Correspondence.

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

Maple Sugar.

To the Editor of the Scientific American:

There is a short article headed "Maple Sugar," in your issue of April 27, in which the writer gives an account of the process of the manufacture of that sweet compound. He says that nearly all of our hard wood trees will yield more or less sugar; this I doubt. I do not deny but what all of our hard wood trees will yield sap, but I deny that nearly all of them will yield sugar. Take, for instance, the birch; one birch tree of common size will yield more sap than two or three maple sugar trees will, in the same length of time; but the sap concentrated by boiling yields a compound as unlike sugar, in looks, taste, and smell, as tar is unlike honey. Again he says: "After the sap is drawn, it is concentrated by boiling it until it commences to crystalize." Now this is not so. Having had considerable experience in sugar making, I will give to your many readers the usual process of the manufacture of that desirable article. After the sap is drawn, it is concentrated by boiling to the consistency of sirup, but never until it crystalizes. When the sirup becomes thick enough to "apron" (as the farmers call it), or when it will drop from a dipper (which they always have to stir the sap with and to dip off the scum which rises to the top) in thick sheets, it is immediately removed from the fire, and allowed to cool or not as the maker of the sugar may desire. After it is removed from the fire, it is dipped from the kettle or pan in which it is boiled into wooden pails or barrels. The next operation is to strain or filter the sirup through woolen cloth This done, it is set away, and the farmer can sugar it off at his convenience.

If the sap were allowed to boil until it commenced to crystalize, it would be impossible to filter the sirup; consequently it would be of no value, for the reason that it would be so full of dirt that it could not be used.

When the farmer comes to "sugar off" his sirup, as it is called, the kettle or pan is cleansed until it is perfectly clean. The sirup is then poured in and two or three eggs, according to the quantity, are well beaten and added to the sirup. This is to cleanse it from all impurities which rise to the top while boiling. Some use milk in the place of eggs; others, both. Farmers never boil the sap that runs after the trees commence to bud, for sugar made from such sap is unfit for use, because it is black and has a taste which is termed "buddy." I have known trees that have been tapped for fifty successive years, and then look as though they would last for as many more.

H. N. L.

The Cause of Earthquakes.

To the Editor of the Scientific American:

I do not know whether the theory I wish to advance about earthquakes is new or old. The phenomena are felt all over the world; and I ask, are they not caused by the shrinking of the earth's crust? Our mountain chains and river valleys are diagonal to the greatest diameter of this planet; and the volcanoes allow vent for the gases, the upheaved crust forming the mountains. The shells and other sea fossils which lie in the formation of these mountains indicate the salt plains; the deep soil through which the rivers plow furrows shows that the richness of the earth is washed into the sea, to be upheaved again when the land has become too poor to support life. When new streets are opened in Kansas City, Mo., the excavation is sometimes thirty or forty feet deep through alluvial deposits, uncovering water worn ledges of rock which are now 100 feet above the river. The tree growth of the Eastern portion of this continent denotes that the land does not show great antiquity.

I hope to learn, through your columns, what *savans* think of the causes of earthquakes.

J. W.

Elgin, Ill.

Making Shingles.

To the Editor of the Scientific American:

Some years ago I owned a manufactory for cutting and sawing pine shingles, and I tried the following experiment: I had an old thick 40 inch saw, from which I broke off the teeth, and then, by running it slowly in a mandrel and holding against it pieces of broken grindstone, ground down the edge upon one face till it was sharp all round like a circular knife. I then put it on my sawing machine, and by putting on a larger pulley and reducing the driver, made it revolve at about 60 revolutions per minute. Then by using well steamed blocks, I succeeded in cutting with it, before the edge turned too much, some scores of perfectly sound and smooth shingles. It required but little power to force the block on to it, and though it crowded or rubbed pretty hard, I do not think it would have heated injuriously if run constantly at that motion. The experiment convinced me that, above all others, this is the way to make shingles, or cut other thin and small sized boards. The difficulty lies in getting a proper and well tempered solid knife, of the kind, made; and after corresponding with several tool and saw makers on the subject, without getting any one to attempt the job, I gave it up. I believe now, however, that a knife made in sections, or plates of tempered steel riveted on to either a cast or wrought solid circular center of the right thickness, would answer the purpose. This might be an inch or more in thickness at the center, so as to give great rigidity. A knife of this kind need never be taken from its bearing to be sharpened. but could always be kept with the keenest edge by having a stone so fixed as to bear against it as it revolved. Owing to its drawing cut, it would pass through knots or other tough places in the timber much more easily than a straight knife, and its edge might be made much thinner and yet stand. My experience in cutting pine shingles shows this to be a great advantage, for, out of good well steamed timber, with a sharp thin knife, shingles perfectly sound can be made, while with a thick or dull knife they will always be checked. An edge that will stand knots safely when chopping through a bolt will not cut a sound shingle.

The advantages of using such a machine as this are so manifest that, when once it were settled that it would work, its adoption would be universal. It would be constantly ready for use, and there would be no stopping for filing or sharpening. It would not take one fourth the power of a saw. It would save at least one fourth of the timber, and would make perfectly smooth shingles. If inclined to heat in use, a stream of water might be run on it to keep it cool.

The best way to set it would be on the top of a perpendicular shaft, with a reciprocating frame holding the bolts sliding back and forth over the top face, cutting two bolts at once from opposite sides.

The cost of steaming timber is merely nominal in a steam mill, using waste steam, which is the best, and it is a positive advantage to the timber to steam it.

CHARLES BOYNTON.

Memphis, Tenn.

Power Required for Canal Towage.

To the Editor of the Scientific American:

The SCIENTIFIC AMERICAN of May 4 contains a paragraph under the title "Cable Towing on the Erie Canal," which might lead your readers to think that you sanctioned all the statements therein made, and in this way serve the interests of the Cable Towing Company, to the prejudice of many other inventors who are now engaged in working out different methods of accomplishing the same result. The portion of the paragraph alluded to, which I think requires your correction, is the statement of the comparative cost of towing loaded boats by horses, and the system by cable. By the former, it is stated, the aggregate cost of towing a boat the entire length of the canal, 350 miles, is $122.50. By the steam cable system, "it is confidently believed" that one tug will haul six boats at a speed of three miles per hour, with an expenditure of two tuns of coal for twenty-four hours, six days being allowed for making a trip. The cost of coal for towing the six boats will be $6 per tun, or $72. I am very anxious to know the facts. My own experience is that it takes three horse power to tow a boat with 200 tuns freight at a speed of one mile and a half per hour, no matter what the motive power may be; and that, to tow the same boat at three miles an hour, will require about twenty-four horse power. This great difference in the power required—with but a small increase of speed—arises from a law which cannot be shirked by any mechanical contrivance. It will, therefore, take 144 horse power to tow the six boats at three miles per hour, and say 26 to propel the tug; in all, 170 horse power. Eight pounds of coal for each horse power per hour is as little as can be allowed; that is 1,360 pounds, equal to 16¼ tuns per day, or 97¼ tuns, which, at $6 per tun, equals $585, the cost of coal for the trip.

If the foregoing statement is about correct, it is safe to say that boats cannot be towed economically at a speed of three miles per hour. The best speed for towing by steam will be found to be two miles an hour, and this can be attained economically by any of several systems that have been invented.

A. B.

Rochester, N. Y.

[While the resistance to vessels in canals is much greater, especially in narrow canals, than in open water, still we think that our correspondent is in error in his estimates for the propulsion of a train of six boats. Some useful data upon the economies of steam power, as applied to propulsion, will be found on page 321 of our present volume, where it appears that 2½ lbs. of coal per horse power per hour are consumed on the steamer *Adriatic*, her maximum speed being 16¼ knots per hour, and her burthen 4,200 tuns.—EDS.]

NORTH CAROLINA FISHERIES.—Herring and shad are so abundant in North Carolina that the former are selling for $1.50 per thousand, and the finest shad at from 10 to 25 cents each. The seines used are of immense size, and are worked by steampower. A seine worked at the mouth of the Chowan is said to be a mile and a half in length, and in it 300,000 herrings have been taken in one day. They also take from one to two thousand shad at a catch. Steamers are at the wharves, constantly loading with these fine fish, packed in ice, for the New York and other northern markets.

HOW TO WASH PRINTING ROLLERS.—Avoid all grit, sand, and dirt, simply use strong ley to loosen the ink; and quickly, with a soft sponge, wash off with water (in winter blood warm) the ley, squeezing the sponge dry, face up the roller, so that no moisture remain thereon. Let it then stand exposed to the air one hour, machine rollers two hours, before distributing ink on its surface. The time for exposure must be guided by the state of the weather, as shorter time will do in dry or windy weather. Be careful to ink the roller as soon as possible after exposure to keep it tacky.

CEMENT FOR FIXING GLASS LETTERS.—A thick solution of marine glue in wood naphtha will answer perfectly if color is no object. But the glass must be chemically clean, and this is not always easy. The least trace of soap or grease will spoil the adhesion of any cement. Try soda or ammonia, followed by whiting and water, clean cloths, and plenty of rubbing, and let the cement dry on the letters till the surface just begins to be "tacky" before you apply them.

The Uses of Old Rags.

Woolen rags, as they come in from the peddlers, comprise every variety of fabric that it is possible to produce from wool, from a coarse and harsh carpet to the finest and softest product of the loom. These are piled up in huge heaps upon the warehouse floor, and women and girls, whose wages average from four to five dollars a week, attack them on all sides and "sort" them into no less than ten grades, each of which has a special use and an established value. The greater part of these are manufactured into "shoddy," and, as this is a word concerning which a general misapprehension exists, it may be well to devote a paragraph to its consideration.

Shoddy is, perhaps, the best abused material in use. So far from being a mere sham and a poor substitute for wool, it is, in reality, a valuable material, and enters, in certain proportions, into the composition of nearly all cloth. It is not, as is generally supposed, woolen rags ground to a powder and worked into the cloth to give it weight, but wool fiber, combed out of wool fabrics by a peculiar process, and, mixed with new wool when the latter is carded, is spun with it, and finally becomes a component part of the cloth.

Thus, by mixing a due proportion of fine grade of shoddy or wool fiber with new wool of a coarse grade, a substantial yet soft and handsome fabric can be produced and sold at a moderate price; while the same thing, with fine high cost wool in the place of the much reviled shoddy, would cost far more and possess but little more value so far as wear and appearance are concerned.

Cotton and linen rags are sorted with equal care. They are the principal source of papermaking material, and are in constant demand. Used alone, they make the highest grade of paper, while, in combination with varying proportions of paper stock, they produce the various grades of paper to be found in the market. Paper material may be used over and over again, provided always that a given amount of new rag stock is used, but it deteriorates in value with each process, owing to the breaking and consequent shortening of the fiber; and, beginning, say in the form of writing paper of fine quality, it passes successively through the various grades, and eventually is found in the shape of a coarse article, possessing little strength and small value.

Saving Money.

The possession of a few dollars often makes all the difference between happiness and misery, and no man, especially with a family dependent upon him, can be truly independent unless he has a few dollars reserved for the time of need. While extreme carefulness as to the expenditure of money will make a rich man poor, a wise economy will almost as certainly make a poor man rich, or at least make him, to a considerable extent, independent of the caprices of employers and of the common vicissitudes of life. Nothing is more important to the poor man than the habit of saving something; but his little hoard will soon begin to grow at a rate which will surprise and gratify him. Every working man ought to have an account in some savings' bank, and should add to it every week during which he has full employment, even if the addition is but a dollar at a time. If he does this, he will soon find the dollars growing into tens, and these tens into hundreds, and in a little time will be in possession of a sum which is constantly yielding an addition to his income, which secures him a reserve fund whenever one is needed, and which will enable him to do many things, which, without a little money, he would be powerless to do.—*Pittsburgh Post.*

Anvils.

The best anvil in the market is, perhaps, the Peter Wright anvil, made in England, and patented. The peculiarities of this anvil are that the horn, bick, face, and arse are one solid piece of metal, and the surface is put on in one piece, while with the ordinary anvil the horn and bick are a separate piece, the body a separate piece, and the arse and four arms or legs are also separate pieces, making, in all, seven pieces before the steel is applied, which is put on in three pieces.

Persons that have never witnessed the manufacture of anvils would naturally suppose, says *The Hub*, that the same were made upon anvils. Such, however, is not the case. The anvil upon which anvils are forged consists of a large cast iron frame of about three inches in thickness, one foot in depth, and about four feet square, resting upon the earth, or having four feet of space either way, which is filled with the heaviest kinds of iron turnings, or the smaller grades of scrap iron, the former being preferable. When the anvil is removed from the fire, it is placed upon this bed of adjustable scrap iron, and after a few blows soon sets itself into the proper position to receive the remaining blows from the strong arms of the half-dozen men who stand about the frame. The small square holes in the ends of the anvil, at what is termed the waist, are called by anvil makers "port holes" or "porter holes," into which the iron porters are inserted when taking to and from the fire and changing the position while forging. The face is finished on the grindstone.

ENDEAVOR to take your work quietly. Anxiety and overaction are always the cause of sickness and restlessness. We must use our judgment to control our excitement, or our bodily strength will break down. We must remember that our battle is to be won by a strength not our own. It is a battle that does not depend upon the swift nor the strong.

ACCORDING to a recent report of the New York and New Haven Railroad Company, not a single loss of life or limb to any passenger, on any train on that road, has occurred during the past sixteen years. Two and a half millions of passengers are annually carried. Length of road, 76 miles. This is one of the safest and best managed roads in the country.

"Sorry He Did Not Learn a Trade."

A young man, well dressed and of prepossessing appearance, called at our office recently and inquired in great earnestness if we had employment of any kind to give him for but a few days, if no longer, as he was a stranger in the city out of money, and unable to pay for a few days' board and lodging. He further stated that he was a book-keeper, but after a diligent search, he had found no one who wanted any help in that line, nor could he obtain employment at anything that he felt competent to perform in a satisfactory manner. The positions of clerk and book-keeper, he remarked, were all filled, and applicants for them far in excess of the demand. "I am sorry," said he, "that I did not learn a trade."

The appeals of the young man excited our sympathy, but, requiring no farther assistance in the office, we were compelled to reply to his eager questioning that we could not employ him.

The door closed after him, and he again went out to continue what, in all probability, proved to be a fruitless search for employment. But his words lingered behind and, as we sat musing on them, recalled to mind the oft repeated expressions of the mechanic, in which he reproves himself for want of foresight in selecting an occupation. Here I am doomed, he says, to toil in a shop, at work which is hard, affording but poor pay. Like a dog, I must come at the call of a whistle, or like a servant, obey the summons of a bell; had I studied book-keeping or entered a store as a clerk, I might have been leading a much easier and more pleasurable life.

In the cases cited, we find each one dissatisfied with his selection, and wishing to exchange places. And the difficulty at once presents itself, as to how we shall decide for them and the classes they represent, so that the seeming mistakes in selection may be remedied. We acknowledge we are unequal to the task.

Food, clothing, tools, machinery, houses, ships, and an almost endless variety of other things are continually in demand, which require the labor of farmers and mechanics; while that class which makes exchanges (merchants) is of necessity comparatively few in number, and, therefore, needs but a small force of assistants. The necessities of the millions of earth require by far the largest number of persons to be employed in agriculture and manufactures. Whenever then, through pride or any other motive, parents disregard the law and encourage their sons in seeking after situations, as clerks, book-keepers, etc., rather than to engage in those pursuits for which there is always a natural demand, there must be a corresponding amount of suffering as a penalty. Hence we find the so called respectable occupations are glutted, while the mechanical branches are suffering through the lack of skilled laborers. An advertisement for a clerk will quickly bring to the office door a small army of applicants of all sizes and ages, while the want column may plead several days for a good mechanic, and fail to meet with a response.

"Sorry he did not learn a trade." Let apprentices and journeymen, who may be bewailing their lot, at once resolve to thus repine no longer, but by hard study and close application master their trades, and having done so, demand a fair compensation. Then by adding to skill, honesty, punctuality and economy in expenditures, there need be no fear that they shall be compelled at any time to beg for sufficient employment to pay for a day's board and lodging.—*Coach Maker's Journal.*

The Diamond in its Matrix.

Professor Gustav Rose, of Berlin, in a communication to the Chemical Society of the Prussian capital on the recent discovery of diamonds *in situ*, said that the diamonds were found not loose and detached in alluvium, but actually enclosed in another mineral, and though of but microscopic size, had not on that account been the less surely identified. They were found by Professor von Jeremjew, of St. Petersburgh, in a mineral first described by Professor Rose during his journey through the Urals, and named by him xanthophyllite. This rock occurs in yellow tabular crystals, cleaving along the principal face, or radially segregated in rounded masses, and was found to be a silicate of alumina, lime, and magnesia, with some water. The spherular segregations often enclose a nucleus of the talcose schist. It is in these crystals of xanthophyllite that the crystals of diamonds are met with, lying in parallel positions in respect to each other and in a definite position as regards the crystals of their matrix, in a similar way to the minute crystals of iron mica in felspar or oligoclase; the diamond crystals, however, are smaller than these, and are not visible to the naked eye. On placing a thin plate of xanthophyllite under the microscope, the diamonds are recognized by their peculiar form, hexakistetrahedra, with somewhat rounded faces, and are seen to have their tetrahedral faces, which are also frequently visible, parallel to the cleavage face of the xanthophyllite. The diamonds are not in equal abundance in all parts of the xanthophyllite. In the yellow transparent crystals they are sparsely found, or not at all; the greenish, less transparent varieties contain them more plentifully, and are often filled to excess with them. In its bearing on the questions of the formation and origin of the diamond, the occurrence in the Urals is very interesting. There, as in Brazil, it occurs with crystaline schists, in the so called metamorphic rocks, which are supposed to be Neptunian rocks that have been deposited from water, and have subsequently undergone certain changes, amongst others that of taking crystaline characters, whereby all the organized constituents have been removed. Why carbon has separated in the itacolumite of Brazil as diamond, and at Strehlen, in Silesia, as graphite, is a phenomenon demanding explanation. Professor Rose asks whether we may trace the cause to the far greater diffusion of itacolumite in Brazil than in Silesia, where it only occurs as beds in gneiss?

Japanese Metal Work.

The Japanese are very skillful in all that relates to the artistic treatment of the metals, and produce works in this branch of art as commendable as they are varied. They are expert in casting, carving, damascening, engraving, inlaying, weaving, and tempering; and in many of these departments produce specimens comparable to anything done in Europe. Perhaps the most characteristic of all their metallurgic works is that called by them *syakfdo*. In this, numerous metals and alloys are associated, the designs being produced in colors through the agency of the various colored metals—white being represented by silver, yellow by gold, black by platina, all shades of dull red by copper and its alloys, brown by bronze, and blue by steel. Gold, silver, and polished steel, of course, represent themselves in designs as well as abstract colors. A red garment, embroidered with gold and clasped with silver, would be executed in red colored copper, inlaid with gold, and furnished with a silver brooch; the sword in the hand of a warrior would be in polished steel, and if bloody, would have red copper inlaid on it. These instances will suffice to illustrate the general mode of producing colored designs by the exclusive use of metals. The Japanese have brought bronze casting to great perfection, as is proved by the superb incense burner which was presented to H.R H. the Duke of Edinburgh by the Mikado, now on exhibition in the South Kensington Museum. They also produce a highly finished and polished bronze work, on which the relief ornamentation is produced by cutting the surrounding metal away. The relieved objects are then engraved, and richly damascened with gold and silver. Bell founding is carried on to a considerable extent, and art is never neglected in the designs. *Repoussé* work is well known to the Japanese metallurgists, but is not so largely adopted by them as it is by western artists. Flat silver wire, woven into diaper patterns, is a favorite material for covering uniform surfaces, and is frequently applied by the Japanese artists in an effective manner. In drawing the attention of the meeting to a group of storks, executed in gold, silver, bronze, and other metals, Mr. Audsley, in a paper recently read by him in England before the Architectural Association, said the audience would agree with him that the Japanese have been more successful than our silversmiths in appreciating the nature of their materials, and realizing the correct modes of working them. This group—where every feather is a thin plate of metal, carefully engraved; where the legs, tails, necks and heads of the birds are in their natural colors; where the rock they stand upon is modelled with accuracy, and its stunted vegetation truthfully rendered—would bear comparison with the best efforts of our silversmiths as displayed in presentation plate, of which the best that can be said is that it contains many pounds of "solid silver;" and the comparison would lead to the award being given in favor of the Japanese work.

Old Rubber.

A fortune awaits the happy inventor who shall teach manufacturers to restore old rubber to the condition in which it was before vulcanization, for, with that secret, there would be practically *no consumption* of this invaluable article. The thing has been done, and successfully, and we have ourselves, says the *Commercial Bulletin*, seen pieces of vulcanized rubber possessing great strength and elasticity which were made entirely from old car springs; but it has never been accomplished on a large scale, and awaits the enterprise and ingenuity of some new Goodyear to develope it.

Meantime, old rubber has its uses. By a system of steaming and passing between rollers, it is reduced to a semi-plastic state, and in this condition is used in combination with a coarse fabric for heel stiffening, a purpose for which it is admirably adapted, its waterproof qualities being of especial value. There is, in a neighboring city, a factory devoted entirely to this branch of manufacture, where several hundred tuns of old rubber of all kinds are consumed annually.

Old rubber is also largely used to mix with new raw material in the manufacture of all kinds of rubber goods. It serves to give bulk and weight, and if it does not increase, it certainly does not lessen, the strength of the fabric. It may also be mentioned that powdered soapstone, white lead, *terra alba*, and other heavy substances enter largely into the composition of almost all rubber goods, the use of which becomes apparent when it is remembered that they are generally sold by weight.

Cure of Hydrophobia.

Dr. Alford, at Flint, Mich. has cured a case of hydrophobia. The disease did not make its appearance until eight months after the patient was bitten. The treatment was this: Sulphate of morphia, one grain, was injected subcutaneously every four hours, and half a dram of powdered castor given internally, in sirup, at the same time. Chloroform was also inhaled in small quantities. In about half an hour, sleep occurred, and continued over an hour. Convulsions then recurred, and continued, with intervals of variation, for about twelve hours, when they entirely ceased. Vomiting and great prostration followed, but the patient ultimately recovered. The excessive prostration was counteracted by wrapping the patient in a woolen blanket moistened with a warm solution of muriate of ammonia, twenty grains to the ounce.

Dr. Alford states that he had another successful case of cure of hydrophobia eight years ago.

A New Sensitive Singing Flame.

Philip Barry has recently described a very sensitive flame produced by placing a piece of ordinary wire gauze on the ring of a retort stand, about four inches above a Sugg's steatite pin hole burner, and lighting the gas above the gauze. "The flame is a slender cone about four inches high, the upper portion giving a bright yellow light, the base being a non-luminous blue flame. At the least noise this flame roars, sinking down to the surface of the gauze, becoming at the same time almost invisible. It is very active in its responses, and being rather a noisy flame, its sympathy is apparent to the ear as well as to the eye."

A simple addition to this apparatus has given me a flame, which, by slight regulation, may be made either: (1) a sensitive flame merely, that is, a flame which is depressed and rendered non-luminous by external noises, but which does not sing; (2) a continuously singing flame, not disturbed by outward noises; (3) a sensitive flame, which only sounds while disturbed; or (4) a flame that sings continuously except when agitated by external sounds. The last two results, so far as known to me, are novel.

To produce them, it is only necessary to cover Barry's flame with a moderately large tube, resting it loosely on the gauze. A luminous flame six to eight inches long is thus obtained, which is very sensitive, especially to high and sharp sounds. If now the gauze and tube be raised, the flame gradually shortens and appears less luminous, until at last it becomes violently agitated, and sings with a loud uniform tone, which may be maintained for any length of time. Under these conditions, external sounds have no effect upon it. The sensitive musical flame is produced by lowering the gauze until the singing just ceases. It is in this position that the flame is most remarkable. At the slightest sharp sound, it instantly sings, continuing to do so as long as the disturbing cause exists, but stopping at once with it. So quick are the responses that, by rapping the time of a tune, or whistling or playing it, provided the tones are high enough, the flame faithfully sounds at every note. By slightly raising or lowering the jet, the flame can be made less or more sensitive, so that a hiss in any part of the room, the rattling of keys, even in the pocket, turning on the water at the hydrant, folding up a piece of paper, or even moving the hand over the table, will excite the sound. On pronouncing the word "sensitive," it sings twice; and in general, it will interrupt the speaker at almost every "s" or other hissing sound.

The several parts of the apparatus need not be particularly refined. By the kindness of President Morton, I have used several sensitive jets of the ordinary kind made of brass; they all give excellent results. Glass tubes, however, drawn out until the internal diameter is between one sixteenth and one thirty-second of an inch, will do almost equally well. For producing merely the singing flame, even the inner jet of a good Bunsen burner will answer. The kind of gauze too is not important; I have generally used a piece which had been rounded for heating flasks; it contained about 28 meshes to the inch.

The experiments can be made under the ordinary pressure of street gas, three fourths of an inch of water being sufficient.—*W. E. Geyer, in the American Journal of Science.*

The Origin of Petroleum.

The recent development of the reproductive power, of petroleum wells that had been for some years abandoned because they were believed to be exhausted (says the *Petroleum Monthly*), is not alone a matter of value, to the owners of the territory that was until lately presumed to be incapable of further production, but it affords a more trustworthy basis than any the world has hitherto been able to obtain for forming an approximately correct opinion concerning the chemical process whereby petroleum is generated. Until within a few days, a popular opinion prevailed that petroleum, in spite of its name, was the product of coal; and so nearly was this idea general among a majority of people, that many foreign receivers of petroleum are still accustomed to order it as "coal oil." The belief, however, that the terrene oil of Pennsylvania and Canada is exclusively a product of bituminous coal may now safely be pronounced to be an error. There is certainly no evidence that coal is not one of the substances from which petroleum is distilled; but, at the same time, it is a somewhat strange fact, allowing a proper degree of credit to the belief that coal does enter into the composition of petroleum, that no coal beds susceptible of being worked are known to exist within fifty miles of the oil-producing territory. Again, it is a manifest and recognized fact that carbon does predominate as an integral essence of petroleum; and the other fact that the oil territory of Pennsylvania is surrounded by beds of bituminous coal, renders it eminently reasonable to believe that coal enters largely—if not, indeed, more largely than any other substance—into the process of distillation whereby petroleum is produced. Petroleum is certainly a mineral oil. But whatever may be the number and chemical variety of the minerals from which it is formed, the distillation of it is more intimately associated with limestone than with any other mineral. Sandstone is also found in boring oil wells, but it is from the pores of limestone that, in the chemical process of extracting oil from the minerals found in connection with its production, the greatest quantity of petroleum is taken. It is singular that, in boring for oil, no coal has ever been found, even in the smallest quantities, while sand, sandstone, and limestone abound. The inference, therefore, cannot be escaped that petroleum is the product of the distillation of at least two, and probably of more than three distinct mineral properties.

Improved Fire Shield.

It is the object of this invention to provide convenient and efficient means for preventing the spread of fires in cities and villages. It consists of a portable adjustable shield or screen, composed of fireproof plates or sheets, mounted on wheels, as indicated in our engraving, so that the machine can be transported from place to place without difficulty and with expedition.

A light frame or platform, A, is supported on the axles, B, of the wheels, C, but raised above and projecting over the wheels. Two pairs of stanchions, D, attached at the bottom to the platform, A, and connected at their top ends, have a pulley hanging from the center of each pair. There is an upright rod, G, at each corner, or one for each stanchion, rigidly connected to the platform and extending up about half way, more or less, to the top of each stanchion. The upper ends of these rods are curved and forked, and each contains a pulley, H. There is a brace for each of the rods, G, on which horizontal pulley shafts, J, are supported. A horizontal pulley shaft, K, at each corner of the platform, is supported by stands, L. Another horizontal pulley shaft, M, at each corner of the platform, is also used.

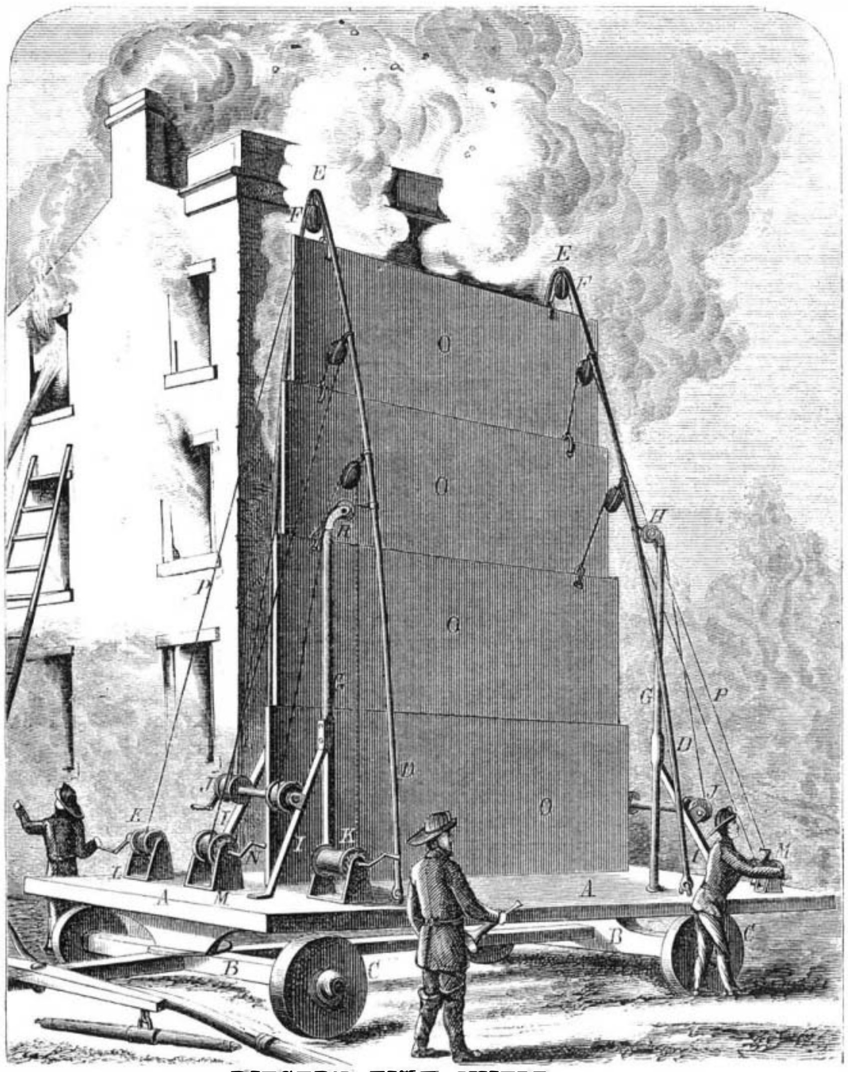
All these shafts are provided with cranks, by means of which they are revolved, and are also furnished with wheels and pawls, by which movement may be prevented.

Sheets or plates, O, of metal or other incombustible material, are suspended from the stanchions, and from the rods, C, by means of chains or wire ropes, P, and are raised or lowered by means of the crank pulley shafts.

The plates may be of any size or thickness, and are so arranged that they work independently of each other; and they may be adjusted in a mass, or so as to present two or three thicknesses to the heat of a burning building.

It is claimed that, by interposing this shield between buildings, one of which is on fire, that the fire may be limited in extent and much property saved.

Patented through the Scientific American Patent Agency, Nov. 28, 1871, by Henry Rieger, whom address, Kansas City, Mo., for further information.



RIEGER'S FIRE SHIELD.

Improved Mattress Stuffing Machine.

Our engraving illustrates a mattress stuffing machine, by which, it is claimed, the stuffing of mattresses can be effected with astonishing rapidity. The whole arrangement is simple, easily managed, and, we judge from examination of a model of the machine, constitutes a valuable and important addition to appliances of the upholsterer's art. It is adapted to all sizes and kinds of mattresses, and its use will, we think, effect a large saving in this branch of business.

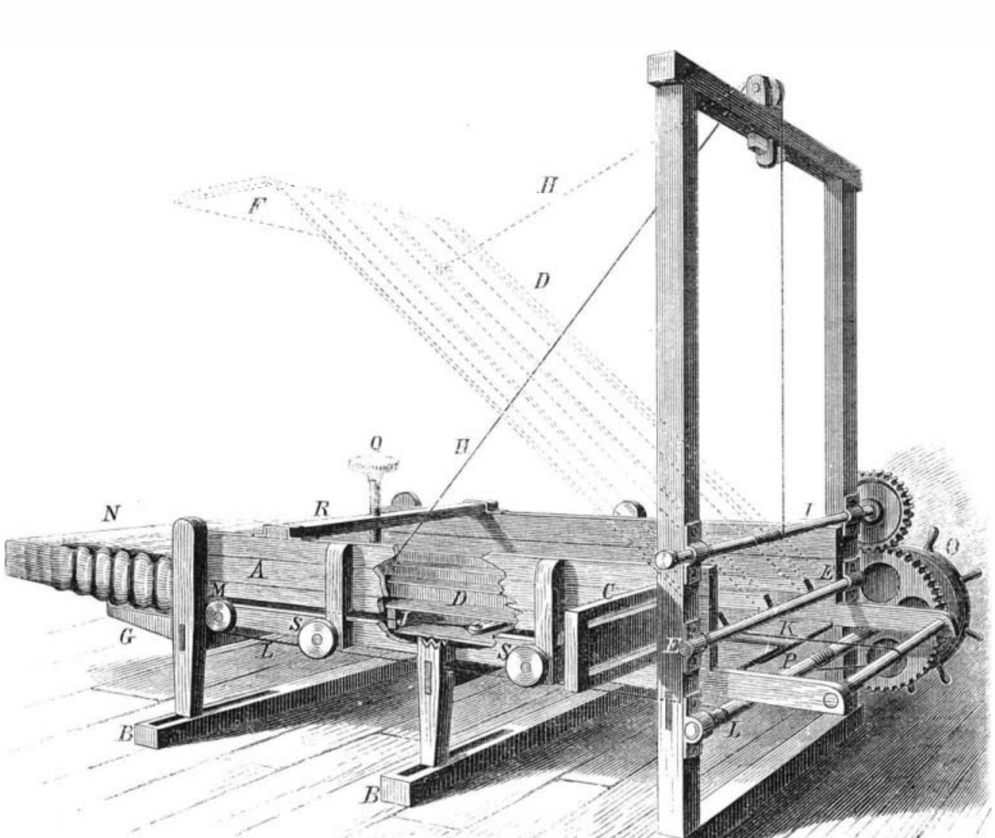
A box, as wide and as long as the largest sized mattress, has one side, A, laterally adjustable for any required width of mattress, the legs of that side sliding in slots formed in the sills, B. One end of the side, A, has attached a slotted board, C, which slides on bolts (not shown), and by which, and the screws, S, the side, A, may be adjusted and held in position when adjusted for width. A cover, D, ribbed longitudinally and pivoted at E, is raised, while placing the filling in the box, into the position shown by the dotted outline. That part of the cover shown in dotted outline, and lettered F, is pivoted to the other portion, and, when the cover is lowered, turns down to form a closed end of the box while the stuffing is being placed; but when the pressure is applied, it extends straight with the rest of the cover, so that, in connection with extensions of the sides and bottom of the box, it forms a chute, through which the filling is forced into the case or tick. The latter is placed for filling over this chute, being gathered into folds thereon, and is held from yielding and escaping too readily by laterally bent springs, G, which press against the tick and hold it against the bottom of the chute.

The cover, D, is raised by the rope, H, which runs over a pulley and is wound up by the shaft, I, at the same time that the compressing follower, J, is withdrawn by the action of the cord, K, the cords, L, running over the pulleys, M, actuating the follower, J, in the direction to force the filling into the tick, N, whenever the hand wheel, O, is turned to wind up the cord, L, on the shaft, P.

The shaft, I, has long bearings, which allow it to be thrust endwise to run its pinion out of gear and permit the cover to be lowered independently of the action of the hand wheel. When thus lowered, the cover is forced down to compress the filling by the action of a screw, Q, which runs in a thread formed in the removable bar, R, this bar being taken out while the cover is raised or lowered. When the follower is actuated against the stuffing, the latter enters the tick, which, as fast as it is filled, slips off the chute very much as a filled case slips off the nozzle of a sausage stuffer.

With the use of this machine and that of a trifling machine by the same inventor, and on which a patent is now pending, a mattress can be filled and stitched in a remarkably short space of time. The machine has already elicited high praise from practical men, and has won prizes in all fairs where it has been exhibited. There is no doubt that it is a first class machine for the purpose intended; and we would recommend parties interested in this class of manufactures to make personal investigation into its merits.

The simplicity of its arrangements, and the ease with which it is managed, together with the time saved by its use, cannot fail to be considered points in its favor. It was patented through the Scientific American Patent Agency. April 2, 1872, by Thomas A. Watson. For State, county, or other territorial rights, address Watson & Phillips, Brenham, Washington, Co., Texas.



WATSON'S MATTRESS STUFFING MACHINE.

WATER ordinarily freezes at 32° Fah. But if it be confined in a strong vessel, so that its tendency to expansion is restrained, the freezing point may be lowered to 23° Fah.

Effects of Electricity on Milk.

The *Milk Journal* states that, in an address before the North Western Dairymen's Association, Mr. X. A. Willard repeats the following interesting facts:

Mr. Andrew Cross, the celebrated English experimenter, considered that the roots and leaves of plants were in opposite states of electricity; some of his experiments in this direction are very interesting. He cut two branches from a rose tree. They were as nearly alike as possible, with the same number of buds, and both equally blown. An arrangement was made by which a negative current of electricity was passed through one, a positive current through the other. In a few hours the negative rose drooped and died, but the positive continued its freshness for nearly a fortnight; the rose itself became full blown and the buds expanded, and survived an unusual length of time. Again, he was able to keep milk sweet for three weeks in the hottest weather of summer, by the application of a current of positive electricity.

On one occasion, he kept fishes under the electric action for three months, and at the end of that time they were sent to a friend, whose domestic knew nothing of the experiment. Before the cook dressed them, her master asked her whether she thought they were fresh, as he had some doubts. She replied, that she was sure they were fresh, indeed, she said, she would swear they were alive yesterday. When served at table, they appeared like ordinary fish, but when the family attempted to eat them, they were found to be perfectly tasteless; the electrical action had taken away all the essential oil, leaving the fish unfit for food. However, the process is exceedingly useful for keeping fish, meats, etc., fresh and good for ten days or a fortnight. Now this is consistent with our observation and the facts known to every one in the habit of handling milk. When the condition of the atmosphere is in a negative electrical state, or shows a deficiency of positive electricity, a state of weather which we designate as sultry, close, muggy, and the like, there is always difficulty in keeping milk sound. Even in good, healthy milk, the fungus germs common to all milk increase and multiply with great rapidity, producing the common lactic acid fermentation or souring of the fluid; but in case fungi from decomposing animal or vegetable matter comes in contact with the milk, rapid decomposition takes place, and we have rotten milk, putrid odors, and floating curds. The exposing of such curds to the atmosphere, as well as the aeration of milk to improve its condition, are both philosophical, because these minute organisms of fungi are affected by the oxygen of the air, which checks their development and multiplication.

The influence of electrical action is a question entirely new to the dairy public, but it is one concerning which I think some useful suggestions present themselves for our consideration. When the electrical equilibrium is disturbed, or when the state of the atmosphere indicates a preponderance of negative electricity, we are all made aware of the fact by its depressing influences. At such times, it is important that we take more than ordinary care in the handling of milk; that it be kept out of harmful odors; that attention be given to its aeration, and such treatment be given it as shall be inimical to the growth and development of fungi. And again, the fact that milk may be kept sweet a long time in hot weather by electrical action will offer a very important suggestion to inventors in the preservation of milk, and perhaps in the improvement of cheese at the factories. I believe that we are only on the threshold of the cheese making art, and that as we become better acquainted with the laws of Nature and their application, great progress is yet to be made in every branch of dairy husbandry.

THE best authorities estimate the entire world's wool product for 1871 at 1,620,000,000 lbs. Of this enormous quantity, Europe produced about 827,000,000 lbs; Asia, 470,000,000 lbs.; Australia, 175,000,000 lbs.; the United States, 122,000,000 lbs., and South Africa, 34,000,000. Great Britain presents the largest market for wool in the world, her own annual production being estimated at 260,000,000 lbs., while her consumption is something over 250,000,000 lbs. The United States used of the raw material, in excess of the home production, about 68,000,000 lbs., imported at a cost of $9,780,000. The value of the manufactured articles imported into the United States, in 1871, was about $44,000,000.

THE production of quicksilver in California amounts, on an average, to about 2,250 flasks per month.