Correspondence.

To the Editor of the Scientific American:

In one of the late issues of the SCIENTIFIC AMERI-CAN there appeared an article concerning the Wimshurst electrical machine without sectors. I have constructed such a machine, the diameter of the plates being 231/2 inches. I have found that, after starting the machine, the "neutralizing brushes" may be re- douits gives the results of a number of experiments on insoluble body precipitated from such solutions, it was moved an inch or more from the plates without decreasing the effectiveness of the machine.

This may be known to others, yet I have never heard or-read of it, and I think it would be valuable, since it decreases the strain of the plates and reduces the labor of running the machine. JOHN HERTNER. Dayton, O.

Chemically Preserving Potatoes.

from the numerous experiments made on the best method of preserving potatoes, it has been established per cent; this figure corresponds to about 255 pounds ate, calcium carbonate, magnesium carbonate, calcium that any action should not be on the skin of the tuber, | net. The cut-off was at about 30 per cent of the but rather on the tuber itself. I have proved, says M. Schribaux, that by radically destroying the shoots on the French State Railways. The engines used were when more or less developed, the potato retains all its four coupled, the wheels being 6 feet 6¾ inches in nesium sulphate, aluminum borate, zine borate, calqualities at least till the time when the next year's diameter, and the cylinders 17 27 inches in diameter by growth has become abundant in the market.

Where the number of potatoes to be dealt with is small it is sufficient to remove the eyes, or the shoots, ton displacement. The working pressure varied from with the point of a knife, or better still with a steel | 128 pounds to 142 pounds per square inch. The engines acid, ammonium tungstate, potassium carbonate. penholder in which a steel pen has been placed with the point turned inward; this will be found to act in the manner of a gouge. By inserting this for rather more than a tenth of an inch into the potato, the eye is easily removed. I have in the laboratory potatoes of the year 1891 which have shriveled owing to evaporation, but of which the substance is firm, and has not and slightly less at the higher ones. On another occasensibly deteriorated. A singular circumstance is that sion one of these engines was run by a driver who prethey have become sweet, and contain a sugar which ferred to throttle the steam instead of linking up, and differs in no way from cane or beet sugar.

that an unskilled laborer was, in a working day of 10 regulator wide open and the speed governed by linkhours, easily able to deal with 300 lb. of potatoes. Cooking potatoes, which have a small number of eyes, indicated horse power per hour. By giving the valve can, of course, be easier dealt with. If a large quantity | negative inside lap, this consumption was further rehave to be treated a chemical process must be resorted to, in order to destroy the shoots.

to 12 hours in water containing from one to two per 142 pounds per square inch, with a cut-off at one-fifth cent of ordinary sulphuric acid. The potatoes must the stroke, and the valves designed so as to give negaafterward be dried and put in a cool and well-aired tive inside lap. place. The acid solution should be placed in a recep tacle of wood.

The solution keeps good for a long time if the tubers are carefully cleaned so that no earth adheres to them before being put into it.

The acid acts in the following way: It eats in for about a tenth of an inch in the region around the eyes where the skin is tender, while it does not affect the rest and thicker part of the skin. About the eyes it will be found that an incrustation has formed, which acts on these residues vigorously, but not dangerously. completely blocks them up.

to treat any but sound potatoes in this way, as the this mixture is exposed to the air for a short time, the treatment does not stop disease, but merely keeps the moisture that is absorbed by the sodium peroxide sufsound potatoes wholesome. The potatoes should be fices to set up a spontaneous combustion. This may carefully cleared from earth before being put into the likewise be induced at once by the addition of a few solution, as earth adhering checks the action of the drops of water, and is accompanied by the production acid. It is well before treating any large quantity of of a very high temperature. This mixture must, therethree dishes of glazed earthernware and fill them with used with caution.-A. Rossel and L. Frank. solutions containing respectively 1 per cent of the acid, 1½ per cent and 2 per cent. Then immerse half a dozen potatoes and leave them in for from 10 to 12 hours. After that take them out and dry them, and trolley lines," said a railroad man the other day, to a vapors formed producing an uncombustible mixture after three days' interval examine them by cutting into reporter of the Philadel phia Record, as he glanced with the combustible gases. Calcium, magnesium, and the eves to see whether these have been destroyed. ruefully over some figures, which showed a decrease of zinc chlorides act in a similar manner through the The external aspect of the potato will, moreover, show \$40 a day in his company's receipts from suburban separation of hydrochloric acid. Sodium and potasthe skin, and the proper strength of the solution to be road. "We have to give too much to our patrons," effective as fireproofing materials. Zinc sulphate and used on the particular class of potato to be dealt he continued. "We provide handsome terminals, fine alum likewise owe their effectiveness to dissociation

sion lessened the powers of resistance of the man to th^e ravages of the disease that caused his death, the fact of his having voluntarily offered his blood for the stances for their capacity of rendering materials uninbenefit of his master absolved the latter from any finan-flammable showed that the compounds recommended cial responsibility that might be urged against him.-Lancet.

Steam Consumption of Locomotives.

In the Revue Generale des Chemins de Fer M. Desthe steam consumption of locomotives per indicated horse power per hour. Experiments made in France in 1867 showed that at that time express engines used on test 36.38 pounds of water per indicated horse power per hour, and goods engines 33.07 pounds. It is stated, however, that the priming water amounted to 30 per stances employed are classified as follows: cent, which, if correct, reduces the true consumption of steam to about 26.5 pounds per indicated horse power per hour. In 1882, a locomotive tested on heavy In a paper on this subject M. Schribaux states that, inclines on the Lyons Railway used 2744 pounds of water per indicated horse power, the priming being 9 stroke. In 1893 an elaborate series of tests were made 25.6 inches stroke.

The clearance at each end was 5 per cent of the piswere first tested on the regular express service between speed ranged from 37.2 to 40.3 miles per hour on five different trips, and the average consumption of water amounted to 25.61 pounds per indicated horse power per hour. It was slightly greater at the lower speeds, the engine then used 29.1 pounds of steam per indicated It may be said that the process is slow, but I find horse power, while on the same trip made with the ing up, the steam consumption fell to 24 37 pounds per duced to 23.96 pounds. M. Desdouits considers the experiments to show that with simple engines the best The tubers then are immersed for a space of from 10^{1} results are obtained with a working pressure of about

Spontaneous Combustion of Sodium Peroxide and Aluminum,

Sodium peroxide (Na_2O_2) is for many purposes an ad mirable oxidizing agent, which, however, must be used carefully, as Victor Meyer has already shown.

The authors use it in aqueous solution to oxidize the residues they have obtained when making phosphorus by the action of aluminum upon the phosphates. It

The reaction is quite different when aluminum pow-The following remarks are to be noted: It is useless der and sodium peroxide are mixed together. When potatoes to experiment on a few as follows: Take fore, be regarded as highly dangerous, and should be monium salts and aluminum hydroxide may be con-

The Trolley.

Fireproofing Compounds.

The systematic testing of about fifty different subfor this purpose are of very unequal value. Thus, by holding in the flame of a candle strips of filtering paper uniformly impregnated with solutions of the various bodies containing 20, 15, 10, 5, 3.5, 2, 1, and 0.5 per cent of anhydrous substance, or charged with an found that, while some were rendered practically uninflammable, others did not appear to be much affected by the impregnation, or had become even more combustible than pure paper. In accordance with the results of a great number of such experiments, the sub-

1. Substances Increasing Combustibility.—Sodium sulphate, sodium sulphite, sodium thiosulphate, sodium silicate, sodium carbonate, sodium stannate, sodium tungstate, sodium chloride, potassium sulphate, potassium phosphate, potassium chloride, zinc carbonsulphate, ferrous sulphate, magnesium hydroxide.

2. Indifferent Substances, or Bodies which are Effective Only When Used in Large Quantities,-Magcium phosphate, magnesium phosphate, aluminum phosphate, zinc phosphate, sodium acetate, potassium acetate, silicic acid, sodium phosphate, aluminum hydroxide precipitated from an acid solution, tungstic

3. Substances which Render Cellulose Specifically Versailles and Chartres, a distance of 43.7 miles. The Uninflammable. – Ammonium sulphate, ammonium phosphate, ammonium chloride, calcium chloride, magnesium chloride, zinc chloride, zinc sulphate, stannous chloride, alum, borax, boric acid, aluminum hydroxide precipitated from sodium aluminate.

The lowest strengths of solution and the least quantity of substance (anhydrous) necessary for rendering 100 parts of cellulose uninflammable are given in the following table. The figures to be taken as approximate only.

| | <u> </u> | |
|--|--|---|
| Name of Substance. | Lowest Percentage of Substance in Solution necessary to render Cellulose Uninflammable. | Least Quantity of Substance required for rendering Uninflammable 100 parts of Cellulose. |
| Ammonium chloride | 1'5 1'5 1'5 | 110 415 415 410 |
| Calcium chloride Magnesium chloride Aluminum hydroxide Alum | 1.5 1.5 1.5 2.0 | 4-5 4-5 3-8 |
| Zinc sulphate Stannous chloride Borax Boric acid | 1.5 2.5 1.5 2.5 | 4·5 8·5 10·0 |
| Magnesium carbonate Magnesium sulphate Sodium chloride " silicate Silicic acid | - 75 75 150 175 | 15 ^{.0} 35 ^{.0} 50 ^{.0} 30 ^{.0} |
| Potassium chloride Sodium phosphate Potassium " Aluminum borate | 20 0 7·5 20·0 12·5 | 450 300 240 |
| " phosphate Calcium " Magnesium " Zinc borate | 10-0 12-5 12-5 7-5 | 30°0 30°0 30°0 20°0 |
| Phosphate Tungstic acid | Above 15 10 10 7.5 | Above 15 " 15 " 10 750 |
| Sodium and potassium acetates | 7 55 0 | |

Of these substances, the three first mentioned amsidered to be the best adapted for practical purposes. The explanation of the fireproofing properties of the ammonium salts is to be found in their becoming vo-"There is no use in our trying to compete with the latilized and dissociated by the influence of heat, the whether the action of the acid has been too great on travel on a branch line since the opening of a trolley sium chlorides being unalterable by heat are also inwith will by this means have been arrived at. The suburban stations, heat, water, light and a seat for by heat. The action of aluminum hydroxide is a

skins of some potatoes, it should be observed, are much every passenger, while the trolley lines furnish almost purely mechanical one, hence the striking difference coarser than those of others, and the solution requires nothing but transportation. They furnish no stations; in the behavior of the granular modification left after to be regulated accordingly.

Transfusion of Blood in Its Legal Aspects,

A gentleman named Lefevre being sick unto death, can't touch us on long distance traveling, but in the transfusion of blood was had recourse to, and the near future I expect to see them absorb a large amount impregnation with the substances enumerated above, patient's gardener volunteered to supply the vital fluid. of our suburban travel." The offer was accepted. Some time afterward the gardener fell ill in his turn, and the worthy delver attributing his illness to his act of generosity toward his master, claimed 60,000 francs damages. Three experts were appointed to examine and report on the case, but sulphate formed separates out; the remainder is treatbefore the report was forthcoming the man died. His ed with nitric acid, whereby sodium nitrate and sulwidow continued the action, and the Civil Tribunal of phuric acid are formed, so that by repeated coolings the Seine has delivered judgment in favor of the de-ammonium nitrate separates. The mother liquors are fendant. A post-mortem examination of the garden- neutralized with soda and used over again to dissolve er's body had revealed as the cause of death cancer of sodium nitrate and ammonium sulphate.-Fr. Benker, stomach. The court held that even had the transfu- Clichy.

crowd the passengers in, so that many have no seat, drying of the voluminous precipitate from an alumiand in that way manage to make money. We can't do num salt and that of the exceedingly finely divided things that way, and so I see no money for us in try-product obtained by the action of carbonic acid upon ing to compete with the trolleys. Of course, they a solution of sodium aluminate.

As regards the increased combustibility of paper after

Ammonium Nitrate.

On mixing solutions of sodium nitrate and ammonium sulphate and refrigerating, most of the sodium etc.

this appears likewise to be owing to a mechanical action, resulting in the prevention of loss of heat. For practical use the following strengths of solutions are recommended :

10 to 15 per cent for textile fabrics, stage decorations,

20 to 30 per cent for pasteboard, thin boards, etc. 25 to 30 per cent, applied twice or three times, for heavy timber, thick boards, etc.

As an addition to the water used for extinguishing fires, calcium or magnesium chlorides might be useful. -P. Lochtin, Dingler's Polyt. J., 290, 230-235.

Oleomargarine and Vegetable Lard. BY H. W. WILEY.

As a distinction between a pure and an adulterated article, take the cases of butter and oleomargarine. Pure butter for instance must be clean, sweet, wholesome, and made of the fat of cow's milk, and must contain only a certain proportion of water, curd and alt. Oleomargarine may be as sweet, clean and wholesome as the butter mentioned above, yet when ment of a national pure food bill has been the feeling sold as butter it is clearly not pure food, but a spurious article.

that the article she obtains has been made from the reptitious sale of cotton oil as olive oil and as lard. fat of healthy, freshly slaughtered hogs, carefully But such a bill would not interfere in the least with selected and cleaned and rendered in clean kettles or the legitimate market for the product. Cotton oil as tanks. Cotton seed oil and beef tallow, in respect of a food has such merit of its own as to warrant the becleanliness, nutritive properties and wholesomeness, lief that it does not require any smuggling to secure may equal and even excel pure lard, but the admix- for it a wide and rapidily increasing use. The South ture of these articles with hog's lard, or their sale as as well as the North would be the gainer from honest such, without the knowledge of consumers, is clearly markets for honest foods, and it is a shortsighted a fraud and an adulteration.

teration is well known. The use of oleomargarine as unfortunate thing for the whole country should an the card to which they were fed. The unevenness must a butter substitute has been practiced for many years. irrepressible conflict between the sus and the gossy-The oleomargarine law, which imposes a tax of two pium keep our interstatemarket forever open to mixed be corrected in this manner. Again, they must be cents a pound on the manufactured product, has not or doubtable fats. helped to restrict its use, but has rather increased it, by giving to the consumer a guarantee of purity. The amount of tax collected on manufactured oleomargarine for the fiscal year ending June 30, 1892, was \$945,675, which shows that there were 47,283,750 that, to those who really appreciate their importance nearly all coarse or all fine as to make a decidedly inpounds of oleomargarine manufactured in the United and shape their practice accordingly, it must seem that jurious change in the roving as each one was used. States in twelve months.

creased during the year more than 22 per cent over many of the smaller woolen mills, and some of the is something to be said against the abuse of the stock the preceding year. The amount of tax paid by retail dealers for the fiscal year ending June 30, 1891, was field for missionary work. The theory and practice \$146,293.70, and for the fiscal year ending June 30, 1892, \$204,215.

nearly 100 per cent. The amount of tax paid by capable of doing, he can at least tend the picker well first breaker is concerned. If the stock is a mixture of wholesale dealers for the fiscal year ending June 30, enough. Any old shed, to follow out this theory and long and short stapled wools, and it is so imperfectly 1891, was \$53,191, and for the fiscal year ending June practice, too, is good enough for a picker house, if it is mixed that the long fibers are fed separately to the 30, 1892, \$106,036.

oleomargarine; it is clean, wholesome and digestible. the only end a picker house is expected to fulfill. It stock is fed to the scale pan in like manner, and if one When it is to be kept for a long time before use, as makes no matter how rough it is, or how open at the portion of such half-mixed stock is what is called a on shipboard or in distant mining camps, it is prefer- top, sides, or floor. The little matter of wool that it able to butter, because it has but little tendency to takes to cover the roughness is of no consequence, as better stock to carry it through, then the card will at become rancid.

objection to the use of cotton seed oil as a substitute for wishes a little more to help out his poor stock that he is the balance sheet. Again, any one can see that there lard or when mixed with lard, provided it be sold for given to understand how expensive it is. The machines are greater chances for breakdowns and more clean what it is. Most of you are familiar with the great and belts of the room may get watersoaked in every waste and consequent loss of production than if the fight which was made against the use of the term storm. But what of it? They are nothing but picking stock, whether good or poor, be thoroughly worked "pure refined lard," which was the trade name of a machines. They simply blow the stock through. There mixture of lard stearine with cotton seed oil. f'Pure is no roving, or yarn, or thread to keep up, as in the refined lard," it was claimed, was a term which had case of the cards, mules, or looms; and as for the belts, been used so long to designate the mixed product that the carder's time that may be spent in repairing them, it had become in reality a trade mark, and was, there although much needed elsewhere, is of no consequence. fore, entitled to respect and protection. In the inves- It makes no difference if the rain does ruin them. At tigation which was held before the Congressional com- least it so appears until the time comes when they must mittees, it appeared that as to the trade the conten- be replaced by new ones, and then there is a loud comtion was quite justifiable. Goods sold under that plaint that they have been so quickly destroyed. Proname were understood to be mixed. When, however, prietors and managers are not altogether blamable for the mixed product was offered to the consumer, it was the existence of such a state of things. They are often purchased with the idea which the name naturally the effects of the carder's indifference and carelessness implied, that an extra fine quality of hog's lard was in regard to what is really one of the most important secured.

All attempts to pass a pure lard bill, modeled on the oleomargarine act, have heretofore failed in Congress, structed and its appointments justas perfect as the card but several of the States have prohibited the sale of room. These things are essential in order that the mixed lard, except when offered under the proper stock may go to the latter room in good working conname. Manufacturers have, therefore, been gradually dition. If a certain degree of warmth and moisture forced to abandon the term "refined lard" when ap- are requisite for the proper working of the wool, it is in plied to this commodity.

a cooking fat largely of vegetable origin to a pure moist. How can this be done in a room which is an animal product. legislatures have taken a reprehensible course in pro- and a refrigerator in winter? Nothing but a thick hibiting the sale of vegetable oils as a substitute for walled brick building, with high and smooth ceilings, lard for cooking. The grower of hogs undoubtedly is fit for the picking or storage of stock. If the inside obtained similar to hydraulic lime or Roman cement, has a right to contend against the sale of vegetable oils partitions of the compartments are of the same mateas hog fat, but when he pushes his claim still further, rial, they will be all the better. as pure and nutritious as his own, he passes beyond only carding machinery, a carder will have some the bounds of public support. Every person in the chance of getting his stock worked up while it is in a United States who prefers cotton oil to lard should suitable condition; that is, if he has seen that it has be allowed to purchase his supplies without let or first been properly prepared. hindrance. Every grower and maker of pure lard has the right to an equally open market from which every has been used, it has been the practice with more or adulterated and mixed lard offered as pure should be less care to lay down the different kinds or colors of rigidly excluded. For a time, a few years ago, when a popular fad prevailed in favor of nitrogenous foods, the true value pile. This heap is then broken down at the sides as it of fats to the digestive and nutritive economy was not well appreciated. At the present day this is all the different kinds or colors may be fed to it at the changed, and we know how to value a fat properly. It is, therefore, a matter of no mean importance to protect the public in the use of olive oil instead of and thoroughly, one would hardly expect to find all cotton oil, of cotton oil instead of lard, and lard instead these precautions neglected in a modern establishment.

choose wisely between the two.

One of the great difficulties in securing the enactin cotton-growing regions that such a bill would restrict the market for cotton oil. This is true, if the Again, when the housewife buys lard it is supposed fraudulent market is meant. By that I mean the serpolicy that leads to a crusade against such legislation Butter.-In regard to butter, the character of adul-'as will secure the desired result. It would be a rather

The Preparation of Wool Stock and Breaker Carding.

to say anything in addition to what has already been The number of retail dealers in oleomargarine in-expressed is but a waste of words. A visit, however, to a universal remedy from all previous unevenness, there larger ones as well, will prove that there is still a wide and the first breaker, as well as the second card. branches of his business.

The picker house should be just as carefully conthe picker room that it must receive it, and every pre-I am of the opinion that many persons would prefer caution should be taken to keep it both warm and To me, it seems that some State oven in hot weather, a swimming pool in wet weather,

of a mixture of beef and cotton oil stearine. It is let a fourteen year old boy take one kind of stock from true that cotton oil, when carefully refined, is almost a bag here, another from a bale there, and so on, using as good a salad dressing as olive oil, but is very much/his own judgment as to how much of each he put into cheaper, and those who prefer to pay the high the mixture before changing to another. No one who price should be secured against fraud. In respect of knows anything about picking need be told that the wholesomeness and digestibility, it would be hard to resulting product of this operation was not as uniform as a well laid batch of stock is before it goes through the mixer. And yet the manager of this establishment had the greatest confidence that all the imperfections resulting from this lack of system would be made all right by the sixty doublings on the second breakers. These doublings are regarded as a sure and never failing corrective for all defects in the preliminary processes. In this very case they were expected to even up such bungling work as we have noted in the picker room. They are also expected to overcome the bad work from half cleaned, worn out cards, with slipping gears, as well as the imperfect work from dirty, neglected and dilapidated feeders.

In a recent article in this series something was said concerning the impossibility of getting coarse and fine drawings into a creel so as to make even drawing from be slight and come with some degree of regularity to used by the second card as fast as they are made by the first. In the room of which we have spoken there would be at times two or three creels full of drawings on the floor, so placed and used that there was a creel So much has been written on these two processes full in separate piles. Many of these piles were so

But suppose this second breaker doubling was such

"Stock well mixed is half carded" is an aphorism still prevails that any one, no matter how incompe- among old carders. If this claim is too broad, it is tent, is generally good enough for a picker tender. If certainly not too much to maintain that stock well The increase in the number of wholesale dealers was there is nothing else in the world that such a person is cleaned, mixed, and picked is half broken, so far as the only sufficiently disconnected from the main buildings card, then it is working harder than at other times. There can be no reasonable objection to the use of to meet the insurance requirements. This is chiefly The same result will follow when light and heavy "carrying stock." while the other is such as requires the cost of wool to be wasted is of no account when it times make more flyings, which must be reworked at Lard.-For similar reasons there can be no possible is to be wasted by the employer. It is when the carder another loss, which of course affects the profit side of together before it reaches the card at all.

> If the second breaker gets perfectly even drawings, it does not require any argument to prove that it will do better carding than if it has at one time to take drawings that are needlessly large, while at others the feed is so very light that, but for the bolstering it gets from the heavier, it would be absolutely useless. Nor will drawing so made, although it may have evenness in weight, yard for yard, give such smooth roving as that which gets its evenness and smoothness from the first card, other conditions being equal.-Industrial Record.

Improved Method of Manufacturing Hydraulic Cement.

In order to render the usual preliminary crushing of cement clinker in stone breakers unnecessary. the patentee adds 5 to 30 parts of granulated blast furnace slag to 100 parts of the ordinary raw materials for the manufacture of hydraulic cement, and burns the mixture in the ordinary way, obtaining a product which is granular and brittle and can be fed direct to the grinding machinery without passage through a stone breaker. By the use of a larger proportion of slag, e. g., 30 to 125 parts to 100 of cement raw materials, and modifying the process of burning, a product can be or Portland cement .-- G. W. A. Stein, Wetzlar, Ger-

* rom a lecture delivered before the Franklin Institute by H. W. Wiley, Chemist of the U.S. Department of Agriculture.

Then with a card and demands that the markets be closed to products room of similar construction, filled with and containing

Almost if not quite as long as the carding machine stock in layers, one upon another, until all the stock intended for the lot or batch was built up in a single is fed to the mixer, so that as much as is possible of all same time. After this long practice, and after all that has been said and written about doing this carefully Within a short time, however, the writer visited a mill zilian gum) are then incorporated with the mass.-E. and found it to be the practice in the picker room to ^{1}H . Lewis.

m**a**ny,

Mount Logan, the Highest Peak in North America. The last number of the Bulletin of the American Geographical Society announces that the recent study of the observations on mountain summits in the neighborhood of Mount St. Elias shows that Mount Logan is the loftiest peak in North America, with a height of 19,500 feet, thus being 1,200 feet higher than Orizaba and 1,500 feet higher than Mount St. Elias.



Waterproofing for the Soles of Shoes.

The compound is applied over the welt and insole, or over the seams, joints, peg holes, etc. Two and onehalf pounds of wax are melted and three pounds of powdered talc, steatite, or soapstone are mixed therewith; four pints of rubber paste or caoutchouc (Bra-