THE COTTON MANUFACTURE IN THE SOUTH.

In a recent article we proffered some advice to the South, as to the proper course to pursue in the reconstruction of her industries. In that article we recognized the possibility that some of the industries which under the old system of things were prosperous, could not under the existing state of affairs be profitably restored, and suggested the substitution of others. Since that article was published a correspondent has called our attention to the feasibility of cotton manufacturing in the southern states, and as evidence of the correctness of his views, has furnished us with some interesting details of the Augusta (Georgia) Manufacturing Company, as shown in the report of its President, for the first six months of the present year. Mr. Wm. E. Jackson, the President, says in his report:

In presenting my twentieth semi-annual report it is with pleasure I can state the condition of the company is very favorable.

The gross earnings for past six months have been		$135,510 65
Interest received		3,921 65
		$139,432 30
From which is deducted expense account	$8,731 64	
Repairs account	3,475 11	
Taxes paid	19,691 41	
		$31,898 16
Leaving as net profits		$107,534 14

From which two dividends of five per cent each; amounting to $50,000 have been paid, enabling us to carry to the credit of profit and loss account $47,534·14, making the amount now to to the credit of that account, $224,798·22.

Goods manufactured from December 14, 1867 to June 13, 1868:

	lbs.	Pieces.	Yards.
4-4	707,018	54,139	2,135,418
7-8	363,801	33,475	1,324,691
Drills	60,685	4,589	178,143
3-4	53,341	6,145	250,049
	1,184,845	98,348	3,888,301

Bales goods on hand December 14, 1867:

	7-8	4-4	Drills.	3-4	Total.
	19	47	6	0	72
Made	1574	2567	254	294	4689
	1593	2614	260	294	4761
Sold	1558	2561	253	276	4642
On hand	35	53	7	24	119

		lbs.
Cotton consumed		1,362,571
Average cost of cotton		19·98
Average yds. per loom, per day		49·13
Average number of looms running		505
Average number of hands employed		507
Aggregate wages paid		$87,546·93
Aggregate sales		$519,965·01

The operations of the company for the past three years, or since the close of the war; viz., from June, 1865, to June 13th 1868, have been as follows:

Nominal balance 17th June, 1865,		$562,583 09
Amount paid creditors due them in Confederate notes,		35,775 22
		$598,358 31
Deduct depreciation in Hamburg and Columbia Railroad stock	$26,625 00	
Deduct depreciation in various assets,	446,284 05	
Deduct suspense account St. Louis,	4,703 71	—477,612 76
True balance, profit and loss account, 17th June, 1865, in United States currency,		100,745 55
Gross earnings from 17th June, 1865, to 13th June, 1868,	932,906 57	
Expense account,	$78,300 61	
Repairs,	33,386 72	
Taxes,	244,479 81	
New machinery,	92,686 76	
Dividends paid,	360,000 00	808,853 90
Add to profit and loss account,		124,052 67
		$224,798 22
Bales goods made		23,545
Aggregate sales		$3,765,301·80
Aggregate wages paid		$632,280·15
Average yards per loom per day		45·9
Average number of hands employed		578

Production for three years:

	Pounds.	Pieces.	Yards.
4-4	3,726,014	292,540	11,337,660
7-8	2,120,137	200,154	7,711,451
Drills	362,173	28,275	1,065,759
3-4	53,341	6,145	250,049
	6,261,665	527,114	20,364,919

It may not be uninteresting to some of our present stockholders to state what has been accomplished in the past ten years. It will be remembered by those who were among the original purchasers, that the property was purchased of the city for $140,000 on ten years' credit, with interest at seven per cent, payable semi-annually, and one tenth of the principal annually, the purchasers paying in as commercial capital $60,000. This amount, in consequence of the dilapidated condition of the property, was almost entirely expended in the first two years, in repairs rendered necessary by the then condition of the property. We have, since the purchase, paid for the entire property without calling on the stockholders for another dollar; added largely to the property by purchase and building, bought about $100,000 worth of new machinery, increased the capital to $600,000 by the addition of a portion of the surplus; paid dividends regularly, and have now a property worth the par value ($600,000 in gold).

Our correspondent, who writes us from Nashville, Tenn., says;

Should you wonder how it is, that the people of the South (who are usually supposed to be quite ignorant in regard to manufacturing knowledge) could succeed so well in making so profitable a matter of a cotton mill, I can readily solve the mystery. In the first place, owing to the mildness and salubrity of our climate, equally free from the intense cold of winter, or the extreme heat of the further South, added to the unbounded fertility of our soil, we produce provisions of all kinds, not only the bare necessaries of life, but as well many of the luxuries at the lowest possible cost of capital or labor—here we have cheap labor and especially of that class (I mean the youth) who are most needed as operators in cotton manufacturing—and this class of labor too, is quite abundant, as there have been but very slight drafts as yet made on it. Beside cheap labor and cheap means of living, we have a great abundance of cheap fuel of all sorts wood, away from the cities or large towns at a merely nominal cost—with a supply of bituminous coal enough to run every steam engine on the continent for centuries.

And again, we have the raw material (cotton) right at the doors of the mills that fabricate it into cloth, saving the enormous cost of transporting it to Lowell or Manchester, and retransporting its manufactured product back again.

If you will estimate this item alone, and suppose for argument sake (for it is not otherwise supposable) that the labor employed in converting it into cloth is as great as it is in New England, you will at once see that it allows as much profit as any reasonably avaricious man should desire.

Our correspondent assures us that the above is not an isolated case, and there are plenty of others which although their business has not been so extended, have achieved equal success in proportion to their investments. He says all that is needed to develop the resources he has enumerated is capital. The capital of Tennessee as of the other slaveholding states in past times, consisted largely in their slaves. This is lost to the South, and until it is in some way replaced in part at least, manufacturing growth must be inevitably retarded.

He states that clever, honest, industrious people will be welcomed to Tennessee, and their personal safety, and that of their property, willbe as assured there as in the North.

The journal from which we have copied the above extract challenges a comparison of the report of the Augusta Cotton Manufacturing Co., with that of any similar establishment in the Northern States, and thinks the cotton manufactures of New England had better look to their laurels.

Correspondence.

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

Propulsion and Dynamical Levers.

MESSRS. EDITORS:—The prevailing opinion among engineers, and, in fact, with scientific men generally, is, that no power can be saved or gained by use of a lever. While this is absolutely true, as relates to the use of the statical lever, it is radically wrong and a very great fallacy as relates to dynamical levers, as will be seen by the following argument.

Under the head of statical levers are included the common scales, the pulleys, the wheels of fixed machinery, and every other kind of levers where the axis is fixed and stationary.

Dynamical levers are those where the supposed axis is not fixed or stationary, but actually the point and line of motion; and under this head are included the wheels of any vehicle, the oar, the legs of all animal and insect organisms, the wings of a bird, the fins of a fish, the duck's foot, and, in short, the one vital principle of the propulsion of all animate and much of inanimate nature is the dynamical lever.

Let us inquire whether or no anything is gained by this kind of lever. Now, it is a solid fact, that a horse can pull a tun weight on wheels, at a speed of two or three miles per hour; whereas, if the tun weight were not on wheels, he could scarcely move it at all. Why is this? The general answer given is, because the wheel overcomes a large amount of friction. This, of course, is correct, but does not give a full solution; for it may also be asked, why a mere wheel being round, produces this economy; the more philosophical answer being because the vital principle of the wheel is a lever of the dynamic series. From this fact, one of two deductions only can be made; namely, that economy or saving of power *is* produced by use of a dynamical lever, or that the wheel is not a lever.

Again, take another variety of this kind of lever—a man's legs. Given, A and B, two men of exactly equal powers, let A use his own legs, and B have stilts added to his, enabling him at each stride to step three times the distance of A, and it must be conceded that if there is no gain or economy in the dynamic lever, that A will be able to walk as far in any given time as B. But we know that this is impossible, hence the manifest gain by use of the lever; and those who would deny the gain or saving produced by the lever, will be forced to deny the fact that legs are levers.

Furthermore, the closer the student of nature examines the wonderful structure of all living creatures, he finds that nothing is created by accident, everything that God has created being supplied with most perfect means for any desired end, and becomes more and more impressed with the wonders of the universe, and the goodness and absolute wisdom of its divine architect. Therefore, he who would still dispute the economy of the dynamic lever, must be prepared to deny the wisdom of the All Wise.

Were the practical effect of this fallacy limited to the mere expression of opinion, and did it not interpose a serious obstacle to the advancement of a very important branch of science, namely, that of propulsion and steam navigation, it would be an error of small importance.

The paddle-wheel, owing to its axis being the actual and true line of motion by which the speed of the boat may be measured, acts as a lever of the dynamic series, and much is to be gained in economy by the proper application of power; for from the application of power to the axle of the cart wheels, and to the axis of the levers we call legs, it is evident that the nearer the power is applied to the axis or line of motion, and the longer the lever used, the greater the economy. Therefore, it stands to reason, that the shorter the crank by which the axis is turned, the greater the economy—provided always, however, that this gain or saving shall not be lost or counterbalanced, owing to some radical defect in the present rotary system, as is actually the case.

Hence it is that well-informed engineers, and many scientific men, overlooking the fact of the difference in effects produced by statical and dynamical levers, and not realizing the fact that the paddle wheel acts as a dynamical lever, having its great economy overshadowed by the natural defects of the present rotary system of steam navigation, have *erroneously* decided that there is no economy or saving in the short crank. The writer has spent several years, and some thousands of dollars, in the practical study of propulsion, and has abundant evidence to show that, given the same boat, the same power, and the same paddle, if the crank be one half length of radius of paddle, the "slip" will be much greater than if some power is applied to a crank of one eighth or one tenth.

Now, as it can be proved that propulsion is simply a question of power and comparative resistance, and that the "slip" is diminished by shortening the crank, it follows, that if some other system, not rotary, could be adopted, that the application of the power as near the axis as possible, and as far away from the fulcrum (which in propulsion is the water at the propellers) that the limits of increased economy can only be estimated by mechanical possibilities.

The writer has invented such a system, possessing not only the advantages of great economy in fuel and machinery, but also many important mechanical advantages over either screw or paddle wheels, which will form the subject of another paper.

I hope these remarks will clearly show that there are two classes of levers; namely, the statical and dynamical, and that while nothing can be gained or saved by use of the former, that the economy produced by the latter is almost limitless; and that by so doing, one of the errors that obstruct the path of the world's progress may be removed.

New York city. F. R. P.

Poisonous Drugs and Cosmetics.

MESSRS EDITORS:—In your issue of November 25, I notice an article headed "Poisonous Drugs and Cosmetics." Now while the writer fully agrees with you that the evils to which attention is called are very great, he begs leave to differ as to the best curative measures, and he also thinks that the statement, "we believe there is no department of trade in which, as a rule, retailers know so little that is requisite to the proper conduct of their business as in the drug trade," was made without due consideration, and that it is altogether too sweeping a condemnation of the class.

The head of the largest drug house in New York remarked, after twenty-five years of daily dealings with retailers in every State in the Union, that, "outside of the learned professions, no class of men possessed so much intelligence." You fortify your statement by the fact that "a druggist doing a large prescription business did not know that vinegar contained acetic acid." Now, unfortunately for the public, they are very apt to give their patronage to the man who will sell the cheapest, in this trade as in others, forgetting that they cannot judge of the purity of drugs, or the ability of the dispenser, with the same accuracy as they can the quality of cloth, or the taste of the draper. Thus many a man builds up a large business who, judged by the standard of an experienced pharmacist would not be thought fit for a third assistant in a first-class store. If mistakes occur, and ignorance is shown, in such cases, who should bear the blame,—the class of intelligent apothecaries, or an unwise public? We answer, so long as the public will employ physicians or apothecaries who are not regularly educated they must take the consequences if mistakes occur. We advocate the most thorough education on the part of the apothecary, but we think that the public are bound on their part to liberally support such men.

That "nothing should be done blindly" is impressed upon the mind of the youngest boy in the trade, as one of his earliest lessons, in all well-regulated stores. No rule is more thoroughly established and constantly acted upon than this. If an overdose of a powerful medicine is ordered, the prescription is re-submitted to the prescriber; thus many times when physicians wish to order large doses of powerful medicines they find it difficult to get the prescription put up by the careful apothecary.

"Finally, prescriptions should be written plainly in plain English." One would suppose, to hear what is said, and to read what is written on this subject, that physicians adhered to obsolete and inconvenient Latin names for drugs, for the sole purpose of mystifying their patients. Let us examine this matter. That certain exact and invariable names, understood alike by the physician and the apothecary, must be used, is evident. The botanical names of plants, and the chemical name of chemicals, form the basis of the nomenclature of the United States Pharmacopœia. Should we gain anything by a resort to English names? Let us see. What, for instance, is the English name of the plant known in the Pharmacopœia as *Cypripedium pubescens?* It is called in various localities, nerve-root, nervine, moccasin plant, and ladies' slipper. What is the English for the *Gaultheria procumbens?* It is known as wintergreen, partridge berry, deer berry, tea berry, mountain tea, and checkerberry; and no two old ladies well versed in herbs will be found, who can agree that these names all refer to the same plant. "Wintergreen, indeed!—why that's another thing altogether," one says. To be sure, the common princess pine is also known as wintergreen. Indian hemp may mean the *Cannabis Indica*, or it may mean the *Apocynum Cannabinum*—two articles widely different both in nature and use.

Among chemicals, the synonyms are not so many, yet who would choose to give up the simple, exact, and descriptive chemical names for the inaccurate, and in many cases foolish common ones? If common names are not adopted, how are

the mass of mankind to know what they are taking; for how many people in the hundred know even that Epsom salt is sulphate of magnesia? If people have studied medicine sufficiently to be able to judge "whether the dose presented to their lips is calculated to heal their infirmities or send them to eternity by the run," they ought at least to know the scientific names of medicines. The fact that these names are used is, too, something of a safeguard to the public, as it obliges the apothecary to know at least this much, although it is a very small part of the knowledge of the intelligent man, who will know thoroughly the thing itself, not barely its name.

The nomenclature of our Pharmacopœia, as well as the body of the work is revised once in ten years by a committee of able and scientific men, of whom Dr. Squibb has done, perhaps, more than any other man to perfect it.

The subject of abbreviations has been often and well discussed, and those sanctioned by use are such as cannot without gross carelessness be mistaken, if plainly written. We deny that the profession is behind any other in intelligence, or in a desire for advancement, and would ask all skeptics to read the *Journal of Pharmacy* and the proceedings of the American Pharmaceutical Association, at its annual meetings. Five colleges of pharmacy are already in existence, where lectures on botany, chemistry, materia medica, and the art of pharmacy are delivered by able professors. Young men are encouraged by their employers to attend these lectures, and to gain the diploma of these institutions. But something more is needed—it is this: a wise legislation which shall provide in every State a board of examiners whose duty shall be to test the qualifications of all who desire to practise the art, and whose certificate of ability shall be necessary before they are allowed to do so. Then, the public will have some protection, and not till then.

The public, also, must be educated to look upon the business in its true light, and it must be as willing to pay the educated pharmacist for faithfully compounding a prescription, as it is now to pay the physician who prescribes it. Then, perhaps, the assistant who works now, for fourteen hours a day, for from $12 to $18 a week, may earn as much as a mechanic.

All "cosmetics" and secret preparations should be obliged to pass examination before a Government assayer before they are allowed to be vended to a credulous and ignorant public; then perhaps we shall hear of fewer cases of poisoning from this source. I beg leave respectfully to commend these suggestions to our legislators as the view of

A PHARMACIST.

[We cordially give place to the above excellent communication, and add that the suggestion that all ready-made preparations kept for sale by druggists should be submitted to examidation by an official appointed for that purpose meets with our entire approval.

In the matter of prescriptions, we do not object to the use of Latin names when there is any ambiguity involved in the use of an English one; but the names of drugs are not all that is contained in a prescription—there are also quantities and directions for use. We yet fail to see why "every other hour" should be written in Latin: "*alterna quaque hora*," and abbreviated at that into "*alt. q. h.*," or why "*cochl. amp.*" is better than "a tablespoonful;" "*bis indies*," abbreviated into "*bis ind.*," better than "twice a day," and so on. When our correspondent shows why they are better we will unsay what we have said on the subject of prescriptions.

If the suggestions we made in the article referred to by our correspondent were carried out, there would be no danger that the public would patronize incompetent druggists on account of cheapness; there would be none of that character to patronize.

We admit that all people are not competent to judge whether drugs prescribed are beneficial or hurtful; but when, as in the instance we alluded to in the article questioned by our correspondent, a mistake is made in so powerful a drug as opium, and one patient is able to detect that the dose is too large when the prescription reads "*Tinc. Opii*," more could be found who could detect the same error, the drug being called simply "laudanum."]

Practical Tanning.

MESSRS. EDITORS.—The article on tanning, in No. 18, current volume, is more theoretical than practical in its details. As a practical tanner in the good old way I should like to make some remarks showing the inconsistency of the correspondent in regard to tanning. The making of leather is a chemical process and therefore rests upon a principle that knows no change either in France or America. The first thing done, is (so the article reads) to throw the hides in the lime to loosen the hair. Now a good tanner would laugh in his sleeve at the simplicity of the idea, for, if that was all, then we could easily dispense with the liming process, as we do in making "sole" in our large tanneries. I was taught that it was for the purpose of softening the gelatine, a constituent of the skin, and leaving nothing but the cuticle or true skin to work upon. Lime having the solvent quality, performs its office in a perfect manner, at the same time loosening the hair so that it can be easily removed. The next step in practical tanning is of the utmost importance, and one which the article referred to completely ignores. My opinion is, that the tanners at Pont Audemer threw dust in the eyes of the correspondent, so that he was left in the dark as to their method of preparing the skins for the ooze. In liming we have softened the tissue and the next step is to remove the gelatine or gluey substance so that we can have a soft pliable skin to work upon. This is done by what dyers call a mordant.

Now I doubt very much if the waters that run through Pont Audemer possess the power, although the correspondent says they threw the skins in the river to remove the lime, and thence to the vats and cover them with "juice of tar" which is a ridiculous blunder on his part. The mordant used in this country and England is the droppings of the hen or pigeon house; others are used, but these are the principal ones employed in all sections for upper and calf. We, practical tanners, call this process "bating," that is, we mix a certain amount of this manure with water, and throw our hides or skins into it. Once or twice a day they are raised, and as soon as they begin to soften, work them over on the beam; this is done until they are cleansed from lime and glue and present a soft pliable appearance when they are ready for the tan, but not the "tar."

The idea of putting skins from the "bate" into strong ooze is simply absurd, as it would be to eat alum or a green persimmon before taking a piece of pie or sweet cake. French calf is remarkable for its fine grain and soft velvet appearance which can only be secured by careful handling in a weak solution of tan. To put green skins in strong tan would draw the grain hard and coarse, it being an astringent in its nature; and hence the philosophy of handling in weak ooze and gradually raising the strength until a good color and grain are secured when you can bring on the "tan." The idea of laying away in dust may do, yet there is nothing gained by the operation, as the leather cannot absorb the tan without moisture, hence you only loose time. You want sufficient to cover the mass and let it lay three to four months; then change and make a degree stronger, until your leather is completely tanned, even if it takes a year or two, the longer the better. I wish some of your scientific readers would give the reason why the tanning principle in bark grows weaker as you go West. I have conversed with tanners in various western States who have emigrated West and they all agree upon this, that it takes more bark than it did East to tan a given number of hides.

S. P. W.

Mechanicsburg, Ill.

[We are always happy to receive letters from practical men—and hope our correspondent will follow up the subject by sending us other articles. "Juice of tar," in the original article may have been a typographical error.—EDS.

A Central Invention Bureau.

MESSRS. EDITOR:—I am much pleased to see you advocating the necessity of a "National Invention Bureau." I have thought a great deal in regard to such a thing, and have decided that the country calls for it. About eighteen months ago I sent a letter, containing hints of the necessity of an association of the kind, to the Farmers' Institute Club, in New York; it was published in the New York *Tribune*, but that seemed to be the end of it. Probably its source was too obscure to demand attention. If Henry Ward Beecher, Horace Greeley, or some other shining light had made the suggestion, doubtless it would have been heeded. An association, or stock company, organized for the purposes as mentioned by you in the SCIENTIFIC AMERICAN, would, beyond doubt, be a source of much profit to the association, a good thing for the inventor, and a still greater benefit to the country at large. As soon as it would be known by inventors that they could have their machinery advertised and exhibited by competent mechanics, at the commercial metropolis of the United States, they would make application, and either pay a sum for exhibition, or have their rights for sale on commission, at a place where the people generally could see them. No better advertisement could possibly be obtained. It would be an inducement to inventors to construct their models in a workman-like manner, and put them in good running trim. All the inventors in the country would visit a place like that; all noted patent right dealers would go there for information. It would save the country from being imposed upon by bogus patents; it would save a vast deal of false circular printing; it would throw on the market, at once, any invention which might be useful to the farmer or the mechanic; it would save thousands of dollars to individuals, spent now "lawing" each other over some infringement in bogus sale. In fact, the present system looks very much like a headless man walking about over the country—making numerous mis-steps, for want of brains and eyes. In truth, we want a head and shoulders, as a grand center directory for the exhibition and sale of the new productions of the country.

Please stir the subject till the right men take hold of the matter. As for myself, I have three or four patents, and probably may have more in a short time, and I feel personally anxious about the matter.

JAMES H. REYNERSON.

Clayton, Indiana.

Preservation of Wood from Decay.

MESSRS. EDITORS:—For the past thirty-six years my attention has been directed to the subject of defending every species of wood from decay, and also to make it incombustible or fire proof. Beside making thousands of experiments, I have assisted others to institute them, and have watched the progress which has been made by the various patents issued for this purpose, such as kyanizing by the use of bichloride of mercury; the Burnett process, (chloride of zinc); the Earl process, (protosulphate of iron); Behr's plan, (solution of borax); Heinemann's patent, by the use of resin; the carbolizing method, the subject of two patents, one for cold carbolic acid, and one for hot acid; the tar and petroleum method as used in the Nicolson pavement, and many others, which have been brought out from time to time, but without having achieved permanent success.

I claim the first application of silicates in their various forms to all organic substances, such as woody fiber, paper, pasteboard, etc., for preventing the attack of the *teredo navalis*, fire, and water. I have frequently shown that by applying, by double chemical affinity, the silicate of soda and lime water, as I will presently describe, I convert the woody fiber into a mineral substance. This process is the most reliable and economical of any I have seen.

Railroad sleepers have to be replaced, under the circumstances most favorable to their durability, every five years, never remaining sound over seven years, and generally lasting only three years. I saw in California, in the gold diggings, timber that had rotted in two years, and was informed that cross ties seldom lasted longer than that period. If we calculate the number of railroad sleepers to the mile, which is 2,112, and their cost at 50 cents each, keeping in mind the fact that we have 40,000 miles of railroads in the United States, the annual cost per mile of replacing sleepers appears to be about $150, even if they lasted an average of seven years. Statistics show that farm houses of wood, wooden bridges, etc., last on an average about 30 years, and demand no less than $100,000,000 annually for repairs. A large proportion, if not the most of this immense sum, could be saved by the use of soluble glass.

My method, described years ago, is simply to steam the timber, then inject a solution of silicate of soda for eight hours, and then soak the wood the same period in lime water.

DR. L. FEUCHTWANGER.

What Farmers Want.---Inventors take Notice.

MESSRS. EDITORS:—While machinery has done very much for the farm, there are yet some unsupplied gaps to be filled to make the mechanical aid complete. One in the hay-making process. We have excellent mowing machines, and horse tedders, and horse rakes, and good horse forks for unloading hay in the barn, where there are no cross beams in front of the mow, but it costs as much as it ever did to get the hay from the field to the barn. We want a machine—a kind of rake—on wheels, eight or ten feet apart, drawn by a single horse, that will go into the spread hay, rake up and load upon itself eight or ten hundred pounds of hay, and bring it to the barn without further aid than the boy that drives it can render.

Most farmers have two horses, and most meadows are not one quarter of a mile from the barn; and with two such machines, ten times the amount of hay usually gathered by the two-horse hay wagon, and the pitcher, and loader, and raker after, could be stored in the same time and with much less labor. The farm pays heavily for the machinery it wants, and for some that it does not want. And the inventor who can make a simple machine for the purpose named (first reading editorial article in SCIENTIFIC AMERICAN, entitled, "Poor Mechanical Work on Agricultural Machinery," December 16, p. 93) need have no apprehension about its not paying. Give over velocipedes and rat traps, and give the old "Mother of Arts" a hoist.

A. N. C.

Sheffield, Mass.

What a Mechanic Thinks.

MESSRS. EDITORS:—It gives me the greatest pleasure to send in this $3 for the SCIENTIFIC AMERICAN another year. I cannot help giving vent to my feelings by saying a word in praise of the SCIENTIFIC AMERICAN. It meets from me a hearty welcome every week. I often wonder how such a paper can be got up for $3 a year, when we have to pay that amount for common papers, printed on poor paper, poor type, done up badly, and sent any how; and a person is none the wiser who reads them.

I have worked in a machine shop, and run steam engines for more than twelve years, and the SCIENTIFIC AMERICAN just hits my case; I have learned more from it than any one thing I ever read. People often say that the SCIENTIFIC AMERICAN is just the paper for me, because it is a mechanical paper. Now I contend it is just the paper for them also. I value my SCIENTIFIC AMERICAN papers very highly—so much so that I have them nicely bound—and I should not take for them what they cost me. They make a book to be proud of. I was the means of your having a few subscribers for the SCIENTIFIC AMERICAN last year. In fact, I often advise my shopmates to take it. I often wonder how some mechanics slide along, year after year, and only learn what is pounded into them.

One more important thing and I close. I often read of boiler explosions, and I wonder why they are not more frequent. I think if those using steam power should furnish their engineer with a copy of your paper, they would be the gainers by it.

EDWIN FLINT.

East Canaan, N. H.

Dangerous Hair Washes.

MESSRS. EDITORS:—The article in your paper of 9th inst., on "Hair Washes," should receive the widest publication, as a warning against their use. Nearly all of the boasted "Vegetable(?) Hair Restorers," which are so extensively advertized, and correspondingly extensively used by the innocent public, contain lead in one or more chemical forms—mostly sugar of lead—the poisonous qualities of which ingredient can be attested by any one acquainted with medicine or chemistry, and by those who have been using any of these restorers. If the country is to be flooded with articles for the purpose of satisfying the vanity of those who have lost their beauty, by the blanching of their former raven locks, the makers of these compounds should know the peril to which they subject all who use them.

It would also be proper, if "hair restorers," or "hair color restorers," are to be used, to invite the attention of inventors or chemists to the propriety of the production of such articles as will have the desired effect, without the danger which now threatens those who use them.

By devoting your columns to the ventilation of this subject you will be adding much to their usefulness, and be doing at the same time a favor for much suffering

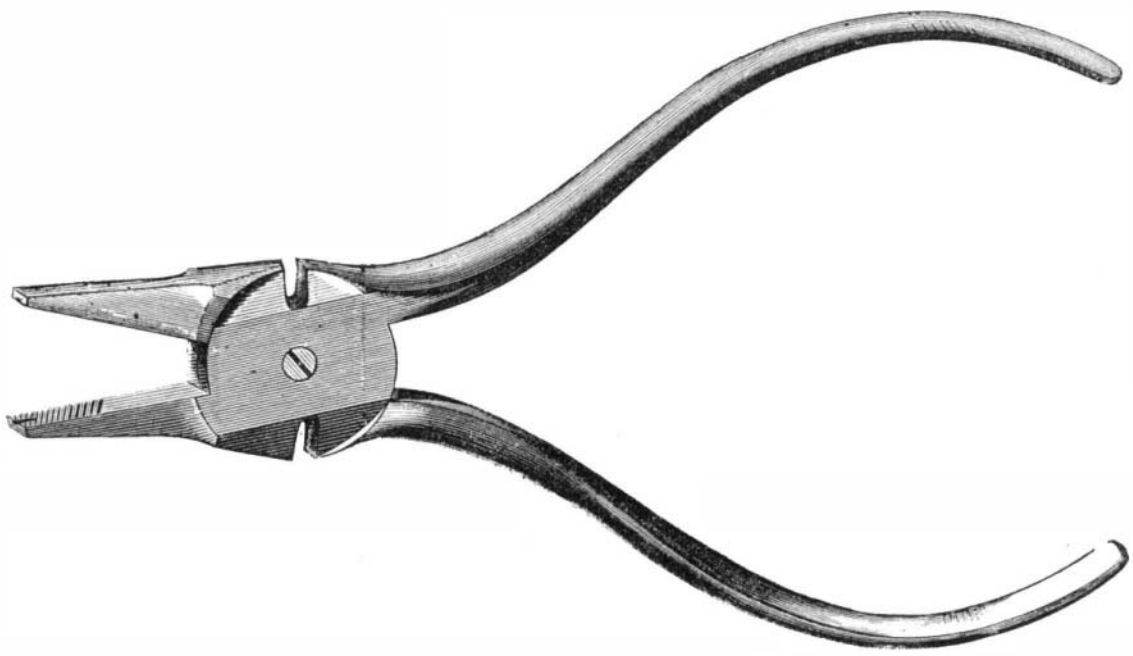
Philadelphia, Pa. [illegible]

Patent Wire Shears and Pliers Combined.

Artisans have long felt the need of such a tool as the annexed engraving represents. Its advantages over others for the same purpose are very great. The jaws of the pliers are constructed in the required form, without the knives at the sides to obstruct their free use, as in the old combined cutting pliers.

The shears are made in the joint, which is formed of two smoothly faced surfaces held firmly together, and moving on a common center in opposite directions, as the pliers are opened and closed.

These surfaces are, in fact, two circular plates of steel, which being angularly notched at the periphery in one or more places, form the most perfect wire cutters in use. They are arranged so as to operate to the best possible advantage, either for ease of cutting or durability. The superiority of the shear cut, together with the increased leverage, enable the operator to cut a wire by one hand with these shears that cannot be cut by both hands with the ordinary cutting pliers; and while the mere attempt in the latter case would be almost certain destruction to the tool, the shears will cut the wire without showing any evidence of having been used. The utility of these combined pliers is obvious. Beside being useful to all who work in wire, such as tinsmiths, machinists, telegraph builders, hoop-skirt manufacturers, etc., every farmer and every housekeeper will find them quite as useful as a hammer or saw. They are made from best cast-steel, and are said to be equal in quality to the best Stubbs goods. The manufacturer has so much confidence in the success of these pliers that he will supply responsible parties in the trade with them, to be returned at his expense if found unsalable.



WIRE SHEARS AND COMBINED PLIERS.

All orders or letters of inquiry addressed to L. Button, manufacturer of steam and hand fire engines, steam pumps, etc., Waterford, N. Y., will receive prompt attention.

Inter-Communication---The Pacific Railroad and the Proposed Darien Ship Canal.

The New York *Shipping and Commercial List*, in favorably quoting our brief article on page 345, last volume, on the facilities for international communication, very truthfully says:

Our cotemporary's views, with regard to the relative cost of water and land transportation, are substantially correct. Still, a good many light costly goods, from Japan and China, such as silks, opium, etc., must inevitably come by the Pacific Railroad. But the transportation of tea, in any considerable quantities, over this route, may reasonably be doubted, as, in the opinion of the trade, the length of the carriage by rail would result in so pulverizing the article, as to detract materially from its value. There cannot be the slightest doubt, however, that the traffic between the Eastern and Western portions of the Continent, together with the business which a short route to China is certain to bring, will afford the Pacific Railroad all the business which it can accommodate, to say nothing of an important intermediate commerce, which it must build up. Nothing is more certain than that this great highway will, within a brief period, be instrumental in thickly populating a vast extent of country, stretching away from the Missouri River to the Rocky Mountains, thus rendering necessary a network of railroads similar to that in the Middle and Northern States. East of the Mississippi and Missouri Rivers there was, in 1860, a population of twenty-seven millions: westward there was less than one thirtieth the population, though double the area. And yet this great area is full of mineral and agricultural wealth; so full, that thirty-five millions of dollars of gold and silver are drawn from it every year, and the rich valleys of the pregnant rivers yield a maximum of agricultural products in return for a minimum of toil. The greatness of the traffic which will come to the great national highway between the Atlantic and Pacific, all contributing to its success and profit, can hardly be over estimated. That it will be so vast, a few years hence, as to necessitate one or more through roads may, we think, be taken for granted. But, for our countrymen to control the rich trade of China, India, and Japan, a cheaper and shorter water route is absolutely essential. This want will be supplied, as soon as science shall assure us the projected Darien Canal; the Isthmus being unquestionably the key to commerce between the Atlantic and Pacific Oceans. Since Cortez first viewed the two oceans from an elevation on the Isthmus, this magnificent project has been the dream of philanthropy and of liberal enterprise. The Spaniards, the French, and the English have repeatedly, during the last three centuries, sent expeditions to solve the problem. No less than nineteen canal routes, and seven railroad and common road lines, have been contemplated, only one of which—the Panama Railroad, an American enterprise—has been accomplished. This avenue, in connection with the steamship lines, has been a potent element in the development of commerce; but what it has accomplished, cannot be regarded as an accurate index of the success that would be likely to attend the canal. We are pleased to know that this grand project is assuming a shape that will, sooner or later, insure its consummation. The leading merchants and capitalists of the United States have taken it in hand, and with them "there is no such word as fail."

"The Wheel, the Axle, and the Rail."

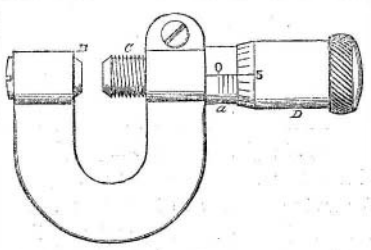
This is the title of a circular containing valuable tables and other information for railroad men, compiled for the Ramapo (N. Y.) Wheel and Foundery Co., by W. G. Hamilton, engineer. We extract from it the following statistical information about car wheels:

There are in daily use on the 37,000 miles of railway in the United States, not less than 1,250,000 truck and car wheels, under 8,500 locomotives, 5,500 passenger cars, 2,700 baggage and express cars, and 160,000 freight cars.

The available statistics show that passenger cars make an annual mileage of 28,400 miles, or 88 75-100 miles per day of 320 days per annum; the average load borne on each car wheel to be 3 1-3 tuns. With this load the average life of a wheel is 45,000 miles or 1 58-100 years. On trains running at express speeds, the average life does not exceed 10 months' service, while wheels under tender trucks have a life of 18 months. Under freight service in the State of New York, with an annual train mileage of 11,483,123 miles, transporting 75·5 tuns of freight per train, the annual mileage per car was 14,649 miles, each wheel bearing an average load of 1·47 tuns, which gives 3·08 years as the life of a freight wheel, corresponding with the experience of one of the principal roads in the State. But assuming that the average life of car wheels, under all kinds of service, as being five years, the total number of wheels worn out annually in the United States will not be less than 250,000. At an average cost of eighteen dollars per wheel, allowing one-half for their value for the old wheel, the annual loss may be stated at two and a quarter millions of dollars.

POCKET SHEET METAL GAGE.

The difficulty of accurately measuring the thickness of sheet metals is well known to all persons who have occasion to use or deal in them. The edges of metal being often imperfect, ordinary gages are prevented from going on readily. It also usually happens that the extreme edges are thinner than the rest of the sheet and cannot therefore be relied upon to give the thickness correctly. In selecting sheets for many purposes, it is desirable to have a gage to indicate the exact thickness in parts of an inch, and to accomplish this result the gage shown in the cut has been devised, which will show the thickness of a piece of metal up to three tenths of an inch in thousandths of an inch, and at some distance from the edge of the sheet. The piece in form of the letter U has a projecting hub, *a*, on one end.



Through the two ends are tapped holes in one of which is the adjusting screw, B, and in the other the gage screw, C. Attached to the screw, C, is a thimble, D, which fits over the exterior of the hub, *a*. The end of this thimble is beveled, and the beveled edge graduated into twenty-five parts and figured, 0, 5, 10, 15, 20. A line of graduations 40 to the inch is also made upon the outside of the hub, *a*, the line of these divisions running parallel with the center of the screw, C, while the graduations on the thimble are circular The pitch of the screw, C, being 40 to the inch, one revolution of the thimble opens the gage $\frac{1}{40}$ or $\frac{25}{1000}$ of an inch. The divisions on the thimble are then read off for any additional part of a revolution of the thimble and the number of such divisions are added to the turn or turns already made by the thimble allowing $\frac{25}{1000}$ for each graduation on the hub, *a*. For example, suppose the thimble to have made four revolutions and one fifth. It will then be noticed that the beveled edge has passed four of the graduations on the hub, *a*, and opposite the line of graduation will be found on the thimble the line marked 5. Add this number to the amount of the four graduations, which is $\frac{100}{1000}$, and it equals $\frac{105}{1000}$, which is the measurement shown by the gage.

The gage illustrated above, which is full size of implement, will measure the thickness of sheet metal or other material, by thousandths of an inch up to three tenths of an inch at any point within half an inch from the edge and will also answer to measure the diameter of wire. Means of adjustment are provided in case of wear by continued use.

The attention of machinists is called to the usefulness of this gage for convenient and accurate measurement. It is light, small, and suitable to carry in the pocket. Address for further particulars, Brown & Sharpe Manufacturing Company, Providence, R. I.

A CITIZEN of Mechanics Falls, Maine, has a very old coin, a Spanish silver dollar, bearing the date 1179. The figures and lettering are very perfect. On both sides there are several Chinese letters or characters, about twenty-three in number.

The Origin of Porcelain.

An apothecary's assistant at Berlin, John Frederick Bottcher by name, being suspected of alchemy, fled thence to Dresden, where the Elector, believing him possessed of the secrets of the transmutation of base metals, and their conversion into gold, placed him in the laboratory, and under the close surveillance of Tschirnhaus, who was seeking for the Universal Medicine. It was here that the contents of some crucibles, prepared for alchemical purposes, unexpectedly assumed the appearance of Oriental porcelain, which had been introduced into Europe from China, after the voyage of the Portuguese navigators around the Cape of Good Hope, and which was even then much prized by and only in possession of the wealthy. Augustus II. appreciated the importance of the discovery of Bottcher, and removed him to the Castle Albrechtsburg, at Meissen, where, with an officer as a constant attendant, he was provided with every comfort and luxury, and with every facility for his research, till, in 1709, the true white porcelain was produced; and, in the succeeding year, the great manufactory at Meissen was established, with Bottcher as director.

The secret thus discovered was carefully and jealously guarded; strict injunctions, with respect to secrecy, were enjoined upon the workmen. The establishment in the castle was a complete fortress; the portcullis raised neither day nor night, and no stranger allowed to enter, whatever the pretence. The chief inspector and all under him, were sworn to the closest silence, with the punishment of imprisonment for life attached, for divulging aught connected with the manufacture. Every where around the establishment was the warning motto: "*Be Silent unto Death.*"

Despite these injunctions and precautions, and even before Bottcher's death, which occurred in 1719, one of the foremen escaped from the manufactory; and, going to Vienna, was cordially received by Charles VI., and granted the exclusive manufacture for twenty-five years. Thence the process, no longer a secret one, spread over Europe, and the art, relieved from its cramping restrictions—and with the incentive of rivalry among various manufacturers—assumed its proper importance, and made its products available to all classes.

What it Costs to Go Around the World.

Putnam's Monthly for January says the circumnavigation of the earth has become an easy and not a very expensive undertaking. A European journal gives the following estimate, taking Paris as the starting point; we translate the sums into greenbacks:

From	to	First class fare
Paris	Marseilles,	$25⅝
Marseilles	Alexandria,	137½
Alexandria	Suez,	20½
Suez	Aden,	266⅝
Aden	Point de Galle, Ceylon,	200
From Paris to Ceylon,		$650

From Point de Galle the circumnavigator has choice of two routes. The first and most direct is *via* Japan, as follows:

From	to	First class fare.
Point de Galle	Hong Kong	$200
Hong Kong	San Francisco,	420
San Francisco, *via* Panama	and St. Nazaire, to Paris,	517
Ceylon to Paris,		$1137

The other, *via* Australia:

From	to	First-class fare
Point de Galle	Sydney,	$333½
Sydney	Panama,	420
Panama	Paris,	342½
Ceylon to Paris,		$1096

The time occupied by the two routes is thus given:

From	to	Days.	From	to	Days.
Paris	Ceylon,	25	Paris	Ceylon,	25
Ceylon	Sydney,	24	Ceylon	Hong Kong,	15
Sydney	Paris,	55	Hong Kong	Paris,	64
Total,		104	Total,		104

It is estimated, however, that when the Pacific railroad is completed, the journey around the earth will be reduced to eighty days, traveling time. Not only the intercourse between China and Japan and Europe, but between Australia and Europe, will then find its speediest route across the American continent.

A Better Umbrella Wanted.

A correspondent in one of our exchanges asks the question: Will no inventive genius improve upon the construction of the umbrella? As at present formed this indispensable article is shockingly ill adapted to its purposes. The best part of it, where one would put his head, is occupied by the stick and wires, so that only half the sheltering cover is available. Then the roof is so contrived as to cast the rain that falls upon it either on to the shoulder or into the coat pockets, or down over one's knees and feet. To remedy these evils the stick should be placed out of the center, and a turned-up rim should be made to constitute a gutter, with one shoot or spout only, which can be turned into such a position as to throw the water always to leeward of the pedestrian. If I were an umbrella maker I would endeavor to work out these improvements; as it is I can only enforce them upon the attention of those whom they may concern.

A CONVENTION of white lead manufacturers was held in St. Louis on November 11. The object was to effect a concert of action on matters relating to the trade, and the further object of promoting the interests of Western white lead manufacturers exclusively, reducing the price of white lead, and ridding the markets of adulterated material.