There are no doubt plenty of machines that will turn out these spokes at an average rate of one thousand per day, and which can be afforded for less than the cost of one man's labor for a single year. We are certain that machines are made which will turn out also from three to four hundred hubs of this timber per day. Indeed, the Kaufman *Star* informs us that a Northern firm offer to furnish spoke machines capable of making from twelve hundred to fifteen hundred spokes per day, for $250 each, and machines at the same price that shall make from four hundred to four hundred and fifty hubs per day, each requiring only one attendant, and the two doing more work than one hundred men could do without machinery.

It is easy to see how the introduction of such machinery into the region described would enable these hubs and spokes to be made for shipment to all parts of the country at a remunerative price, or even to be exported.

But Texas is not alone in the possession of timber treasures. Virginia, Georgia, North and South Carolina, and many other parts of the Southern States also can boast of very large tracts of valuable timber land, the most of which could be made to yield immense returns by the introduction of such machinery as has been for years employed in the timbered sections of the North. The cost of transportation after the raw material has been made into forms of increased value, is not materially more than for the shipment of the crude lumber, while it pays far better.

The manufacture of tubs, pails, chairs, sashes and blinds, and the great variety of wares which have made New England famous as a wood-working section, might, without doubt, be most advantageously carried on in the South, and our information of some few factories of this kind, which are now running in Southern localities is such as to greatly encourage the establishment of others.

PARAFFINE INDUSTRY.

In the Paris Exhibition of 1855 was shown a block of paraffine, with a few candles. Few visitors understood what it was, and no one could have anticipated the great extent to which the trade in this article would subsequently be pushed. The manufacture of paraffine candles has become an important industry, and there are single establishments in Germany capable of turning out 240,000 candles daily. In England and France the industry has reached vast proportions, and in this country it has no mean significance. Wagner estimates the production of paraffine in Prussia alone for the year 1870 at 11,000,000 pounds. The brown coal of Germany and the bog-head of Scotland and the Rangoon petroleum are particularly well adapted to the production of paraffine, while Bohemian and Austrian and other continental coals yield a very small quantity. The uses of paraffine are many. As its melting point is low it is proposed to employ it for the preservation of meat. Meat several times immersed in a bath of melted paraffine will keep for a long time, and when wanted it is only necessary to melt off the adhering wax-like coating to prepare it for cooking. For stoppers to acid bottles, to coat paper for photographic and other uses, as a lubricator, for candles, as burning oil, to coat pills, in the refinery of alcohol and spirits, paraffine now finds ready use. It has also been employed for the adulteration of chocolate and candies; for the preservation of railroad timber; to saturate filter paper for certain purposes; to coat the sides of vessels in which hydrofluoric acid was to be kept; to preserve fruit from decay; for oil baths of constant temperature; to prevent the oxidation of the protoxides; to render fabrics waterproof; as a substitute for wax in the manufacture of matches; as a disinfecting agent; as a varnish for leather, and for many other useful purposes. There are very few bodies that can attack or in any way decompose paraffine, and hence its great value in many chemical processes. Its use is likely to be further extended the more we become familiar with its properties, and it appears destined to assume an important position among our chemical industries.

CRAIK'S PRACTICAL AMERICAN MILLWRIGHT AND MILLER.

In our column of "New Books and Publications" will be found the notice of a book under the above title which deserves more than the ordinary notice; not that it has no deficiencies, or that it is characterized by scientific style and method, but that it embodies the results of a long and varied experience in the construction of various kinds of mills, an experience all the more valuable, as the author gives evidence in his pages that he is one of the comparatively rare individuals who can observe with discrimination, and draw accurate inferences. Perhaps no department of engineering demands greater fertility of resources than mill construction. Hardly any two mills are alike in circumstances of position, available power, and character of soil, upon which their foundations must be placed. Dams, also, require endless variety of detail according to the peculiarities of the beds of streams upon which they are erected. Varying heads of water, also, introduce further complications. In all of these particulars, and in many others, not specified, no amount of theoretical information can supply the lack of experimental knowledge; and next to such knowledge, personally acquired in practice, ranks that tersely and plainly communicated by such a man as the author of this work. The aim has not been to produce a scientific treatise. The work is rather an embodiment of practical results and tests of the various kinds of mill machinery under a wide range of circumstances, some of them "offering considerable difficulties and calling for great diversity of practice." The six chapters on water wheels are alone worth the price of the book. They however comprise only a comparatively small portion of the work, which is a large octavo, filled with practical information upon nearly every topic connected with the subject of mill building and running. The subjects of wind mills, their construction and adaptation to our Western prairie country, is of great interest, and is treated at length. The style of the work is such as any mechanic may understand, all algebraic formula being avoided, and the rules being simplified to the utmost.

Mr. Craik makes a statement in his discussion of the transmission of motive power, which is not correct. He says, "probably the greatest distance power was ever carried was by a combination of jointed rods used to connect a series of pumps with the water wheels which drove them, at the celebrated waterworks of Marli, near Paris, in France. Eighty-two of these pumps were placed more than three hundred feet above the power which drove them, and *half a mile away*." In Prof. Barnard's report upon the Paris Universal Exposition, on page 132, is an account of the successful transmission of power by Hirn's telodynamic cable, to a distance of nearly three and one eighth miles, at the mines of Falun, in Sweden. A short extract upon this subject, from the report alluded to, was published in our last issue.

But such an error as this is of little importance when compared to the great practical value of the work. In another part of the paper will be found an extract which is a fair sample of the plain, comprehensive character of the book, which we can confidently recommend to all who are interested in mill building and milling.

THE MILLENNIUM, OR SOMETHING LIKE IT.

We have, in another column, noticed the fact that the American Association for the Advancement of Science is forced occasionally to listen to papers containing nothing but twaddle, and that this twaddle, printed, redounds not to the honor of the Association at home or abroad.

Such, however, was not the character of the paper read by the well known scientist, thinker, and inventor of the "panatechner," Clinton Roosevelt, of this city. His paper discussed the question, "Ought a true science of national wealth to be excluded from the curriculum of the American Association for the Advancement of Science?"

If we may judge from the character of many of the papers read, the question as to whether anything should be excluded seems superfluous. But a superfluous question is often a splendid thing to string words upon, especially if in the stringing, the elegancies and accuracies of congruity, pertinence, terseness, perspicuity, and logic, are not considered essential..

To discuss the momentous question propounded by Mr. Roosevelt, was by no means a difficult task to one so rich in ideas, and so fertile and felicitous in diction. We were not present at the reading of his paper, but the report of it, published in the *Times*, gives evidence of its brilliant and exhaustive character. The assembled *savans* no doubt gave full expression to their delight when Mr. Roosevelt finished his paper. Being a polite set of men, they would not be likely to interrupt him by applause during the reading, however much the fullness of emotion might struggle for utterance.

Mr. Roosevelt was willing to allow, according to the motion of Professor Agassiz, made at the last annual meeting of the Association, at Salem., Mass., that the system of political economy, as taught in our colleges and universities, embracing only production, distribution, exchange, and consumption of articles having exchangeable values, is insufficient to embrace a true science of national wealth. In his view the science of national wealth consists of three orders and nine genera, without counting the species, varieties, etc.

Surely the *savans* cannot refuse to seize upon a subject involving three orders, nine genera, and an indefinite number of species. Such a field as this to enter in upon and take possession of! A veritable scientific Caanan, flowing with philosophic milk and speculative honey, and bearing choice fruits of endless discussion and debate! Surely, they each and all exclaimed in their hearts (being too polite to speak in meeting), "*Here's* richness! Here's *Richness!*"

According to Mr. Roosevelt, "the reason why all systems of government by reason alone, have failed hitherto to make peace on earth and good will to all, is that the will of man is not governed or to be governed by the greatest motives, but by the same general law that governs in physics; thus accepting the science of government as the science of motive powers. Motive powers are of two kinds, metaphysical and physical. And whereas, in physics motive powers operate directly as the substance, and inversely as the squares of the distances in space, in metaphysics motives govern the will of man in times. Thus men who verily believe in eternal rewards and punishments still give way to the present temptations, and fear little practically, until death or the instrument of punishment comes near. Thus, as in the State of Wisconsin, the La Crosse and Milwaukee Railroad Company bribed all at once the Legislature, the Judiciary, and the Executive, and left the people as so many sheep without a shepherd; so has it always been."

As a specimen of much in little, we commend this passage as a model for very young students of English composition. Much words and little sense is a style that pays well in modern literature, as most contributors to our magazine literature are now paid by the column.

"The same things, which, if left alone, are destructive to life and happiness, if removed, become beneficial in their proper places; as the offal of cities left to find its own level in the lowest places, sends forth malaria, disease, and death, if transported to the surrounding country and covered in the soil produces flowers, fruits, and cereals for the support of life and happiness; that there is a law of Providence under the higher law of absolute necessity in the nature of things; that what a man or nation will not labor or fight to gain and guard when gained, shal' not be enjoyed."

This passage is copied verbatim from the *Times'* report. It doubtless means something, and if it were not too late, we would suggest that the Association should appoint a committee to ascertain the meaning, correct the grammar, and report at their next meeting whether it should be admitted into the curriculum of the Association, or not.

At the same time, Mr. Roosevelt's orders, genera, and species might also be distributed among the members—a priceless boon, since, according to that gifted thinker, they comprise "all that man can reasonably desire on earth, as useful or delightful to him"—a millennium, or something like it.

Mr. Roosevelt is especially hard on the free-traders, putting them into the same category with "free-lovers" and "free-booters." We don't see how they are going to stand this violent attack, which, following Mr. Greeley's *Tribune* essays on political economy, is, like charging, after a battle, upon the dead and wounded—to say the least—ungallant of Mr. R. He might, indeed he might, have let the free-traders alone, and confined his remarks to the physical and metaphysical motors which run railways and legislatures. How easy it would have been to have pilloried Prince Erie on his metaphysical motors, Fisk's Opera House, Camp Jay Gould, and an unlimited grab from the pockets of the Erie stockholders, not to mention Fisk himself, the most metaphysical motor on this continent.

But we reluctlantly leave Mr. Roosevelt's paper, from the reading of which we have become better, wiser, and more able to grapple with the hard problems of social science. When in due time the transactions of the American Association for the Advancement of Science shall appear, it will be demonstrated to the world that he who advanced it most, during the year 1870, was Clinton Roosevelt, Scientist, Thinker, and Inventor of the Panatechner.

THE ANALYSIS OF MILK.

Dr. Chandler, of Columbia College, has recently been paying attention to the analysis of milk in connection with an examination of the milk vended in this city. The results of his examination having been published, the method adopted for the analysis of milk in so far as its adulteration by water is concerned, has met with criticism from the pen of Dr. A. E. Davies, in the *Chemical News*. As the short article of Dr. Davies not only gives the method employed by Dr. Chandler to ascertain the amount of adulteration by water, and the reasons why it is considered defective, but adds a method considered much more exact, we copy the whole of it. The method is one that can be easily and generally applied, and will be found of use in the numerous cheese factories established during the past few years in this country.

Dr. Davies says:

"As to water being the only substance which is employed for adulterating milk, I perfectly agree with Dr. Chandler. Carbonate of soda and nitrate of potash are occasionally added, but only rarely, and in very small quantity. I have never met with chalk, sheep's brains, mucilage, sugar, etc., in any sample which I have analyzed.

"Since water, then, appears to be practically the only substance fraudulently added to milk, it is a matter of the greatest importance that we should be able to detect the presence of added water, and to estimate, at least approximately, its amount. This (at least the presence of added water) Dr. Chandler considers may be done by taking the specific gravity of the milk and estimating the water it contains by evaporating a weighed sample to dryness. 'Pure milk,' he says, 'varies in specific gravity from 1·023 to 1·032, water being represented by 1·000.' And, again, 'It is found that good milk generally has a specific gravity of from 1·029 to 1·032. In testing milk, the lower number is selected as a fair gravity for pure milk; and whenever the gravity falls much below this the milk may be considered as containing an excess of water, and consequently poor in quality or adulterated.'

"Now, according to my experiments, the specific gravity cannot be at all relied on as a test either of freedom from adulteration or of natural richness. I give a single example. A sample of milk of known genuineness recently analyzed by me gave the following results: Casein, 4·26; fat 6·26; sugar, 5·13; salts, 0·60; water, 83·75; cream (by the lactometer), 17 per cent; specific gravity, 1·0246. It was, therefore, a very excellent sample, and rich in all the solid constituents of milk, especially butter, but had it been judged by its specific gravity, it would have been put down as of very inferior quality. Besides, even supposing the specific gravity to be a reliable test of quality, it gives us no indication as to whether the milk is naturally poor or has been rendered so by the addition of water, and the test, in my opinion, is therefore worthless.

"As to the estimation of the amount of water by evaporation, Dr. Chandler says: 'A perfectly reliable method, though more laborious, is to actually determine the percentage of water in the milk, by evaporating a weighed quantity and carefully drying the residue at 212° Fah. If a milk loses more than 88 per cent of water, leaving less than 12 per cent of solids, it may safely be pronounced to be adulterated.'

"From this view, I totally dissent; the presence of 88 per cent of water is an indication of inferior quality, but is certainly no indication whatever that water has been purposely added. In milk of known purity, examined by Dr. Voelcker, as much as 90·70 per cent of water was found; and this alone shows the untrustworthiness of Dr. Chandler's test—at least, as far as it refers to added water.