

improved attachment by which the person sleeping or resting on a bed or sofa will be fanned, thereby insuring a more comfortable rest in hot weather. The invention consists of a bed cover or cloth that is hung to hooks at the foot end of the bedstead, and attached to fulcrumed crank arms at the head end of the bedstead. The crank arms are operated by crank rod connection from a suitable clock train, so as to impart a fanning motion to the spread or cover.

Mr. Floyd Heavener, of Laramie City Wyoming Ter., has patented an improvement in Wind Wheels, designed to render the same self-governing by causing the area of resistance which the wheel presents to the wind to be automatically varied in inverse proportion to the force of the wind, to render the action of the wheel uniform.

Correspondence.

The Deleterious Use of Alum in Bread and Baking Powders—Alum being Substituted for Cream of Tartar

BY HENRY A. MOTT, JR. PH.D., E.M.

Having been appointed Chemist by the United States Government for the fudian Department, it became my duty to submit to chemical analysis, among other articles, the various baking powders offered the Department, and as a result of my investigation I found that at least fifty per cent of the baking powders offered were grossly adulterated. After making this discovery I determined to submit to analysis every baking powder I could find on the market, and to expose such powders as were adulterated, so that the public may be warned from purchasing them in the future. The number of baking powders I have examined amount to forty-two—twenty-nine of them from various sections of the country having been offered to the Department, and thirteen obtained from various grocery stores throughout the city of New York.

Instead of the baking powders of commerce being composed alone of those constituents which have been demonstrated to be perfectly harmless and wholesome, the public have imposed upon them powders largely adulterated with most injurious and hurtful compounds, put up in cans neatly labeled "chemically pure," as if that fact (?) had anything to do with rendering the powders wholesome. Scheele's green (arsenite of copper) is often "chemically pure," but it is always a deadly poison.

It, therefore, becomes necessary for the benefit of the public to examine into the powders on the market, and to denounce such of them as are composed of constituents detrimental to health.

The best powders are composed of bitartrate of potash (cream of tartar), tartaric acid, carbonate of ammonia, and bicarbonate of soda, held together to prevent decomposition by a little starch.

The injurious powders are composed of alum and bicarbonate of soda, and often contain terra alba (white earth), insoluble phosphate of lime, etc., etc. The effect of alum when taken internally has been shown by Wilmer and others to produce dyspepsia, constipation, vomiting, griping, and even inflammation of the gastro-enteric mucous membrane, as it is a powerful astringent acting chemically on the tissues. These serious effects will not of course be brought about immediately from the small quantity of alum used in one loaf of bread, but it is certain that persons continuing to eat bread containing alum will, in time, suffer from its evil effects, and the weaker the constitution the sooner will the effects be noticed.

Duma speaks to the same effect when he says: "It is to be feared that this salt exerts a deadly action by its daily introduction into the stomach, especially in persons of a weak constitution." And other great authorities, such as Carpenter, Dundas, Thompson, Gibbon and Normandy, all agree that the continued use of bread containing alum will bring about dyspepsia and other troubles, and such was the opinion of the late Baron Liebig. The celebrated Pereira considered "that whatever may have been the effect in the case of healthy persons, sick persons did really suffer in that way." In the *Lancet* is mentioned a case in whom dangerous gastro-enteritis was apparently induced by a single dose containing between ten to twenty grains of burnt alum. Dr. Parkes, in his work on Hygiene, states that from eight to forty grains of alum, and probably more, have been found in a four-pound loaf of bread.

The effect of alum on bread is to tend to whiten it, and to prevent an excess of fermentation (when yeast is used) when the altering gluten or cerealine acts too much on the starch; but while it accomplishes this object, it lessens at the same time the nutritive value of the bread by rendering the phosphoric acid insoluble.

Sufficient proof, I think, has been shown that alum is a most dangerous element to introduce in baking powders, and it now becomes necessary for the benefit of the public to expose such unwholesome and injurious powders as contain it. Having analyzed the Royal Baking Powder, I find it composed of only those elements which have been demonstrated to be perfectly wholesome and healthful, having for its active principle pure grape cream of tartar instead of the injurious alum used in the following powders. I do not mean by signaling the Royal Baking Powder, that it is the only properly made powder on the market, as there may be others equally as good. I simply introduce it as I had to select one, and thought the one I had used in my

kitchen for years, and which had always proved satisfactory, would be the best illustration.

Out of the many baking powders I have examined, I have selected the more prominent ones that are adulterated, giving in each case a quantitative analysis of the same. The following analyses are of "Dooley's Standard Baking Powder," "Patapsco Baking Powder," "Charm Baking Powder," and the baking powder manufactured by C. E. Andrews & Co., of Milwaukee. The analysis of the last three baking powders given in the first column was made by Professor Robert W. Schedler.

No. 1.

DOOLEY'S STANDARD BAKING POWDER.	
Burnt alum.....	26.45 per cent.
Bicarbonate of soda.....	24.17 " "
Sesquicarbonate of ammonia.....	2.31 " "
Cream of tartar.....	None
Starch.....	47.07 " "
	100.00

No. 2.

PATAPSCO BAKING POWDER.	
Smith, Hanway & Co., Baltimore, Md.	
Analysis by Dr. Mott.	
Burnt alum.....	19.16 per cent
Bicarbonate of soda.....	23.36 " "
Cream of tartar.....	None
Starch.....	57.48 " "
	100.00

No. 3.

CHARM BAKING POWDER.	
Rohrer, Christian & Co., St. Louis, Mo.	
Analyzed by Dr. Mott.	
Burnt alum.....	29.60 per cent
Bicarbonate of soda.....	31.13 " "
Cream of tartar.....	None
Starch.....	38.12 " "
	100.00

No. 4.

BAKING POWDER MANUFACTURED BY C. E. ANDREWS & CO., MILWAUKEE, WIS.	
Burnt alum.....	22.53 per cent.
Bicarbonate of soda.....	21.79 " "
Cream of tartar.....	None
Starch.....	55.68 " "
	100.00

On reviewing the above analyses it will be seen that, in the "Patapsco Powder," about 20 per cent of burnt alum is used, over 22 per cent in Andrews', over 26 per cent in Dooley's, and about 30 per cent in the Charm. And the manufacturer of "Dooley's Powder" not only has the audacity to put on the market this injurious and unwholesome powder, but to put upon the labels the deceptive statement, "chemically pure."

Not one pound of these powders could be sold in England, as it is against the law to use alum for making bread. Why have we not such a law?

A case is reported in the English Law Reports of 1871-2, 7th Queen's Bench, 135. November 15, 1871, where a baker was convicted for using alum in making bread.

I could furnish, if it were necessary, analyses of many other alum powders, as at least 50 per cent of the baking powders contain alum; but the above serves to illustrate their nature, and to show the importance of discriminating with a great deal of care when purchasing baking powders. It is far better to select only "standard powders," as the "Royal Baking Powder," for example, than to risk purchasing the many adventurous compounds which are sure to be put on the market by persons who have no higher motive than dollars and cents.

What would become of the above-mentioned baking powders containing alum if they were introduced on the English market? The answer is simple—they would be swept out of existence. It is to be hoped, then, that the public, by refusing to purchase them, will bring to them all the same fate.

By exposing these injurious and unwholesome baking powders, the public must not be frightened from using baking powders when properly made—of which I have already stated there are a number on the market. In fact, baking powders are a great convenience, as the constituents are so combined that their use is always attended with success; and there is no danger of biscuits made with them having an alkaline taste, or being impregnated with yellow specks or streaks, as is often the case when ordinary cream of tartar and soda are used. This results from the fact that the ordinary cream of tartar found in market is adulterated from 10 to 90 per cent with foreign substances; consequently it becomes necessary to change the proportion to be used with every new lot, which can only be correctly arrived at by a chemical analysis of the cream of tartar.

The advantages of using "baking powder" in preference to yeast are, that with the former none of the nutritive parts of the flour are destroyed, a larger yield is obtained, and the result accomplished with a great saving of time, which would otherwise be required to promote the fermentation when yeast is used.

The advantages of using "baking powder" in preference to the ordinary cream of tartar and soda found on the mar-

ket are not only that it is more economical, but the results are always attended with success, there being no fear, as stated, of producing an alkaline taste or yellow streaks in the product.

The Swedish Buckeye Machine.

To the Editor of the Scientific American:

In number 25 of the SCIENTIFIC AMERICAN for the 22d of last June, Mr. E. H. Knight, in a letter from the International Exhibition in Paris, concerning the reaper and mower exhibits, says that "Westeras Mekaniska Werkstad" has illegally pirated the patented "Buckeye machine" of Adriaance, Platt & Co., of New York; and in a bold faced manner entered on a contest at the Exhibition. As these statements have been published even in the Swedish newspapers, we respectfully request that you in your paper would copy the following explanations:

The Buckeye machine is not patented in Sweden. In consequence whereof is anybody in this country justified in making a copy of the same.

Westeras Mekaniska Werkstad has never pretended to be the inventor of the machine, and which as well our advertisements from the commencement of the manufacture, as our catalogues plainly ascertain, when mentioning that "it is made from the Buckeye model," although that has not been inscribed on the machine, as such a thing has been deemed unnecessary.

We have certainly not thought there was anything cabalistic in the figures; we have simply let them remain (in order not to alter the model) and use them in our catalogues so as to give such countrymen of ours, who are in possession of American Buckeye machines, an opportunity of obtaining parts for reserve, which otherwise would have been almost impossible.

The Swedes are not yet able to stand a contest with the Americans in the construction of harvesters, especially as they only for a few years past have been used in this country, and then of American make. The handiwork has formerly here been cheap, and harvesters therefore less necessary; but of late, on account of several reasons, the day's wages have been raised and the farmers compelled to, at a very high price, buy American machines in want of any Swedish ones.

Consequently, when we came to the conclusion of making reapers, we thought ourselves best serve the public at large by using a pattern which we considered the best; and we certainly believe that we have acted with perfect honesty as long as we never have claimed those copies to be our own invention; on the contrary, always told their origin, though not on the machine itself, as we have deemed that unnecessary, every machine being accompanied by a catalogue explaining that it is of the Buckeye construction, and the appearance so plainly shows the copied model, that no doubt regarding our position of manufacturers of the said machine ever ought to arise.

WESTERAS MEKANISKA WERKSTADS AKTIEBOLAG.

Westeras, September, 1878.

The Mound Builders' Unit of Measure.

Mr. J. W. McGill, who has been making a critical study of the artificial mounds of northeastern Iowa and contiguous parts of Wisconsin and Minnesota, finds considerable evidence of the employment of a unit of measurement in their erection, the possession of which would prove the mound builders to be tolerably advanced toward civilization when they entered the country. In the *American Journal of Science and Arts*, for October, Mr. McGill gives a large number of measurements made by him in one of the most extensive systems of mounds in northeastern Iowa, and arrives at the conviction that the linear unit employed by the builders was simply, or had grown out of, the pace or yard.

The northern limit of the mounds of definite dimensions is not certainly known. Mr. McGill has sought vainly for evidence of the use of measurements in the most northerly of the mounds. His own examinations so far extend only to latitude 43° 30' N., and there the mounds are of constant or related dimensions. The most northerly of the measured mounds are undoubtedly within Minnesota.

In conclusion Mr. McGill observes that if we assume a slow southerly migration to have taken place in the mound builders, it will explain the evident increase in geometrical knowledge attested by the various works found in passing across the United States from north to south. In the Northwest we find measurements of simple lines, but not of angles or areas. In Ohio, angles were correctly measured, the squares being accurate squares and the circles perfect circles; and areas were measured, as attested by adjoining squares and circles being equal or very nearly equal in area, though there is no satisfactory evidence that the cardinal points were then known. In the lower Mississippi region the cardinal points were known. The gradual modification in the various arms and implements, and the striking improvements in pottery, together with many other important considerations, lend support to this view.

A FULTON, N. Y., man recently laid his finger on the table in front of a buzz saw to feel the momentum of the air. The saw was going so fast that the teeth were not to be seen. His finger was taken off. While he was looking at it the foreman came up with the question: "How did you do it?" "Why, I put my finger down so," answered he, placing the other forefinger, as he thought, well away from the teeth. To his horror, the saw took off that one, too, at the second joint.

**Parsnips.**

The *Journal d'Agriculture Pratique* contains an article in favor of the parsnip as fodder for all kinds of domestic animals, and especially for milch cows. The author first notices some of the charges that have been made against the root as provoking certain diseases, and shows that they have but slight foundation. He then quotes Trehonnais, who ranks this as first among roots in respect to nutritive value.

In Bretagne 100 lbs. of parsnips are considered as equivalent to 300 of beets, and 16 to 18 lbs. of parsnips in the daily ration increase the flow of the milk and the richness of the milk in butter; several authorities are quoted as making similar statements, and among them so trustworthy a writer on these subjects as Magne. As to richness in nitrogen and proportionately in albuminoids, Corenwinder gives the following statement: Parsnip, 1.38 per cent; sugar beet, 0.25; red carrot, 0.23; ruta baga, 0.23; white turnip, 0.16. On good authority the albuminoids are regarded as the most valuable constituent of fodder, and therefore according to this comparison between these several roots, the parsnip is by far the most valuable one for this purpose.

**THE WATSON PUMP.**

Philadelphia, at the present time, has a widespread and well earned fame for the production of many varieties of tools and machines, from the smallest implement to the stately locomotive, and other gigantic engines. At many of the machine establishments specialties are made the prominent articles of production. The Novelty Machine Works of Mr. James Watson, No 1,638 South Front street, Philadelphia, is one of these, where are manufactured a number of specialties, among which is the force and lift pump, for artesian wells or other deep pumping, shown in our engraving. The piston rod, plunger, and lifting or deep well rod of this pump, being in direct line, make the machine both simple and efficient. The bed plate is so constructed as to make a delivery water tank, from which the force pump takes its supply.

One of these pumps is now in operation in the artesian well at the Continental Hotel, in Philadelphia, where it raises water from a depth of one hundred and fifty feet into the tanks, which are placed upon the roof of the building one hundred feet above the pump room. The engineer in charge attests its perfect efficiency: it is so simple as to give no trouble should any repairs be required after long use. It lifts one gallon and a half of water to the stroke, or sixty gallons a minute; and it is very economical in the use of steam.

These pumps could be advantageously applied for purposes of irrigation in such sections as the arid lands of Colorado, and other districts that only require a supply of water to produce abundant vegetable growth, and thus greatly enhance the value of the land.

The machines are all of the best material and workmanship. We may also here state that the entire machinery of the Continental Hotel is driven by one of Watson's steam engines, which satisfactorily performs the work assigned to it. Mr. Watson has recently constructed some very superior machines for crushing bones, used in making fertilizers and manufactures; a patent gap lathe, and several very effective milling machines, and a variety of other labor-saving machines and implements. None but the best artisans are employed on the premises, and the whole work is superintended by the proprietor in person, who was practically brought up to the business by a long apprenticeship in England, and thus is calculated to direct understandingly the mechanical operations, as well as to attend to the theoretical and designing departments. Mr. Watson has secured a high reputation, both as a manufacturer and a man of business, by his skill, promptness, and probity.

**Albumen of the Serum and that of Egg, and on their Combinations.**

The alkaline albuminates differ according to the degree of concentration of the alkali employed. Weak alkalis give rise to a combination which does not yield in solubility to paraglobulin. The acid albumens differ equally according to the energy and degree of concentration of the acid. M. Aronstein had about the same time arrived at the following results: "That by dialysis, albumen can be obtained free from salts; that the albumen, both of blood and of eggs, is soluble in water, and does not coagulate on boiling, even after the addition of an acid; that the coagulation of these two species of albumen under the influence of heat is due to the presence of foreign salts." The results are diametrically opposite to those of the author. He concludes that Aronstein and Schmidt regarded their dialyzed albuminous solutions as free from salts, because they incinerated too small quantities of matter; that their solutions remained limpid on heating, because they still contained alkali, and that they did

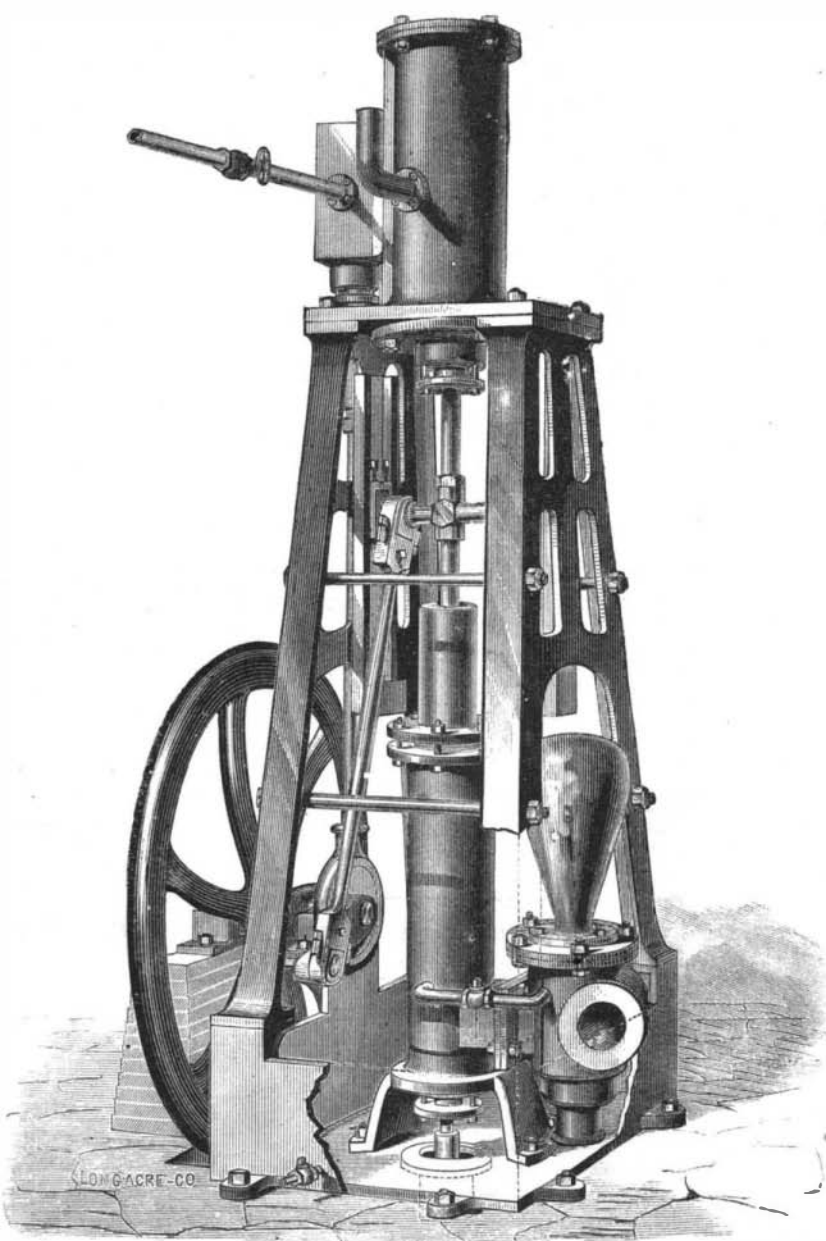
not obtain coagulation after the addition of an acid, because such acid was used in excess. He finds that after the most complete dialysis, there is obtained a combination of albumen with phosphate of lime and magnesia, which is soluble in water, but a really neutral solution of which abandons albumen in a coagulated form at the boiling temperature; that it is not possible to obtain by dialysis albumen free from salts, and that we are not justified in pronouncing it a compound soluble in water.—A. Heynsius.

**New Agricultural Inventions.**

An improvement in Grain Binders has been patented by Mr. Ignatz Karel, of Blue Earth City, Minn. This invention relates to grain binders for binding grain by means of twine; and it consists in a device for bundling, which also carries the twine to the knot-forming and twine-cutting mechanism. It has a novel arrangement for forming the knot.

An improved combination Digging Implement has been patented by Mr. James P. McCann, of Wesson, Miss. This is a new digging tool in which different kinds of spades, shovels, forks, hooks, hoes, etc., may be interchanged upon the same handle, the latter by itself being available for use as a tamping bar.

Mr. Robert Eason, of Springville, Ohio, has recently patented a Cider Mill, by which the cider is made with great rapidity, and with but a small amount of manual labor, the



**THE WATSON PUMP.**

different operations being all performed by use of suitable devices operated from the driving shaft of the mill. The cider mill may be operated by one attendant only, who controls the entire machine from one platform, accomplishing successively the grinding of the apples and pressing of the pomace, the removal of the pomace from the cribs, the filling of the cider into barrels, and the hoisting and conveying of the barrels.

Mr. John S. Lenox, of Gainesville, Texas, has devised an improved Fence, which may be constructed out of common materials, such as can be obtained by farmers, and in such a manner that it will be strong and effect a saving in expense and land. It consists in a rail fence having the rails laid up in a straight line and the bottom one resting upon a pin that is driven in the ground. Wire links are placed between the ends of the rails, and wire is used to hold the rails firmly in place, and also to secure the inclined stakes and riders.

Mr. Jacob Essig, of Milford, Minn., has patented an improved Machine for Thrashing Grain and cleaning it at one operation. This invention possesses novel features, which cannot be described without an engraving.

Messrs. William T. Hildrup and Albert Tschop, of Harrisburg, Pa., have patented a Feeding Device for Seeding Machines, in which the seed is delivered by a revolving feed roller. The peculiar construction insures a rapid, uniform, and even flow of seed.

**Closing of the French Exhibition.**

The great Exposition Universelle at Paris has taken place, and is now rapidly approaching its dissolution. During the past summer it has been the leading attraction not only in and for Europe, but for the world at large, and has been visited by hundreds of thousands of persons of all nationalities, ages, and ranks, and of both sexes. From England a constant stream of visitors has been kept up, not merely from London, but from every town of any consequence in the provinces. Persons in search of pleasure or recreation have this year put off their customary visit to the seaside or Scotland, and have gone over the channel in order to participate in the general gathering in the French metropolis. Business men of all trades and pursuits have traveled to Paris intent on the lessons to be learned there, and have, for the most part, returned home not sadder but certainly wiser men. They have thereby acquired a better and more thorough knowledge of the manufactures and producing capabilities of their Continental and American rivals, and, with the acquisition of that knowledge, have also imbibed a keener and plainer appreciation of the difficulties they have to encounter nowadays in maintaining their old control of the markets of the world. Many of the British visitors were scoffers at the mere mention of foreign competition, and scouted the very idea of the Germans, Belgians, or Americans being in a position to do us harm in any market. This was a foretime and prior to their walk around to the different sections of the Exhibition. They do not feel quite so confident about the matter since that promenade, and are certainly not disposed to underrate the progress made in recent years on the Continent and in the United States.

Our friends at home, continues the *Ironmonger*, have long been convinced of their ability to win in the industrial contest, but they have now begun to admit that it is urgently and vitally necessary for them to gird up their loins and put forth their utmost strength.

The same journal, in an article on agricultural machinery and implements at the Exhibition, thus expresses its inability to describe the multifarious articles in this department:

To write of the immense collection of agricultural machinery and implements in the different parts of the Exhibition with anything like justice, and with a due and fitting appreciation of the value and merits of each separate section, would be to produce a volume far exceeding the whole of the space at our command; hence it is quite clear that what we have to say on the subject must be closely condensed, and from a general rather than from a detailed point of view.

The French, English, and American sections each have a large area devoted to these appliances, the two former being particularly imposing, and the latter hardly less so. Other nations—Belgium, Sweden, Denmark, Norway, etc.—send samples of a rough-and-ready kind of what they can produce in these classes, but they are not of a nature to place their producers in the front rank, and certainly have no claim either to originality or to take any prominent position in any purely international comparison.

Beginning with our own set of exhibits, we may at once give it as our impression that we are at the top of the tree, nothing in the whole range of building being of that equable and high excellence which is, from beginning to end, characteristic of our productions.

Most of our leading agricultural implement makers are present, and they send fixed portable and traction engines, plows, harrows, drills, thrashers, corn dressers, mowers, reapers, hoes, scarifiers, etc., got up with the most assiduous care, and with that close finish which has so long enabled us in this respect to hold the rest of the world at arm's length. In fact, some of the engines, plows, mowers, etc., are so exquisitely got up, polished, or nickel-plated, that they look fitter for a lady's boudoir than for actual work. In pleasing the eye, nevertheless, the manufacturers have in no single particular neglected utility and solidity, so that every article shown will do its work as well in the field as one taken from ordinary stock. Each exhibitor seems to have rivaled his neighbor, so that the general result is a higher tone than has ever previously been noticeable in the same class of goods.

In that portion of the United States space devoted to the same articles we find almost all their principal houses "on the spot," not so much in machinery, as in implements and light contrivances. None of our readers need telling that in all kinds of implements the United States manufacturers are quite up to our own level. If they do not rival us in respect of solidity and finish, they are even with us on the scores of ingenuity, lightness, and the adaptability to special uses of particular articles. This is more observable in mowers, reapers, self-binders, hay and straw forks, and sundry small implements, than in anything else; and we shall merely repeat the record of an acknowledged fact when we say that in these matters our American cousins have done