas Hudson, Troy, N. Y.
114,824.—File.—Amasa Hyland, Hingham, Mass.
114,825.—Shade Fixtures.—W. Johnson, Waterbury, Conn.
114,826.—Washing Machine.—G. F. Jordan, Gardiner, Me.
114,827.—Harvester Rake.—D. A. Kellogg, Valparaiso, Ind.
114,828.—Umbrella.—R. P. Knapp, New York city.
114,829.—Box Stereoscope.—W. M. Kohl, Cincinnati, Ohio.
114,830.—Treadle.—C. P. Leavitt, New York city.
114,831.—Evaporator.—R. G. Leckie, Acton Vale, Canada.
114,832.—Marine Locomotive.—Sverre Lee, New York city.
114,833.—Saw Mill.—C. E. Lewis, Bay City, Mich.
114,834.—Separater.—W. C. Leyburn, Sparta, Wis.
114,835.—Scroll Saw Machine.—S.G.Mason, Rochester,N.Y.
114,836.—Dairy Water Heater.—G. W. McCammon, Manheim, D. H. Burrell, Little Falls, N. Y.
114,837.—Fire Box.—W. L. McDowell, Philadelphia, Pa.
114,838.—Cooking Stove.—W.L.McDowell, Philadelphia,Pa.
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114,840.—Washing Machine.—L. R. Mills, Tekonsha, Mich.
114,841.—Keeper for Bolts.—J.M. Mitchell,Cincinnati,Ohio.
114,842.—Sash Holder.—J. H. Morse, Peoria, Ill.
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114,844.—Globe Valve.—Matthew Murphy, Charlotte, N. C.
114,845.—Whip Socket.—James Nellis, Ypsilanti, Mich.
114,846.—Spark Arrester.—Michael O'Connor,Bangor,Mich.
114,847.—Foot Brush.—J. W. Osborne Brooklyn, N. Y.
114,848.—Amalgamator.—J. S. Phillips, San Francisco, Cal.
114,849.—Alarm.—J. L. Pillsbury, Columbus, J. S. Shorb, Canton, Ohio.
114,850.—Type Setting Machine.—T. J. Plunket, N.Y. city.
114,851.—Girder Rest for Timber.—J.Preston,Boston,Mass.
114,852.—Curtain Fixture.—L. C. Prindle, Chicago, Ill.
114,853.—Horse Power.—F. W. Randall, Burlington, Mich.
114,854.—"Fix" for Furnaces.—A. Reese, Pittsburgh, Pa.
114,855.—Plow.—T. H. Reynolds, Rome, Ga.
114,856.—Finger Ring.—H. P. Richmond, T. E. Carpenter, Providence, R.I.
114,857.—Toggle Pin.—W. H. Ridley, Pittsburgh, Pa.
114,858.—Housing for Rolls.—John Rigby, Pittsburgh, Pa.
114,859.—Dovetailing Machine.—J. B. Ritchey, Pomeroy,O.
114,860.—Kettle Handle.—H. T. Robbins, Hyde Park, Mass.
114,861.—Cut-off.—S. W. Robinson, Champaign, Ill.
114,862.—Sewing Machine.—N.M. Rosinsky, New York city.
114,863.—Steam Mangle.—Peter Rundquist, New York city.
114,864.—Plate Holder.—J. F. Ryder, Cleveland, Ohio.
114,865.—Valve and Governor.—R. Sanderson,Cleveland,O.
114,866.—Applying Motive Power.—J.Schley,Savannah,Ga.
114,867.—Fruit Parer.—R. P. Scott, Cadiz, Ohio.
114,868.—Paper Board.—E. A. Seeley, Scotch Plains, N. J.
114,869.—School Desk.—H.G.Sellman, North Newburg,Mich.
114,870.—Mechanical Movement.-A.Shear,Plymouth,Mich.
114,871.—Envelope.—E. J. Smith, Washington, D. C.
114,872.—Gas Retort.—J. H. Smith, Newark, Ohio.
114,873.—Churn.—B. H. Steele, Barnesville, Ohio.
114,874.—Horse Power.—H. B. Stevens, Buffalo, N.Y.
114,875.—Shutter Worker.—F. Strattner,Wilmington, Del.
114,876.—Steam Boiler.—Daniel Sullivan, Bangor, Me.
114,877.—Railway Axle Box.—J.B.Sutherland,Detroit,Mich.
114,878.—Excavator.—Thomas Symonds, Portland, Me.
114,879.—Hand Stamp.—C. G. Taft, Jr., Norton, Mass.
114,880.—Paper Pulp.—Thos. Taylor,Grove End Road,Eng.
114,881.—Cultivator.—N. S. Thompson, Richmond, Ind.
114,882.—Malt Bruising Machine.-J.F.Tibble,Detroit,Mich.
114,883.—Smoke Stack.—Wenzel Toepfer, Milwaukie, Wis.
114,884.—Brick Machine.—J.V.Tompkins,Canandaigua,N.Y.
114,885.—Carriage Bow.—I. N. Topliff, Elyria, Ohio.
114,886.—Ruling Machine.—J.Tregurtha,Charlestown,Mass.
114,887.—Cutter.—J. R. Tunnicliff, Van Hornesville, N. Y.
114,888.—Stripper.—J. R. Tunnicliff, Van Hornesville, N.Y.
114,889.—Cotton Chopper.—E. B.Turnipseed, Columbia,S.C.
114,890.—Millstone Balance.—G.T.Clark,Kalamazoo,Mich.
114,891.—Roasted Wheat.—G. W. Waitt, Philadelphia, Pa.
114,892.—Metal Roller.—C.While, W. Lewis, T.Strickland, S. Caddick, Spuyten Duyvil, N.Y.
114,893.—Pencil Holder.—H.J.Wickham, Manchester,Conn.
114,894.—Measuring Pail.—J. B. Wightman, Brooklyn,N.Y.
114,895.—Wood Pavement.—R. H. Willet, Washington,D.C.
114,896.—Millstone Dress.—James Wilson, Davis Mills,Va.
114,897.—Lumber Rack.-R.B.Woodcock,Grand Rapids,Mich.
114,898.—Fanning Mill.—Peter Young, Austin, Minn.
114,899.—Windmill.—S. M. Abbott, Wilmington, Del.
114,900.—Molding Machine.—J. Albright, Midway, Tenn.
114,901.—Chewing Tobacco.—D. A. Alden, Malden, Mass.
114,902.—Steam Radiator.—V. D. Anderson, Kewanee, Ill.
114,903.—Pipe Coupling.—V. D. Anderson, Kewanee, Ill.
114,904.—Water Pipe.—T. J. Barron, Brooklyn, N. Y.
114,905.—Mold.—T. J. Barron, Brooklyn, N. Y.
114,906.—Wick Regulator.—H.Beebe,JerseyCityHights,N.J
114,907.—Wainscoting.—J. W. Boughton, E. C.Hussey,N.Y.
114,908.—Planter.—W.C. Bowman, Clarksburg District,Md.
114,909.—Carriage.—F. A. Bradley, New Haven, Conn.
114,910.—Latch.—E. K. Breckenridge, West Meriden, Conn.
114,911.—Battery.—D. Brooks, Philadelphia, Pa.
114,912.—Beehive.—J. F. Broomfield, Richmond, Ky.
114,913.—Whiffletree.—W. S. Brown, Thorntown, Ind.
114,914.—Propulsion.—Patrick Burke, Boston, Mass.
114,915.—Window Sash.—A. G. Buzby, Philadelphia, Pa.
114,916.—Cooler.—J. W. Campbell, Sr., New York city.
114,917.—Curtain Fixture.—N. Campbell, Rochester, N. Y.
114,918.—Curtain Fixture.—N. Campbell, Rochester, N. Y.
114,919.—Tempering Wheel.—F.L.Carnell,Philadelphia,Pa.
114,920.—Nail Pointer.—A. H. Caryl, Groton, Mass.
114,921.—Saw Filer.—C. P. Case, Troy, Pa.
114,922.—Churn.—S. S. Case, Marion, N. Y.
114,923.—Bed Spring.—J.P.Chamberlain, N. Abington,Mass.
114,924.—Insulator.—Stephen Chester, Elizabeth, N. J.
114,925.—Harness.—F.L. Churchill, R. C. Beach,Minneapolis, Minn.
114,926.—Saw Arbor.—G. W. Colburn, Gardiner, Me.
114,927.—Metallic Sign.—S. C. Collis, Philadelphia, Pa.
114,928.—Base-burning Stove.—A. C. Corse, Troy, N. Y.
114,929.—Loom.—J. F. Crowley, Philadelphia, Pa.
114,930.—Bread Slicer.—J. W. Currier, Springfield, Mass.
114,931.—Can Top.—C. E. Dayton, Meriden, Conn.
114,932.—Cigar Mold.—N. Dubrul Joliet, Ill.
114,933.—Vehicle.—W. Fisher, Marathon, N. Y.
114,934.—Clothes Dryer.—M. Flanders, Kendall, N.Y.
114,935.—Screw Taps.—G. H. Fox, Boston, Mass.
114,936.—Switch.—Samuel French, Boston, Mass.
114,937.—Wagon Jack.—A. R. Giles, Adams, N. Y.
114,938.—Repeater.—Elisha Gray, Chicago, Ill.
114,939.—Pipe Cutter.—Dennis Harrigan, Somerville, Mass.
114,940.—Gate.—S. H. Heatwole, Bridgewater, Va.
114,941.—Tanning.—Allen Hisey, Tama City, Iowa.
114,942.—Sash Holder.—R. B. Hugunin, New York city.
114,943.—Stove.—Zebulon Hunt, Hudson, N. Y.
114,944.—Propeller.—Robert Hunter, Cincinnati, Ohio.
114,945.—Billiard Balls, etc.—J.W. Hyatt,Jr.,Albany,N.Y.
114,946.—Artificial Stone.—J. J. Johnston, Columbiana, O.
114,947.—Stove.—W. M. Jones, Horicon, Wis.
114,948.—Bracket.—A. D. Judd, New Haven, Conn.
114,949.—Boot Heel.—A. B. Keith, Braintree, Mass.
114,950.—Igniter.—W. Klinkerfues, Göttingen, Prussia.
114,951.—Firearm.—James Lee, Milwaukee, Wis.
114,952.—Bag Holder.—W. P. Leland, Mendon, Mich.
114,953.—Borer.—Robert Little, Freeport, Ill.
114,954.—Lamp.—C. B. and S. S. Mann, Baltimore, Md.
114,955.—Bed.—C. F. Manuel, D. M. Leonard, La Crosse, Wis.
114,956.—Sheet Iron.—Caleb Marshall, Philadelphia, Pa.
114,957.—Feeder.—C. E. Moore, Boston, Mass.
114,958.—Car Wheel.—J. K. & N. B.Morange,Pittsburgh,Pa.
114,959.—Current Wheel.—C. Morehouse, Wayland, N.Y.
114,960.—Earth Closet.—H. Moule, Fordington, and James Bannehr, Exeter, Eng.
114,961.—Flour Sifter.—W. B. Nichols, Seymour, Conn.
114,962.—File.—H. B. Nickerson, Boston, Mass.
114,963.—Bank Check, etc.—A. C. Paquet, Philadelphia,Pa.
114,964.—Cultivator.—G. W. Parsons, W. S. Finney, Harrisburgh, Pa.
114,965.—Draft Regulator.—W. E. Pearson, E. Boston,Ms.
114,966.—Flour Bolt.—D.N.M.Peregoy, Elizabethtown,Ten.
114,967.—Millstone.—D. N.M.Peregoy,Elizabethtown,Tenn.
114,968.—Copying Drawings, etc.—I.Rehn,Washington,D.C.
114,969.—Piston Packing.—G. H. Reynolds, New York city.
114,970.—Boot Jack.—M. A. Richardson, Sherman, N. Y.
114,971.—Lard Package.—John Ring, St. Louis, Mo.
114,972.—Preserving Meat.—A. Robertson, Seymour, Ind.
114,973.—Wagon Brake.—John J. Rose, Elmwood, Ill.
114,974.—Separator.—L. C. Royer, Royerton, Ind.
114,975.—Knife.—Morgan Rufe, Doylestown, Pa.
114,976.—Brake.—J. W. Scott, Broad Top City, Pa.
114,977.—Fanning Mill.—H. H. Seeley, Hudson, Mich.
114,978.—Blacking.—J. C. Sellars, Birkenhead, England.
114,979.—Car Wheel.—G. Sewell, Brooklyn, N. Y.
114,980.—Bolting Roll.—D. Shamp, Perry, N. Y.
104,981.—Faucet.—E. D. Shoenberger, Philadelphia, Pa.
114,982.—Hitching Post.-E.F.Shoenberger,Germantown,Pa.
114,983.—Brake.—C. A. Smith, Jersey City, N. J.
114,984.—Separator.—John Smith, Burlington, Wis.
114,985.—Cooling Milk.—D. E. Somes and F. C. Somes, Washington, D. C.
114,986.—Square.—Knud Steen, Rochester, N. Y.
114,987.—Rule Joint.—D. H. Stephens, Riverton.
114,988.—Draft Equalizer.—W, Stevenson, Neponset, Ill.
114,989.—Pump.—Z. T. Sweet, Tiskilwa, Ill.
114,990.—Washing Machine. J. Taber, S. Wolfborough, N. H.
114,991.—Nut Lock.—S. I. Thompson, New Waterford, Ohio.
114,992.—Key Fastener.—L. Tobey, Naples, N. Y.
114,993.—Dough Kneader.—W. Tyler, Georgetown, D. C.
114,994.—Boot Sole.—H. S. Vrooman, Boston, Mass.
114,995.—Brake.—Henry Walmer, Lebanon, Pa.
114,996.—Hydrant.—James Walsh, Philadelphia, Pa.
114,997.—Tobacco Pipe.—W. F.Warburton, Philadelphia,Pa.
114,998.—Ice Creeper.—M. Warne, Philadelphia, Pa.
114,999.—Pitching Casks.—Albin Warth, Stapleton, N. Y.
115,000.—Lathe.—Hervey Waters, Boston, Mass.
115,001.—Bolt.—Jacob Weimar, New York city.
115,002.—Cigars.—John Wettstein, Baltimore, Md.
115,003.—Alarm.—F. E. Whiteside, Oxford, Pa.
115,004.—Harvester.—J. B. Whiting, Ripon, Wis.
115,005.—Paper.—J. M. Willcox, Glen Mills, Pa.
115,006.—Shuttle.—Daniel Wright, Waltham, Mass,
115,007.—Screw Bolt.—C. O. Yale, New York city.
115,008.—Hammer.—G. M. Young, El Paso, Ill.
115,009.—Bolt.—O. P. Briggs and L. W. Briggs, Chicago, Ill.

REISSUES.

4,379.—Horse Power.—H. Aldridge, Elizabethtown, N. M.—Patent No. 68,829, dated September 17, 1867.
4,380.—Grinding Ore.—Thomas Bates, Central City, Colorado.—Patent No. 102,476, dated May 3, 1870.
4,381.—Head Covering.—C. F. Bosworth, Milton, Conn.—Patent No. 38,306, dated June 9, 1863.
4,382.—Pulley.—G. W. Gregory, New York city.—Patent No. 57,125, dated August 14, 1866; antedated February 14,1866; reissue No. 2,784, dated October 22, 1867; reissue No. 2,939, dated May 19, 1868.
4,383.—Cultivator.—T. McQuiston, Morning Sun, Ohio.—Patent No. 25,843, dated October 18, 1859.
4,384.—Seasoning Lumber.—H. H. Beach, Rome, N. Y.—Patent No. 107,854, dated October 4, 1870.
4,385.—Feeder.—G. Cade, Long Branch, N. J.—Patent No. 101,427, dated April 5, 1870.
4,386.—Stove.—W. J. Keep, Troy, N. Y.—Patent No. 101,368, dated March 29, 1870.
4,387.—Heater.—David Stuart and Lewis Bridge, Philadelphia, Pa.—Patent No. 79,275, dated June 23, 1868; reissue No. 3,608, dated August 17, 1869.

DESIGNS.

4,903.—Sash Holder. E. C. Heister, G. O. Heister, Reading, Pa.
4,904.—Eraser.—S. D. Hovey, Brooklyn, N. Y.
4,905.—Carpet Pattern.—A. McCallum, Halifax, England.
4,906.—Fountain.—J. Moore, W. Wilkinson, Brooklyn, N. Y.
4,907.—Fountain.—J. Moore, W. Wilkinson, Brooklyn, N. Y.
4,908.—Carpet Pattern.—E. Perrin, Kidderminster, Eng.
4,909.—Carpet Pattern.—E. Perrin, Kidderminster, Eng.
4,910.—Stove.—J. R. Rose and E. L. Calely, Philadelphia, Pa.
4,911.—Bracelet.—D. H. Smith, Attleborough, Mass.
4,912.—Clock Case.—W. L. Tyler, Bristol, Conn.
4,913.—Bedstead.—N. C. Whiscomb, Oak Hill, N. Y.
4,914.—Carpet Pattern.—G. C. Wright, New York city.
4,915.—Jelly Glass.—J. S. Atterbury and T. B. Atterbury, Pittsburgh, Pa.

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EXTENSIONS.

Binding Books.—A. H. Rowand, of Allegheny City, Pa. Letters Patent No. 17,299, dated May 12, 1857.
Bedstead Fastening.—A. M. Rodefer, of Springfield, Ohio. —Letters Patent No. 12,693, dated April 10, 1855.

DISCLAIMERS.

Lantern.—W. Westlake, J. F. Dane, and J. P. Covert.—Letters Patent No. 42,520, dated April 26, 1864; reissue No. 3,747, dated Nov. 23, 1869.
Composition for Roofing.—Plastic Slate Roofing Joint Stock Company, of New York city.—Letters Patent No. 46,495, dated Feb. 21, 1865; reissue No. 2,634, dated July 16, 1867.

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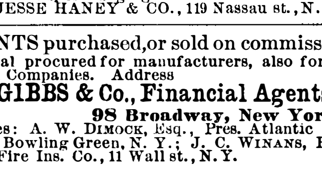

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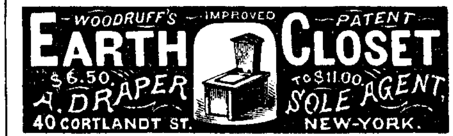

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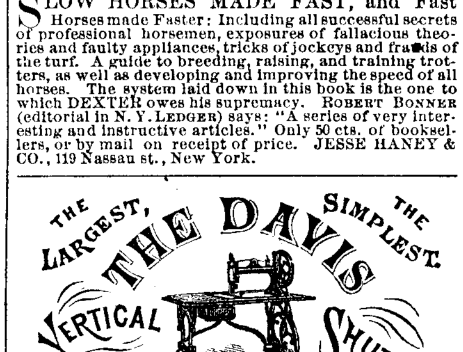

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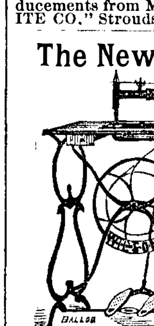

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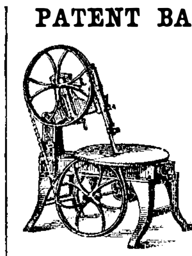

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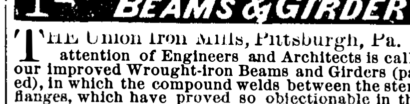

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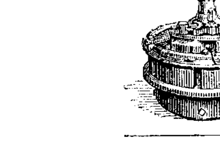

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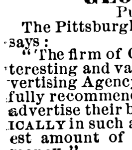

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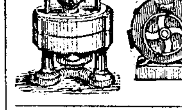

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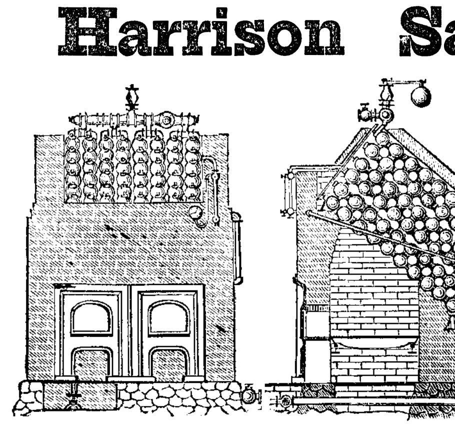

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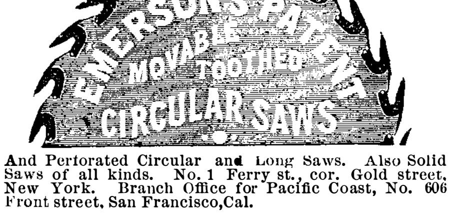

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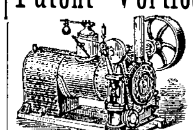

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