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THE COMMERCIAL INTEREST IN FLAX.

(COMMUNICATED.)

It has been stated that in Upper Canada 10,000 acres of flax were grown in the year 1864, and that 50,000 acres will be grown this year; this, at the rate of 12 bushels of seed per acre, at $1 50 per bushel, and 300 lbs. of fibre per acre, valued at from $8 to $10, per 100 lbs.,* would realize the sum of $2,250,000, by which farmers and others will be largely benefited; but not near to that extent which might be accomplished by a more improved system of cultivating and preparing the crop. The prices of flax in Ireland at present range from 49s. to 72s. stg. per cwt. of 112lbs.; and some lots of their very worst flax brings 36s. per cwt., or about as much as is stated to be the average of Canadian flax. 300 lbs. of fibre per acre is given as the average for Canada, 650 lbs. per acre for Ireland. In fact, the quantity is more than double, the rate of price is double, and the same extent of ground sown in Ireland produces from three to four times the amount of money it would do in Canada. This is not the fault of Canadian soil or climate, for it will grow flax equal to the best Irish; it is altogether owing to the systems of cultivation and preparation of the crop. The quantity of seed per acre sown in Canada has been proved by experience both in Ireland and other parts of Europe, to be quite insufficient. The quality of the seed sown is also much inferior to that sown in Ireland—it is the produce of coarse, short branchy flax, much superior no doubt to the United States seed, but much inferior to European. It is grown in Canada year after year, "like begetting like;" and the mode of preparation in usual practice is also calculated to give nothing but an inferior quality of fibre; in fact Canada is growing and preparing flax after the old systems which were long in use in Ireland, but have been abandoned generally during the last twenty years. It would be well that this subject should be considered, not merely by farmers but by the commercial interests.

When flax had risen to a high figure in Europe in the early part of the present century, any one in Ireland could make a profit by the growth of flax, of a quality no better than that now produced in Canada, but prices fell, and the growth of flax in Ireland gradually became less and less. In 1813, 52,014 acres were grown, and in 1815 it had increased to 148,124 acres, but the European wars being ended by the battle of Waterloo, checked the upward tendency of prices, and flax becoming a less profitable crop, in 1816 only 93,665; in 1822, 76,809; in 1847, 58,312; and in 1848, 54,000 acres of flax were grown in Ireland, We then again find flax growing extending in that country; in 1849, 60,000; 1850, 91,000; 1862, 150,070; 1863, 214,661; and in 1864, 300,944 acres. For many years after 1815, the Irish were unable to compete with the Belgians and others more skilled in the cultivation and preparation of flax, and owing to the increased demand caused by the introduction of spinning mills into Ireland, they were unable to get a sufficiency of their own home-grown flax, when some clear-sighted practical man set about to discover how the evil could be remedied. The ROYAL FLAX IMPROVEMENT SOCIETY was formed, enquiries were set on foot, and it was soon discovered that the reason why Irish farmers could not grow flax to compete with the Belgian, was simply because of the superior skill of the latter. Instructors were procured and sent amongst the farmers, pointing out to them the most approved methods at every stage of the business. The value of this is evidenced in the fact that flax is now grown there fully equal to the best Belgian; and though the population of that Island has decreased about three millions since 1846, we find its cultivation of flax has extended from 54,000 in 1848, to 300,944 acres in 1864. In these figures and facts there is an important lesson for Canada. There are many who may be startled by the assertion that the sum of $2,250,000, which will be the value of the farmers' crop of this year at the rates here estimated, is little more than one-half of what might be obtained by the adoption of more improved systems of cultivation, and by the proper selection of seed for sowing; for the produce of fibre now estimated at 300 lbs. could easily be increased to the Irish average of 650 lbs. per acre, or even to equal some of the prime Irish crops, which have reached the rate of 900 or even 1,000 lbs. per acre. By thus increasing the quantity of fibre, no doubt the profits of the seed crop would be lessened, but not abandoned. The saving of the seed is at present a great object in the economy of careful and skillful Irish flax growers, though until lately they neglected to take advantage of this branch of profit.

* The rates adopted by Mr. Donaldson in his Report made to the Committee on Agriculture in July last.

By the proper selection of seed and improved cultivation and preparation of flax, the quality is also improved, and flax which under the ordinary treatment is, when scutched, only worth 10 or 12 cents, might by skillful treatment be made worth from 25 to 35 cents. It is not unlikely that upon a review of the produce of the Canadian and Irish crops of 1865, it will be estimated that a greater return has been received from 20,000 acres in Ireland than from 50,000 in Canada, under the systems now in practice; though we know from the very best authority of Irish flax growers, who have narrowly looked into the capabilities of both countries, "that the soil and climate of Canada are admirably adapted to the growth of flax." "Flax grows in Canada luxuriantly," and in it "as good flax can be grown as in Ireland;" opinions which are fully borne out by the desire evinced at all times by farmers to grow flax, if they could only get machinery to dress it and a market in which to sell it—both of which *wants* it is now to be hoped will be supplied by men of capital and spirit, who are convinced as to the certainty of the profits to be derived from an investment in these branches of trade.

It may be thought by many that anything relating to the cultivation of flax is merely an agricultural subject, and that the farmer is the only one interested in it, Such is a very mistaken idea; for agriculture, manufacture and commerce, are so closely linked together in flax that no one of them can carry on its branch of the business without the aid of the other; nor are they the only branches which should exert themselves to encourage it—its uses are known in some degree to nearly every one, but neither its uses nor value are known to such an extent as they ought to be.

By the manufacture of Cotton, Manchester—Liverpool — Ashton — Stockport — Burnly — and other towns, with leading canals and railways, have been made in England.

By the Flax, Yarn, and Linen trade, Belfast—Lisburn — Ballymena — Coleraine — Bainbridge—Guilford—and other towns in Ireland, have grown in population and wealth.

By the cultivation of flax and the employment it has supplied, farmers have accumulated riches and earned independence in the Province of Ulster, which, though inferior to many other parts of Ireland in the fertility of its soil, stands out in bold contrast against its sister Provinces—evidencing the superior prosperity, comfort and happiness of its industrious population; and all this can be traced to its staple trade in flax. In 1824 Mr. Mulholland erected the first spinning mill in Belfast. In 1841 there were 250,000 spindles working up 16,000 tons of flax annually; in 1851 they had increased to 500,000 spindles, working up 32,000 tons of flax; and in 1864 there were in Ireland 650,638 spindles spinning above 40,000 tons—89,600,000 lbs. of flax, which at the rate of 300 lbs. (the average in Canada) would require 298,666 acres to be grown annually to supply these spinning mills. In 1855 there were about 17,000 persons employed in the linen trade of Belfast; there are now about 25,000. The value of the Irish crop of flax of 1864 is estimated at £3,962,989 sterling. The total value of linens exported from the United Kingdom was, in 1863, £8,469,036 sterling. In 1852 there were no power looms in Ireland, yet in July, 1864, there were in it about 8,000, performing as much work as 70,000 hand looms. All this prosperity has grown up from beginnings as small as those which originated in Upper Canada a few years back, and with no more natural advantages in many respects than it possesses.

It is said that in those parts of Belgium where flax is grown pauperism is unknown, because it gives employment to all by its cultivation, preparation and manufacture. Though the value of the raw materials of flax exceeds that of any other crop which a farmer can grow at equal expense, and under similar circumstances, yet its value is small when compared with the resources it possesses for profitable development of labour, industry, skill and capital. The only capital invested in it originally is for the purchase of the seed for sowing. The produce of an acre of flax may be manufactured into materials of ordinary fineness to the value of from $600 to $700, all of which, except a few dollars originally expended for seed, has been attained by labour. The farmer's share of its profits are but small when compared with the profits of others in the trade; but unless the farmers grow the crop there will be no provision of means by which these profits can be realized; it is therefore the duty and self interest of every class who is benefited by it to assist in the development of a trade in flax, and to encourage its cultivation, so as to keep up the supply of raw material —to see that the farmer is supplied with suitable sowing seed imported from abroad, and to aid projects which may be set on foot for the erection of factories for the preparation and scutching of the flax to make it marketable. When the seed is cleaned it is ready for market, and there is no difficulty whatever in disposing of it. The same is the case with regard to fibre when the scutching of it is completed. Were the seed and fibre thus prepared, buyers would be found going to the very houses of the farmers to purchase it.

In Ireland markets are held once a week in the towns, and so near together are they in the north of Ireland, that almost every farmer has markets that he could go to and return from on every day in the week. These markets are well attended by buyers, always ready to purchase more than they can get; and such is the anxiety of buyers to get the flax, that they are to be found daily driving from the house of one farmer and one scutchmill to another, to pick it up before it goes to market. Flax spinners and merchants have their buyers out in all markets, neither distance nor expense deters them; and if any one man in Canada were known to have ten tons of scutched flux for sale, there are speculators in the north of Ireland who would not hesitate to send buyers out all the way to Canada to purchase it.

Mills for spinning, weaving, and oil crushing belong to the more advanced stages of the manufacture of flax—their profits are well known to be great, and capital and enterprize will always be anxious to erect such where the raw material can be got abundant, and self-interest will always provide these where they will be profitable. The erection of factories for the preparation and scutching of flax require a much less amount of capital, and they are proportionately more profitable; but, their profits have not been fully understood in Canada, and thus the erection of them has been too long delayed. This is a subject which requires especial attention by farmers, mechanics, merchants and capitalists—they may in this matter act individually or in concert. The latter would be much the better plan—the project could by it be carried out more successfully and profitably, and with little capital drawn from each.

The erection of factories for the preparation and scutching of flax, are essentially necessary to promote its cultivation. In Belgium, where labour is abundant and cheap, these operations are carried on by manual labour. In Ireland, also, much of it is done by manual labour, though the factory system is rapidly introducing itself there, as it has done also in many places in France, Belgium, and England; it being found that the various processes can be carried out with greater economy than by manual labour, unless where the latter is at a low price, or supplied by the farmers' family at times when they would otherwise be idle.

Before capital is invested in any speculation, and more particularly in one involving the erection of buildings and the purchase of machinery, the questions proper to be asked are:—Will the business pay? How much profit will it pay? And how long will it continue to bring in a profit? The two first questions more properly belong to a detailed prospectus, by which it can easily be shown that such a speculation would pay a profit of 20 per cent. on the paid-up capital, in addition to the benefits conferred on the public, the flax-growers, and those who would be employed. But we will for the present pass on, without entering into the details of those matters, and discuss the question,—How long will it continue to bring in a profit?

The failure of the potatoe crop in Ireland was thought, at the time, to be a calamity for which there was no relief; but it proved a blessing, in stirring up farmers to seek a more profitable crop in its stead. So may the failure of the wheat crop confer lasting benefits on the farmers of Canada, by teaching them not to put too much dependence in grain crops as a source of profit, and inducing them to give place, in their rotation of crops, to flax. Farmers are proverbially a cautious class of men, and the great caution with which they are gradually getting into flax growing is some evidence of their knowing its value, and that they are determined to continue growing it. But there are some who, perhaps, imagine that if the wheat crop returns to its former health, they will abandon the growth of flax. We do not think so. If they but once taste the sweets of the profits of flax, they will be very reluctant to part with them, for it is a much more profitable crop than either wheat or barley.

There are others who, perhaps, think that the restoration of peace in the American States may lead to consequences which will cause farmers to be unable to grow flax profitably, and that then, of course, it will cease, and capital expended in factories and machinery would be lost. This is, in truth, the great question. There is no doubt but the American civil war has influenced the increased price of flax; but it was not the only cause operating to bring it into favour in late years, for, before the war was thought of, an increased demand for flax had sprung up, owing to its own individual merits. The supply of all kinds of raw materials for textile fabrics had not kept pace with the demand, and those interested in their manufacture were looking around with anxiety to discover from whence they might obtain a supply. The Great International Exhibition, held in London, in 1851, had done much to set on foot a spirit of inquiry, and to make the value of flax better understood than it had ever been before. This state of affairs was well described in a small volume, "Flax *versus* Cotton," published in 1853, written by Mr. G. G. Dodd, who seems to have fully understood the subject. He writes:—

"Cotton and flax being competitors, flax took the lead in the spinning and weaving districts of England until the days of Hargreaves and Arkwright, when machinery gave the advantage to cotton manufacture. Flax is now advancing again, and its uses are extending." "The cotton world is a little uncertain as to the future supply of raw material: the flax world offers to do what flax cannot, and is even bold enough to challenge cotton for the leading position." "The American States' planters grow as much as the slaves can pick, and there is a limit to the supply from thence." "It is now an unquestionable fact, that the consumptive power treads not only close on the heels of the productive, but has surpassed it." "Lancashire is put to its wits end to devise a mode of escaping from the perilous dependency on the United States for cotton."

Mr. Dodd's words, written eight years before the commencement of the American war, and when there was no prospect of it, were truly prophetic of the results which followed, when it deprived Lancashire of cotton, and threw the manufacture of textile fabrics out of the Manchester cotton-looms into the Irish linen power-looms, causing an increased demand for flax, which is growing greater every year.

Mr. Baker, the British Factory Inspector, in his report of 1861, writes:—"We can neither procure flax from abroad nor induce our farmers to grow the raw material." The same complaint has been made in the United States, in which there are several flax factories, one of which alone consumes in thread and twine about 700 tons annually, or more than one-half of all the flax grown in Upper Canada in 1860. Within the last three years, agents from the United States have come to induce farmers in Canada to sow flax, and they do not hesitate to admit the inferiority of their own growth in quality. Such has been the anxiety of manufacturers for extending its cultivation, that the U. S. Government allocated $20,000 lately to encourage it; and flax is admitted there, as well as into Newfoundland and Nova Scotia, duty free; in the latter (into which it is imported from Europe) it is used to make twine, thread, fishing-nets, &c. The result of the present civil war must lead to a short supply of cotton from the Southern States for many years to come; and many reasons present themselves to prove that the Southern States are not likely again to supply cotton to the extent they have done heretofore. Cotton, which before the commencement of the war would have sold in England for 6d. or 8d., is now 2s. 4d. per lb., without a prospect of any great decline in price. The necessities of the American Government have already suggested to them the imposition of a tax upon cotton, which will keep up its price almost to what it now is.

British and Irish manufacturers have been using every exertion throughout the world to obtain supplies of cotton, but the continued high price of it proves, to some extent, their want of success. In like manner it has been sought to procure flax. A company was formed in Belfast, some years ago, which has been endeavouring to cultivate flax in the East Indies; but neither in quantity or quality has it come up to what was expected of it, and the cry of the spinners still is, "Give us more flax." The demand for linens is increasing, new mills are being erected, but the raw material is not forthcoming. A few years ago, power-looms could only weave cotton; but, by improved machinery, they are now applied to the manufacture of linen. King Cotton had a long reign, but it seems that Queen Flax is dethroning him, and may long hold the sway of manufacturing power.

So long as prices are high inferior qualities *may* be purchased; but when the demand lowers they will not be sought after. Superior qualities of raw material always are in request. There is no tradesman who does not understand that a good article is always saleable, So it is with flax. The inferior qualities grown in Ireland sold well during the years of increased demand, up to 1815; but when that demand fell off, they were unable to compete with the superior quality produced in other parts of Europe; nor did the Irish flax growers regain their share of the trade until they altered their system, and produced a better quality.

Canada has now begun to share the flax trade, and she will always continue to hold it, if she only improves the quality of her flax fibre, and extends her fields of cultivation so as to produce a sufficient quantity to attract manufacturers or purchasers from abroad, after supplying her wants at home. Linen, and various other flax manufactures, are now largely imported into the Province, though they might be supplied with advantage and economy either wholly or in part of home grown produce. The home demand for flax would of itself justify the erection of flax scutching mills and preparing factories: the business once established would be permanent and profitable.

It is one of the principles of the far-seeing politicians of the present day to deny the aid of governmental credit, or money, to promote objects which would come into competition with or check private enterprize; but this principle may be carried too far; and there are many projects which it is not only legitimate but expedient for Government to aid by loans or grants from the public funds: and of *such* flax appears to have claims at the present time, for neither the Government nor any association in Canada, have yet given to flax any substantial mark of their favor, in any degree proportionate to its importance, or similar to what has been done in other countries, where by fostering care it has been established as one of their staple crops, and of the leading branches of their commerce and manufactures.

In the United States not only have the governments of the States of New York, Maine, Massachusetts, and Rhode Island, lately used efforts to encourage it, but the Federal Government, by their Bureau of Agriculture, has warmly espoused the cause. France and other countries have carefully fostered the linen trade by high protective duties. In Russia, government officers strictly examine and classify the seed exported for sowing, and to this much of their success in establishing a high character for good sowing seed may be attributed. In Ireland the trade and cultivation of flax has for upwards of two centuries been encouraged by the Government, and has received many favors by grants of public money, bounties, and legislative enactments. But we are too far advanced in the age of free trade to advocate the imposition of high protective tariffs, or the bestowal of bounties for the encouragement of any branch of trade. There are other ways, however, by which the Government of Canada might aid and extend the cultivation of flax, without involving any financial loss. One of such ways would be by loans to township municipalities, or incorporated companies, to purchase machinery, to import foreign seed, and to employ practical instructors. Another way would be to make loans to private individuals for the erection of scutch mills, after the manner provided for in Ireland a few years ago to meet the difficulties then existing in many parts of that country, such as now exist in most parts of Upper Canada, from want of those indispensable auxiliaries. Grants should be made to the agricultural boards and associations to enable them to assist in the matter. The appropriation of a portion of the school funds to defray part of the expenses of practical instructions to farmers, would seem to be a fitting application of such funds. A board or association should be formed to which the care of the extension and mprovement of flax cultivation should be specially assigned. The value of such an association has been proved to be very great, in the existence of the "Royal Flax Improvement Association of Ireland," by whose exertions it may justly be said that the present advanced state of the qualities of Irish flax is indebted. This association met with great discouragement and difficulties in the early efforts of their instructors to overcome the prejudices of Irish farmers, who claimed to have inherited from their forefathers a skill in flax cultivation which they thought superior to any of "the new fangled systems, which might do very well in Belgium, but would not suit in Ireland," as they said; but, by persistent and persevering efforts, their prejudices were overcome, hints and suggestions of the instructors were taken, and a new school of flax growers was created among the farmers, producing flax equal to the best Belgian.

Instructions of this kind must be carried home to the fields of farmers in a practical way; theoretical instructions and scientific lectures may create an interest in the subject, and prompt many to try the experiment; and written essays are valuable in like manner, though with farmers they have not the weight they ought to have; and so many written instructions have been published on the subject that flax growers are often puzzled to understand them. What they want is teaching by practical men, with whom they can have an interchange of ideas on the subject, in their fields, at the various stages of the crop. This fact is well known, and has been acted on by some of the leading men in the business in this Province, who have been instrumental in bringing flax culture to its present extent in Upper Canada.

The proximity of the markets to the farmers in Ireland has been before alluded to, and from the opportunity afforded to farmers, hacklers, buyers and spinners to meet in crowds at such markets, immense advantages have been derived. Several hundreds of loads of flax are in these markets exposed to view as at an agricultural exhibition; each farmer sees his neighbour's flax, its perfections and imperfections, learns the value of it, hears the causes of the superiority or inferiority, and interchange their ideas and give their experience to each other, contributing to the information and improvement of all. There are in Canada many who have made up their minds that they are perfectly skilled in the cultivation of flax, but who are far behind the skill of the growers of the last few years in Europe. There are others who know but little of the modern systems, and yet will take upon themselves to assert that the systems now and hitherto in operation in Canada are the best—in fact the only ones suited to the country; and it is hard to say which of these is the most difficult class to deal with. There are, however, many who know the present system to be wrong, and are endeavouring to improve it; and there are not a few of the believers in the old system whose faith is shaken in it, when they hear that by it an acre of their flax will not produce one half—perhaps not one third—the price of what is cultivated and prepared under the modern systems.

Suggestions have been made for the formation of flax companies in Canada for the purpose of erecting scutch mills, and to purchase the crops from the growers. The formation of such companies, and flax growers becoming co-partners in them, would be a step in the right direction. By forming joint stock companies, factories could be erected, and machinery purchased; the grower's flax might be prepared for him on his own account, or purchased from him at its full value and prepared on account of the company, the employees of which must necessarily be men skilled and experienced in the business, who would also aid much in giving instruction to farmers as to growing flax. Payment of shares taken by farmers in such companies could be made by flax, and no money would be required of them, and the shares might be of so small amount as to be within the reach of almost everyone. Such stock would soon be found paying a high rate of per centage, and becoming popular would sell at a premium in the share market. Surely there are men in the Province ready to set on foot such a project, and to carry it out—men whose influence would carry weight with it, and whose money, if needs be, would be forthcoming for investment in a business of such public utility, and which would be largely remunerative to themselves.

It may be asked by some what great secret is there in the cultivation and preparation of flax, the want of knowledge of which prevents any and every one from embarking in it? There is no more secret in it than there is in any other branch of business, which requires a man to be trained to it practically to be able to realize the utmost profits the business is capable of. The knowledge of the kind of seed to sow, capacity to select it, knowledge of the kind of soils in which to sow it, the mode of cultivation of the land, the sowing of the seed, the completing of the labour, the weeding, the pulling and harvesting of the crop, are each branches of business at which a novice would find himself very deficient. The treatment after pulling is one of the most difficult matters to manage properly. It is essentially a chemical treatment, performed no doubt by simple means and in a natural way, but in which some skill in practical chemistry is necessary. Mechanical aid is also invoked, and some of the most complex and ingenious contrivances have been invented to aid in the preparation of flax, and of such there have been patented in the United Kingdom upwards of 100, in the United States upwards of 30, in Canada 5, and in Belgium, France, Austria, Prussia, and other European countries great numbers of inventions have been introdused and patented. Gold medals, and money premiums to a large amount, have been awarded for essays written on the subject. Chemical analyses and experiments have been made, and works written on the subject by learned professors. Much has been read, said written, and done, and yet it is a wide field for further discovery; and he would be bold indeed who would assert it to be so simple as to be understood without the necessity of instruction.

THE RECIPROCITY TREATY, AND ITS EFFECT UPON OUR MANUFACTURING AND OTHER INTERESTS.

According to the decision come to by both branches of the Federal Legislature of the United States, notice will probably be given to the British Government for the termination of the Treaty, on the 16th of March, 1866. In view of such a probability, it is well for Canadians to consider the effect it is likely to have upon their industrial interests.

Although we are convinced that the benefits of the Treaty are on the side of the United States, yet we unhesitatingly say that we consider its continuance, either in its present or a revised form, most desirable. In the first place, because, if terminated, the international difficulties in connection with the Newfoundland and contiguous fisheries, would again be opened to angry controversy; and secondly, because the more unrestricted the commerce and general business intercourse between any two nations, the less likely will it be for war, with its untold and inconceivable horrors, to arise between them. For these reasons do we earnestly desire that the friendly intercourse now existing may not be disturbed in the way proposed.

We cannot, however, look upon its termination as a thing so much to be dreaded; it has both its advantages and disadvantages. Prior to the Treaty, the *milling* interests were prosperous throughout Upper Canada, a large portion of our wheat being here manufactured into flour before shipment; but since the Treaty came into opertion, the wheat has been largely purchased by American manufacturers, and by them made into the exact quality of flour suited to their home trade; but, on the other hand, the Treaty has been very beneficial to the *lumbering* and some other interests of the western part of the Province, and to the residents near the frontier generally.

Should the Treaty be abrogated, a large portion of Canadian wheat would, no doubt, still be purchased by the American manufacturers, to mix with their own growth of wheat, or otherwise; and as our Canadian lumber is so far superior to the American in the Chicago and other western markets, a large business would still be done, even if the lumber so exported should be subjected to a moderately high American tariff.

What we want is, not abrogation of the Treaty, but entire Reciprocity in all our manufactured as well as natural and raw products. Our manufacturers would then have additional reasons for desiring its continuance, apart from those already referred to; for as it now is, the Americans purchase our raw products and pay for them in manufactured goods, both processes being decidedly to their interest and prejudicial to our manufacturers, to whom it increases the price of the raw material, while subjecting them to an unfair competition in an exceedingly limited market, and results in a large annual *balance of trade* against us.

If we compare the annual excess of imports from the United States, over exports thereto, both prior to and during the Treaty, we shall see that it has worked more for the benefit of the American people than for ourselves.

For the years 1852–3, the average annual excess of imports over exports was $2,069,468. During the year 1854 the Treaty came into operation. For the first five years of the Treaty, 1855, 6, 7, 8, and 9, the average annual excess of imports from the United States over the exports thereto, was $4,642,128; showing the balance of trade against us under the Treaty, and before the Rebellion, to have been more than double the amount of the excess prior to the Treaty.

During the years 1860, 1, 2, and 3, the four years of the civil war, the annual excess of imports over exports with the United States was $4,674,087.

These facts go to show that, with increased facilities for disposing of our raw products to the United States, their facilities for supplying us with manufactured goods more than doubly increased under the Treaty; and yet their people, press and congress, with the exception of some of the western States, urge that the benefits are all, or nearly so, on the side of the Provinces, even with the advantages they derive from the fisheries and the free navigation of our canals and rivers, consequent upon the Treaty.

Senator Ramsey, a western State representative, having a more correct appreciation of the subject than most of his co-legislators, in a speech delivered by him during the discussion on the *notice* to terminate the Treaty, said:—

"We exported in 1863 from the United States into Canada, $12,339,367 free of duty by the Reciprocity Treaty, and $6,595,599 free of duty by Canadian tariff—an aggregate of $19,134,966. As the whole exportation from the United States into Canada was $23,109,362, this leaves only $3,974,396 subject to the Canadian tariff, of which the value of $1,855,690 was of articles not produced or manufactured in the United States. In other words, while Canada admitted free of duty $19,134,396 from the United States, the whole amount of our produce and manufactures which were subject to taxation by the Canadian tariff was $2,118,706. The average taxation being twenty per cent, the Canadian consumers paid $423,741 into the treasury of the Province. The importations from Canada during 1863 were $20,050,432, or an aggregate of trade with the United States of $43,159,794. I will not extend these statistical statements. They concur with my former impressions, as a citizen of the Northwest, that the Treaty is mutual and beneficial."

In view of these facts and figures, and especially comparing the excess of imports from the United States before and during the Treaty, we do not see how its termination can injuriously affect the general industrial interests of the Province.

WANT OF PUNCTUALITY.

If there is one evil more prevalent than another amongst business men, in this country, it is the want of punctuality in keeping appointments, and in fulfilling engagements generally. Too many allow themselves to be elected to office, where no emoluments are concerned, merely for the *honor* it confers upon them, and then feel under no particular responsibility to perform the duties they may have assumed. Others with whom they have to act may attend promptly at the hour of meeting, and have to wait half an hour or an hour, before business can be commenced, or adjourn until some other day—perhaps then to meet with a similar disappointment. We have in numberless instances known business men, of punctual habits, meet a number of times in succession, without having sufficient of their colleagues present to enable them to proceed to business, thus having their valuable time sacrificed through the culpable neglect of others.

Mechanics and employees too often enter into rash engagements to have work done, or some other services performed by a stated time, when, if they had properly calculated their opportunities, it would be apparent to them that they could not possibly fulfil the engagements thus rashly entered into. Disappointment and injury is thus caused to others, and their own reputation for truthfulness and reliability is destroyed.

In matters of apparently but trifling importance, the same care in fulfilling engagements should be shown as in more important matters; the habit of punctuality would thus be formed, confidence would not be broken, and much valuable time would be saved. The following anecdote of Sir William Napier, furnishes a lesson for the consideration of the class of persons we have alluded to:—

"He was one day taking a long country walk near Freshford, when he met a little girl about five years old sobbing over a broken bowl: she had dropped and broken it in bringing it back from the field to which she had taken her father's dinner in it, and she said she would be beaten on her return home for having broken it; then with a sudden gleam of hope, she innocently looked up into his face, and said, "But yee can mend it, can't ee? Sir William explained that he could not mend the bowl, but the trouble he could, by the gift of a sixpence to buy another. However, on opening his purse it was empty of silver, and he had to make amends by promising to meet his little friend in the same spot at the same hour next day, and to bring the sixpence with him, bidding her, meanwhile, tell her mother she had seen a gentleman who would bring her the money for the bowl next day. The child, entirely trusting him, went on her way comforted. On his return home he found an invitation awaiting him to dine in Bath the following evening, to meet some one whom he specially wished to see. He hesitated for some little time, trying to calculate the possibility of giving the meeting to his little friend of the broken bowl and of still being in time for the dinner party in Bath: but finding this could not be, he wrote to decline accepting the invitation on the plea of a "pre-engagement," saying to one of his family as he did so, "I cannot disappoint her, she trusted me so implicitly."

HAND LOOMS FOR WEAVING.

In the January number of the *Journal*, we noticed that a gentleman had made enquiries of us as to the price of hand-looms for weaving plain woollen or linen fabrics, and where such looms can be obtained; believing that if introduced here they would be of immense benefit in employing a large portion of our idle population during the long winter months. A friend informs us that as power-looms are now being extensively introduced into Ireland, any number of displaced hand-looms may be procured at almost nominal rates.

The price of ordinary hand-looms and their necessary appliances; he states to be about £4 sterling, or $20., in Ireland.

Since writing the above we notice a communication on this subject in the *Canada Farmer*, from a practical man, which we have copied into another portion of this Journal.

NOTICE TO INVENTORS.

Inventors and Patentees would facilitate the diffusion of a knowledge of their inventions, by forwarding to this office specifications for publication in the *Journal*, free of charge; and also any suitable wood cuts or stereotype plates illustrating such inventions.

Communications also on any discoveries of new applications of machinery or inventions to industrial processes, that may have been observed in other countries, are particularly desireable for publication in the *Journal*.

NOTICE TO MANUFACTURERS.

The pages of this *Journal* are always open to manufacturers or others, for descriptions of the nature and extent of any branch of manufacture in which they may be engaged, or have any knowledge; and also to communications on any subjects connected with or tending to advance any of the various industrial interests of the province.

Board of Arts and Manufactures

FOR UPPER CANADA.

FREE LIBRARY OF REFERENCE.

The Library of Reference, containing about 1,300 volumes of valuable works on Patents, Mechanics and Manufactures, Designing and Decoration, Engineering and General Science, Parliamentary Publications, &c., is open to ALL free of charge, each day except the Sabbath, from 10 A.M. to 4 o'clock P.M.; and on Tuesday and Friday evenings, for the especial benefit of the industrial classes, and others who cannot attend during the day, it is open from 7 till ten o'clock.

FINAL EXAMINATIONS.

Notice to Institutes.

Directors and members of Mechanics' Institutes are reminded that the Final Examinations of the Board will be held not later than the first week in June next, and that the names of Candidates, and the subjects they propose to be examined in, must be communicated to the Board on or before the first day of May, so as to enable the Examiners to set the papers necessary for the examinations.

Blank Forms, upon which to make these returns, will be mailed to any institute applying for them.

The details of the preliminary and final examinations will be found in the No. of this Journal for Dec. 1864; but any further information required will be furnished on application.

W. EDWARDS,
Secretary.

DUBLIN EXHIBITION.

The Hon. the Minister of Agriculture has placed at the disposal of this Board a small sum of money, for the purchase of "Objects of Arts and Manufactured Articles," with a view to securing, at the forthcoming Dublin Exhibition, a "restricted and cheap exhibition of our products, but characteristic and attractive."

The Objects required by this Board will not include natural products, woods, furs, or Indian curiosities, as such will be provided for through other agencies than this Board; nor can bulky or heavy articles be received, even if offered on the mere condition of transporting them, for two reasons: first, the want of space in the Dublin Exhibition Building, and the character of the exhibition; second, the want of sufficient funds for the forwarding of such goods.

Manufacturers and others possessing suitable articles, must communicate with the Secretary of this Board, at once, as the time is so exceedingly limited.

We would suggest, as suitable objects to send home, TOOLS peculiar to the requirements of this country; manufactures of WOOL, FLAX, COTTON and HEMP; small articles manufactured of WOOD, STONE, GLASS and LEATHER; specimens of MAPS, and of BOOKS written or printed, or written and printed, in Canada; PAPER and paper manufactures; Chemical and Medicinal Preparations; and Art Views and Sketches, illustrative of Upper Canada.

It is much to be regretted that the time is so limited for collecting specimens; but as this matter is beyond the control of the Board, they have to rely on the prompt assistance of those immediately interested to ensure any degree of success.

W. EDWARDS,
Secretary.

Transactions of Societies.

HAMILTON AND GORE MECHANICS' INSTITUTE.

The Annual Meeting of the Members of the Hamilton and Gore Mechanics' Institute, was held on Friday, the 24th February, 1865.

Thomas McIlwraith, Esq., the President, occupied the Chair.

In the absence of the Secretary, Mr. Stuart, Mr. Thos. M. Simons read the Annual Report of the Directors, of which we give the following abstract:

Number of Members.

The number of Members on the 1st of February, 1864, was	484		
Members have been elected during the year, numbering	103		
		587	
Deduct number of those who have retired during the same period		92	
			495
From which deduct also those over six months in arrear			52
And there remain in good standing on the books			443

Finance.

The Receipts and Expenditures for the past year are as follow:

Receipts.

	$	cts.
To Balance from last year	110	16
" Subscriptions to 1st February, 1864	1072	15
" Hall Rent	1381	07
" Donations	328	00
" Paper Sales	159	16
" Reunions	780	85
" Show Cards	24	00
	$3855	42

Expenditure.

	$	cts.
By Cash paid for Magazines	33	95
" " Newspapers	301	28
" " Building Repairs, &c	210	43
" " Water Rates	5	00
" " Gas Account	477	80
" " Outstanding Debts	593	40
" " Salaries	735	35
" " Cleaning hall and room	81	33
" " Mortgage to Canada Life Company	550	00
" " Fuel	92	14
" " Postage	74	64
" " Printing	20	55
" " Books and Binding	119	84
" " Reunion Expenses	417	11
" in hand	142	60
	$3855	42

Library.

The number of volumes added to the Library during the year has been	180
of which 160 were purchased, and 20 were donations.	
The total number of volumes at the date of the last Report was	2844
	3024
Deduct damaged and incomplete works	45
The number of volumes in the Library on the 1st inst. was therefore	2979

The number of volumes issued during the year was 6711, or an average daily issue of over 21 volumes.

The following gentlemen presented books to the Institute during the year: Thos. McIlwraith, Esq., 17; Thomas M. Simons, Esq., 2; Wm. Haskins, Esq., 1—20; and a Chart of Natural History by A Macallum, Esq.

News Room.

For the gratuitous supply of 46 local and foreign newspapers, the Board recommended that thanks to the gentlemen supplying them be recorded; and also reported 52 newspapers and magazines as purchased by the Institute.*

It is extremely gratifying to the Directors to be enabled to call attention to the improved condition of the Institute, as exemplified in the fact that during the past year its revenue has been considerably increased. For although the subscriptions amounted to a sum less by $51.03 than those of the preceding year, the Hall Rent was more by $369.45; the Reunions, a new source of income, added $363.74, and newspaper sales were increased by $78.22. The Reunions may now be regarded as a legitimate source of revenue, for the favor with which they have been received will render it incumbent on future Boards to continue them, and use every exertion to make them popular entertainments.

The Directors have much pleasure in inviting attention to the different items of Eexpenditure. While the Library has been increased by 135 volumes, and an excellent supply of Newspapers and Magazines maintained, outstanding debts amounting to $592.49 have been satisfied, and $550 paid to the Canada Life Assurance Company. The outstanding debts had for years been a source of much trouble and anxiety to the Directors of the Institute, and a determined effort was made during the past year to pay them off.

The Hall has, during the past year, been considerably improved. Heretofore, complaints were repeatedly made by those renting the Hall, not only that it was deficient in almost everything that was requisite for popular entertainments, but because it was both badly heated and badly ventilated. Neither of these complaints can now be made.

The Board of Directors refer with pleasure to the donations which have been made to the Institute during the past year. The Great Western Railway, with praiseworthy liberality, $250; Donald McInnes, Esq., made a handsome donation of $50; Edward Jackson, Esq., gave $20; and other gentlemen gave smaller sums.

To the services of the Superintendent, Mr. Rutherford, his zeal and assiduity, the Directors have great pleasure in alluding; he continues to perform the various duties which his office requires.

Report of the Directors was adopted, and ordered to be printed for the use of Members. Resolutions were unanimously adopted, tendering the cordial thanks of the Members to those Ladies and Gentlemen who have so kindly given their assistance at the Reunions during the past year; and to the Manager of the Great Western Railway, for his liberal donation of two hundred and fifty dollars.

It was also resolved to recommend to the Board to grant the sum of $100 to the Superintendent, Mr. Rutherford, for the various extra duties he had to perform, in connection with the Institute, during the past year.

The following Gentlemen were then elected office-bearers for the ensuing year;—President, Thomas McIlwraith; Vice-President, Tho. M. Simons; Directors; Jas. Hilton, Wm. Turnbull, Jas. McIntyre, W. H. Glassco, A. Harvey, K. Fitzpatrick, R. Roy, Anthony Copp, and W. R. Macdonald. A vote of thanks was accorded to the President Vice-President and the Directors, for their attention to the interests of the Institute during the past year, and the meeting then adjourned.

* In the list of publications reported as purchased, we notice the name of *this Journal*. This is a mistake, as the Journal has been presented free to this and all other Mechanics' Institutes, that we have any account of, in Upper Canada, from the date of its first issue.—Ed.

TORONTO MECHANICS' INSTITUTE EXHIBITION.

The Exhibition noticed in the last number of the Journal as about to be opened in the Toronto Mechanics' Institute, has more than realized the most sanguine anticipations of its projectors. The collection comprises a very large number of Pictures, Native and Foreign, in Oil, Water Color, Crayon, Pencil, and Engraving; Marble and Parian Statuary; Modelling in Plaster; Bronzes; Models of celebrated European structures; Natural History, such as prepared Birds, Fishes, Insects, Animals and Reptiles, and various specimens of Native and Foreign Minerals, and Natural Curiosities; several large collections of Coins and Medals; Ancient Books, Manuscripts, Autographs, &c.; Volunteer Prize Vases; Organs and other Musical Instruments; and various superior specimens of Machinery and Manufactures; Ladies Work, &c., &c.: and a most interesting and extensive collection of Philosophical and School Apparatus, illustrative of the Educational Appliances of Upper Canada, a very large portion of which are of Canadian manufacture, and are exhibited by the Educational Department; who also, on certain evenings, very successfully exhibit—under the control of Dr. May—the Electric Light. We hope to hear of large profits being realized by the Institute, and that other Mechanics' Institutions will organize similar exhibitions, by which the tastes of their members and of the public cannot fail to be educated and improved.

The terror of the desert of Sahara is being removed by the application of science. In 1860 five wells had been opened, bringing fishes to the surface from a depth of 500 feet. Vegetation is springing up around the wells, and the "desert will blossom like the rose."

In science there is work for all hands; and he is usually the most fit to occupy the highest post who has risen from the ranks.

Canadian Patents.

BUREAU OF AGRICULTURE AND STATISTICS.

Patent Office, Quebec.

(For the half year ending December 31st, 1864.)

Letters Patent of Invention for a period of FOURTEEN YEARS, from the dates thereof.

WALKER UNWIN, of the Township of Blanshard, County of Perth, Yeoman, for "an improved Plough, called Unwin's Adjustable Plough."—Dated 5th July, 1864.

JOHN HART, of the Township of Granby, District of Bedford, Carpenter and Joiner, for "a new and improved Gas Stove for the consumption of Coal Oil as Fuel."—Dated 11th July, 1864.

JAMES FITZGIBBON DAVID BLACK, of the City of Montreal, Merchant, for "an improved Rail and Arch for strengthening and Arching Vessels."—Dated 16th July, 1864.

JOHN CONDELL, of the Town of Brockville, County of Leeds, Artist, for "an improved Artificial Leg."—Dated 23rd July, 1864.

HENRY BROWN, of the City of Kingston, County of Frontenac, Merchant, for "the Art of Manufacturing a Pulp from the Bark of the Cedar Tree, furnishing a fit and proper material for a new and useful composition of matter for the manufacture of Paper, called Cedar Bark Paper Pulp."—Dated 23rd July, 1864.

JOHN CONDELL, of the Town of Brockville, County of Leeds, Artist, for "an improved Artificial Limb, called Condell's Artificial Limb."—Dated 23rd July, 1864.

DAVID COLEMAN, of Castleton, County of Northumberland, Harness-maker, for "a new and useful Draft Neck-Yoke."—Dated 26th July, 1864.

CYRUS HORTON, of the Township of Southwold, County of Elgin, Yeoman, for "a new and useful Combined Drill and Sowing Machine."—Dated 26th July, 1864.

EDWARD COOK, of the Township of West Zorra, County of Oxford, Yeoman, for "a new and useful Safety Rail-Coupling."—Dated 5th August, 1864.

SAMUEL MALPUSS, of Middleton Centre, County of Norfolk, mill-wright, for "a new and useful Shingle-Jointer."—Dated 16th August, 1864.

WILLIAM TAYLOR, of the Township of Malahide, County of Elgin, Clerk, for "an improvement in Carriage Springs, called The Taylor Carriage Spring."—Dated 17th August, 1864.

CONRAD VANDUSEN, of the Town of Milton, County of Halton, Gentleman, for "a machine which he calls The Champion Clothes Dryer."—Dated 17th August, 1864.

HENRY DENISON DUNBAR, of the Village of Oshawa, County of Ontario, Civil Engineer, for "a new and useful Self-Adjusting Steam Piston-Packing."—Dated 17th August, 1864.

JOHN MCFARLANE, of the Township of Etobicoke, County of York, Yeoman, and DANIEL MCFARLANE, of the same Township, Yeoman, jointly, for "an improved Mechanical Contrivance or Machine for opening and closing any ordinary Gate, called and known as the The McFarlane Self-Acting Gate."—Dated 17th August, 1864.

ABEL MERRIL, of the Township of Houghton, County of Norfolk, Yeoman, for "an improved Keel for Vessels."—Dated 17th August, 1864.

ANDREW GALLOWAY, of the Township of Glanford, County of Wentworth, Wheel-Wright, for "a new and useful discovery which he calls Galloway's Patent Portable Combination Single and Double Ladder."—Dated 17th August, 1864.

JOHN GIBSON, of the Town of St. Mary's, County of Perth, Blacksmith, for "a new Mill-Pick, called Gibson's Mill-Pick."—Dated 20th September, 1864.

FREDERICK JOHN PAYNE, of the Township of Southwold, County of Elgin, Yeoman, for "a new and useful Field Cultivator."—Dated 20th September, 1864.

THOMAS THOMPSON, of the City of Quebec, Wine and Spirit Merchant, for "an improved Smoking Pipe."—Dated 24th September, 1864.

THOMAS THOMPSON, of the City of Quebec, Wine and Spirit Merchant, for "a new and useful Purifier."—Dated 24th September, 1864.

ISAAC GAMACHE, of the Town of Levis, Merchant, for "a new and useful Apparatus for Loading and Unloading Vessels."—Dated 24th September, 1864.

RICHARD SMITH, of the Town of Sherbrooke, district of St. Francis, for "a new and improved Tobacco-Cutter, to be called Smith's Eureka Tobacco-Cutter."—Dated 24th September, 1864.

JAMES E. THOMPSON, of the City of Toronto, County of York, Hydraulic and Gas Engineer, for "an improved Safety-Lock."—Dated 24th September, 1864.

ISAAC ALLBRIGHT MOYER, of the Township of Clinton, County of Lincoln, Yeoman, for "a new and useful Meat-Chopper, called The Empire Meat-Chopper."—Dated 27th September, 1864.

JOSEPH THAYER, of the Town of Belleville, County of Hastings, Machinist, for "a new and useful Guide-Head for Lathes, called Thayer's Eccentric Guide-Head."—Dated 27th September, 1864.

ALONZO QUACKENBUSH, of the Village of Port Dalhousie, County of Lincoln, Mariner, for "an improved Churn."—Dated 28th September, 1864.

EBENEZER STOVEL, of the Village of Mount Forest, County of Grey, Yeoman, for "a new and useful Self-Regulating Snow Gate."—Dated 28th September, 1864.

WILLIAM CLARK DONNELLY, of the Township of Walpole, County of Haldimand, Physician, and JESSE PARKER, of the same township, Yeoman, for "a Safety Carriage Spring."—Dated 4th October, 1864.

SAMUEL MOWE WHITMORE, of the Parish of St. Francois du Lac, in the County of Yamaska, Farmer, "a new and useful improvement in the art of tanning."—Dated 10th October, 1864.

HENRY YEAGER, of the Township of West Flamboro, County of Wentworth, Wheel-Wright, for "a new and useful machine which he calls a Tire Upsetting Machine."—Dated 24th October, 1864.

CHARLES LA MAIN, of the Township of Hamilton, County of Northumberland, Yeoman, for "a new and useful Seed-Sowing Machine."—Dated 24th October, 1864.

JOSEPH C. HENDERSON, of the Town of Brockville, County of Leeds, Manufacturer, for "an improved Coal-Stove, called Henderson's New Coal-Burner."—Dated 24th October, 1864.

WILLIAM C. VAN BUSKIRK, of the Town of St. Thomas, County of Elgin, Physician, for "a new and useful Draining Plough."—Dated 25th October, 1864.

William Dutton, of the Township of Vespra, County of Simcoe, Miller, for "a new and useful system of dressing Mill-Stones, called The Auxiliary Mill-Stone Dress."—Dated 25th October, 1864.

David Johns, of the Village of Exeter, County of Huron, Tin-Smith, for "a new and useful Machine for Moulding Eave-Troughs."—Dated 26th October, 1864.

John Askew, of the Township of Raleigh, County of Kent, Mill-Wright, for "a Cast-Iron Arm to apply to Wrought-Iron Axle-Trees"—Dated 26th October, 1864.

William W. Richardson, of the City of Hamilton, County of Wentworth, Merchant, for "the Magic Self-Compressing Clothes Wringing Machine."—Dated 9th November, 1864.

Edwin Roblin, of the Township of Sophiasburgh, County of Prince Edward, Machinist, for "a new and useful Churn Power."—Dated 9th November, 1864.

Stephen Washburn, of the Township of South Dumfries, County of Brant, Mechanic, for "an improved Portable Fence, called the Portable Picket Worm Fence."—Dated 15th November, 1864.

John Hanford, the younger, of the Town of Windsor, County of Essex, Mill-Wright, for "an improved Saw-Setter, to be known as Hanford's Saw-Setter."—Dated 18th November, 1864.

Joseph Van Norman, of the Township of Dereham, County of Oxford, Iron-Founder, for "a new and useful improvement in the construction of furnaces for the melting of metals, and in the art of melting metals therein, to be known as Joseph Van Norman's improved Furnace for the Melting of Metals."—Dated 18th November, 1864.

Jesse Weaver, of the Township of Malahide, County of Elgin, Farmer, and Robert W. Rule, of the same place, Machinist, for "a Ditching Machine."—Dated 19th November, 1864.

Henry Fryatt, of the Village of Aurora, Township of Whitchurch, County of York, Carpenter, for "an improved Sawing Machine."—Dated 21st November, 1864.

Franklin P. Goold, of the Town of Brantford, County of Brant, Potter, for "a new and useful improved Churn and Butter-Worker."—Dated 21st November, 1864.

Samuel Lambert, of the City of Kingston, County of Frontenac, Mechanic, for "a new and useful Rail-Joint Fastening for Railways."—Dated 22nd November, 1864.

William Parson, the younger, of the City of Toronto, County of York, Oil-Refiner, for "a new and useful machine for forcing oil and water from the bottom of wells, and water from mines, to be called and known as Parson's Oil Ejector."—Dated 22nd November, 1864.

James Collins, of the Town of Guelph, County of Wellington, Machinist for "an improved-Self-Delivering Attachment for Reaping Machines."—Dated 22nd November, 1864.

Edward Beanes, of the City of Toronto, County of York, Gentleman, for "a new and useful Process for improvements in the Preparing or treating of Animal Charcoal."—Dated 24th November, 1864.

Richard Charles Honey, of the Village of Newtonville, in the Township of Clarke, County of Durham, Coach Builder, for "a new and useful improved Wheel-Hub."—Dated 24th November, 1864.

Alexander Anderson, of the City of London, County of Middlesex, Machinist, for "a new and useful Straw-Cutter, to be called and known as Anderson's Straw-Cutter."—Dated 28th November, 1864.

George Lacey Darling, of the Town of Simcoe, in the County of Norfolk, Jeweller, "a new and useful machine, to be called and known as Darling's Lever Power and Vertical Sawing Machine."—Dated 29th November, 1864.

Flavius Gustavus Goodwin, of the Township of Dereham, County of Oxford, Yeoman, for "an improved Seed Drill."—Dated 9th December, 1864.

John S. Robinson, of the City of London, County of Middlesex, Oil Refiner, for "a new and useful Currier's Oil."—Dated 10th December, 1864.

Thomas Robson, of the Town of Brantford County of Brant, Miller, for "a new and useful Flour-Drier, to be called the Steam Flour-Drier."—Dated 10th December, 1864.

Henry Carter, of the Township of Malahide, County of Elgin, Blacksmith, for "a new and useful Hydrostatic Engine."—Dated 10th December, 1864.

Hervey Killam, of the Village of Waterford, County of Norfolk, Mechanic, for "a new and useful Mouldboard for Ploughs."—Dated 10th December, 1864.

James E. Mitchel, of the Town of Paris, County of Brant, Machinist, "a new and useful matching machine, to be called and known as Mitchel's non-parallel Matching Machine."—Dated 10th December, 1864.

John McArthur, of the Village of Fergus, in the County of Wellington, Blacksmith, "a new and useful Mouldboard."—Dated 10th December, 1864.

William Vahey, the younger, of the Village of Arkona, in the County of Lambton, Gentleman, "an improved Weather Strip."—Dated 20th December, 1864.

(List of Patents issued by the Patent Office from the 1st January 1865, to the 28th February 1865)

Charles La Main, of the Township of Hamilton, in the County of Northumberland, Yeoman, for "a new and useful double-mouldboard drilling Plough."—Dated 10th January, 1865.

Joseph Paradis, of the City of Montreal, Machinist, for "a new and useful Press for compressing hay, cotton, tobacco, &c., &c."—Dated 16th January, 1865.

Cornelius Ryan, of the City of Montreal, Tinsmith, for "a new and useful improvement in stoves and heating apparatus."—Dated 16th January, 1865.

Richard S. Hunter, of the Township of Stanstead, in the District of St. Francis, Gentleman, for "a new and useful metallic Threshold and out side door attachment."—Dated 16th January, 1865.

James Hodges, of the Township of Bulstrode, in the District of Arthabaska, Civil Engineer, for "a new and useful machine for manufacturing fuel from peat, for excavating canals, and for other purposes."—Dated 16th January, 1865.

Rufus Trumbull Monroe Wells, of the Township of Stanbridge, in the District of Bedford, Doctor of Medicine, for "a new and useful machine for starting cars."—Dated 16th January, 1865.

Joshua Crawford, of the City of Toronto, in the County of York, Gentleman, for "an Abdominal Supporter."—Dated 17th January, 1865.

AARON LINTON, of the Town of Brockville, in the County of Leeds, Miller, for "an improved Mill Pick."—Dated 21st January, 1865.

JOHN C. FEELY, of the Town of Brantford, in the County of Brant, Cabinet Maker, for "a new and useful Horse-Rake."—Dated 23rd January, 1865.

WILLIAM TOMLINSON, of the Township of Brantford, in the County of Brant, Yeoman, for "the Economical Threshing Machine."—Dated 3rd February, 1865.

JAMES ROGERS ARMSTRONG the Younger, of the City of Toronto, in the County of York, Iron Founder, for "a new and useful cooking stove, called the 'Armstrong.'"—Dated 3rd February, 1865.

ISAAC WESTCOTT, of the Town of Bowmanville, in the County of Durham, Blacksmith, for "a new and useful machine called 'Westcott's Cultivator.'"—Dated 3rd February, 1865.

JOHN WORT and PETER CLAYTON, of the Township of Malahide, in the County of Elgin, Yeoman, Esquire, for "a new and useful improved washing-machine, called 'Wort's and Clayton's Improved Washing-machine.'"—Dated 8th February, 1865.

DAVID BRUCE, of the City of London, in the County of Middlesex, Machinist, for "a new and useful improved Sawing-machine."—Dated 8th February, 1865.

ROBERT MITCHELL, of the City of Montreal, Machinist, for "a new and improved Radiator."—Dated 14th February, 1865.

GEORGE SAVAGE HOBART, JOHN ISRAEL ENSLEY, of the City of Kingston, in the County of Frontenac, Druggist, Manufacturer, for "a new and useful combined Burner and chimney, with nonconducting wick tube."—Dated 14th February, 1865.

JOHN RITCHIE, of Etchemin, in the County of Levis, Mill-wright, for "a new and useful machine for holding saw-logs, to be called 'Ritchie's patent attached saw mill chain.'"—Dated 15th February, 1865.

EDWD. PAYNE, of the City of Montreal, Distiller, for "a new and useful staple clamp for supporting and insulating over ground telegraph wires."—Dated 15th February, 1865.

MARK LIBBY, of the Township of Bolton, Gentleman, for "a new and useful machine for raising alluvium, muck and soft earth from swamps, ponds, marshes, beds of rivers or any other place."—Dated 15th February, 1865.

Useful Receipts.

Cure for Diptheria.

Diptheria in early stages, may be recognised by any person of ordinary capacity, by two marked symptoms; the sensation of a bone or hard substance in the throat, rendering swallowing difficult, and painful tendencies.

On the appearance of these symptoms, if the person is old enough to do so, give a piece of gum camphor, of the size of a marrowfat pea, and let it be retained in the mouth swallowing slowly the saliva charged with it until it is all gone. In an hour or so give another, and at the end of another hour a third: a fourth will not usually be required, but if the pain and unpleasant breath are not relieved, it may be used two or three times more, at a little longer intervals, say two hours.

If the child is young, powder the camphor, which can easily be done by adding a drop or two of spirits or alcohol to it, and mix with it an equal quantity of powdered loaf sugar, or better, powdered rock candy, and blow it through a quill or tube into its throat, depressing the tongue with a spoon. Some recommend powdered alloes or pellitory with the camphor, but observation and experience have satisfied us that camphor is sufficient alone. It acts probably by its virtue as a diffusable stimulant, and antiseptic quality.

Some may be disposed to try the following more violent remedy, but the foregoing should have the precedence.

A lady of Fort Byron, Cayuga County, N.Y. has cured six children (five of her own) of diptheria, or putrid soar throat by the following remedy:

"When the symptons are first discovered, take Spanish flies, pound and mix with Venice turpentine, spread it on a piece of soft leather or cloth and bind it on the throat, which will raise a blister and soon remove the disease from the throat."—*N. Y. Examiner.*

Cure for a Felon.

As soon as the part begins to swell, get the tincture of lobelia and wrap the part affected with cloth saturated thoroughly with tincture, and the felon is dead. An old physician says he has known this to cure in scores of cases, and it never fails if applied in season.

Kitchener's Relish.

Ground black pepper and salt, of each 1 oz., allspice, horse-radish, and shalots, of each ½ oz., walnut pickle, or mushroom ketchup, 1 pint, infuse 14 days, and strain. Used for sauce.

Red Ink.

Pernambuco wood 4 oz., dilute acetic acid 16 oz, water 16 oz., boil down to 24 oz.; add 1 oz of alum, evaporate to 16 oz.; add gum arabic 1 oz., strain, when cold, add protochloride of tin 1 drachm.—*Weber*

To Varnish Articles of Iron and Steel.

Dissolve ten parts of clear grains of mastic, five parts of camphor, 15 parts of sandarach, and five of elemi, in a sufficient quantity of alcohol, and apply this varnish without heat. The articles will not only be preserved from rust, but the varnish will retain its transparency, and the metallic brilliancy of the articles will not be obscured.

Cement for Ivory, Mother of Pearl etc.

Dissolve one part of isinglass and two of white glue in thirty of water, strain and evaporate to six parts. Add one-thirtieth part of gum mastic, dissolved in half a part of alcohol, and one part of white zinc. When required for use, warm and shake up.

Whoever is master in the art of tool-making, possesses the key to the construction of all machines.

Selected Articles.

SEASONING AND DRYING LUMBER AND TIMBER.

A COMPARISON OF SUPERHEATED STEAM WITH OTHER MODES OF SEASONING, AS IT REGARDS SPEED, THOROUGH WORK AND CHEAPNESS.

It seems to be a great mystery to the uninitiated how lumber, and other substances, can be dried while in direct contact with steam.

All understand that steamed lumber will dry in the open air, more rapidly after, than before, it is steamed—though all do not understand why it does it. They notice that the lumber comes from the steam in a very wet and soaked state, and the general impression would be, that it would require a longer time to dry than before it was thus soaked.

The fact however that it does dry more rapidly, has induced many to adopt this mode, when they were in haste for some dry lumber, even though practical tests have shown that such steaming injuries its beauty of finish, as well as the strength and durability of the lumber and timber. The reason for this will be seen.

This steaming and soaking process extracts the albumen, which if properly coagulated and retained, is a preservative to the lumber, so that they never shrink again to their smallest size, and do not often return as tubes, but shrink into angles; thus injuring the strength as well as beauty of finish. If these improperly shrunk tubes were placed under a powerful microscope, they would look like hills and valleys and very high ones.

This albumen is somewhat difficult to dry in the pores of the lumber, by air drying, for it does not part with its moisture readily, and when dried in the outside pores of the lumber, it nearly hermetically seals the inside, as it becomes nearly impervious to moisture.

Many attempts have been made to get rid of this albuminous substance in the lumber, for even after it has been once dried, it will ferment, if water be added, and this fermentation produces eramacausis or dry rot, which destroys millions of dollars' worth of railroad timbers, ties, and bridges, per year, as well as timber in buildings, ships, &c.

Kyanizing, paynizing, burnetizing, and other similar processes, are only modes used to coagulate or chemically change this albumen, by using the various kinds of salts, such as corrosive sublimate, zinc, copperas, &c. Many of these modes have been found to be valuable for preserving the timber from the dry rot. But since these processes are usually performed by soaking or steeping the lumber in a solution of these salts, much of the albumen passes out, to the injury of the lumber; for when all of the strength and beauty of finish is desirable, the albumen should be coagulated and retained in the pores of the lumber. Of course the lumber comes from all these processes as well as in steaming, boiling, or soaking in water—in a wet and soaked state, and must therefore be used in the wet state, or afterwards dried by the air, either naturally or artificially. In either case, the outside of the timber is dried first, and forms an enamel, which will not further shrink, as the drying progresses, and therefore the timber cannot be brought to its smallest size, even though the drying process be continued forever.

Air drying we must remember always commences on the outside of the lumber, and its tendency is to close up its own way, and check materially its own progress, forming an enamel with dried albumen, and by closing the pores of the lumber on the outside first. The further therefore the drying extends into the lumber by this process the slower must be the future drying, for the passage of the moisture from the inside is the more strongly resisted, the thicker this enamel becomes. Is it any wonder, therefore, that the center of thick lumber is rarely ever dried. Comparatively small sticks of oak timber have been used for a fire piece for at least sixty years.

Many millions of dollars have been expended in experiments to season and dry lumber. The result has generally proved to be drying without seasoning, and seasoning without drying. But when both seasoning and drying have been attained by subjecting the lumber first to one process and then to the other, the result has usually been a sacrifice of the strength and durability of the lumber, as well as its beauty of finish, to say nothing of time and expense.

In contrast with the foregoing plans we will now examine the new mode, that seasons and dries at the same time, by what is called superheated steam without pressure, or with the simple pressure of the atmosphere. No other mode known to science has ever accomplished this, and yet the process is a very simple one, as I shall attempt to show, though I may fail to make it fully understood in an article that would not be too long for insertion here. If the principle, however, should still be obscure to any one they can inquire by mail.

Suppose a room 14 feet high be divided so that the lower room shall be 8 feet and the upper one 6 feet high. The lower we will call the fire steam room, and the upper the lumber or drying room. The division, however, between these rooms is only the joist on which the lumber is piled, or that sustains the cars on which the lumber is dried, and on which it is passed into and out of the dryer. The two rooms are, therefore, virtually one.

A stove or other heater, with long radiating or smoke pipe, to save all of the heat from escaping into the chimney, as well as to generate heat rapidly, is placed in the fire room, with the door of the stove opening out to supply fuel. This stove and the radiators are placed quite at the lower part of the fire room, which avoids the direct heat of the stove on the lumber, and also to occupy the coldest part of the room, which is the most favorable for obtaining all the heat of the fuel.

A steam generator may be so arranged at a small expense, in connection with the heater, that steam will be generated just in proportion to the heat made.

This steam, whether generated in this or in some other convenient way, should be just sufficient in amount to fill both the fire and lumber room, with no steam to pass off to waste the heat. As soon as the rooms are filled with steam the air is excluded and the steam takes its place for conveying caloric. Steam will convey heat by convection 90 to 300 times as rapidly as air.

This steam atmosphere is not one that can be seen but one that can be felt. It starts a free perspiration from all the pores of the skin when you go into the kiln. It does the same thing to lumber, for it never wets or swells the lumber as by common steam, but the first act is a drying one, as the tendency of the moisture of the lumber is all outward; let us see how this is accomplished.

Steam as soon as it is generated rises. As soon, however, as a particle of steam meets a body colder than itself it instantly imparts its heat to that body and is condensed. This particle of condensed steam descends by its own gravity to the fire room. Here it comes into contact with the stove or radiators, and is re-converted into steam, and carries its heat to the lumber and descends again in its condensed form for more heat. This one particle of steam may carry up heat this way a million times, and yet it has imparted no moisture to the lumber, as it has returned with its moisture in the shape of condensed steam. If by any accident this one particle of steam is absorbed or lost, the steam generator supplies another particle to take its place, and thus preserves a constant steam atmosphere among the timber, not only to convey heat but to shut out the air.

It is worthy of note in this connection, to state that a particle of steam will instantly receive as many degrees of heat as there are degrees in the heater with which it may come in contact. If for instance the stove should be red-hot, and the particle of returning or condensed steam should come in contact with the red-hot iron, this particle of steam would instantly receive at least 900 degrees of heat. This 900 degrees of heat would be carried to the lumber, and the condensed particle of steam would return for more heat in the same time as though it carried only 212 or any other number of degrees of heat.

It is also worthy of note that the tendency of steam is to fly to the coldest place to impart its heat. If, for instance, a ball of ice were suspended at the ceiling of a room, and some water should be thrown upon a hot stove in the room the steam thus generated would go continually to the ice until it was melted. Thus as an equalizer of heat steam has no equal.

This superheating and condensing of steam in particles goes constantly on in the kiln, and with a rapidity just in proportion to the amount of heat generated by the stove or heater. All of the heat which the stove makes the steam will absorb and convey to the lumber. If heat is generated rapidly the steam will convey it rapidly to the lumber. Inch lumber has in this way been thoroughly seasoned in six hours.

This mode of heating and condensing progresses until the lumber is so hot that the aqueous or watery portion of the sap is changed into steam.

Up to this time you will notice all of the heat we have made is yet in the kiln, for there has been no means of escape to waste it, nor have we made the lumber wet or damp by the steam since the steam has only imparted its heat and not its moisture or condensed steam.

But when the lumber is all so hot as to generate steam rapidly from the water it contains, then there will be more steam than the kiln can contain, for it was full of steam before. This excess of steam must pass out of the kiln or the kiln would burst and the lumber would never become dry.

When this surplus heat passes out it escapes through sawdust or a similar device to retain the heat while getting rid of the steam. This sawdust should be of such thickness as to balance the steam, retaining a full steam atmosphere inside, while the surplus steam passes out, taking with it the moisture from the lumber. As there is a steam atmosphere at all times surrounding the lumber to be dried, it cannot dry the outside first and form an enamel, as in the case of air drying.

The nature of steam is so penetrating that it finds the center of the lumber, before the drying has made any considerable progress. After the drying commences steam generated from the lumber is constantly flowing out, so that the pores of the lumber cannot close until the moisture is principally out of the lumber, and then the centre must dry first, for the steam must leave the center before it leaves the outside.

When the aqueous portion of the sap has all been converted into steam and passed out of the lumber, it creates a vacuum which the pores of the lumber close to supply. When this is done the lumber has shrunk to its smallest size, or to as nearly a solid as drying can make it.

But as there is moisture in red-hot iron, so there must be some moisture left in the lumber after the pores close and after the shrinking is all done. Indeed if the moisture was all removed the lumber would be ruined for charring commences long before the moisture is all out.

By gaging a piece of timber in the kiln from day to day, it is quite easy to ascertain when the shrinking is all done. When the shrinking of the lumber is completed there is no further advantage in drying, but a positive injury, as far as the strength and toughness is concerned, for the more moisture there is left in the lumber and timber after the shrinking is all done, the better. If desired, however, the lumber may come from the steam in a dryer state than the air can ever make it.

I am admonished, however, that this article will soon be too long for insertion in the Scientific American, and I will reserve, perhaps for No. 3, the degrees of heat necessary to coagulate albumen in lumber at its different stages of drying, and perhaps say something of the degrees of this kind of heat desirable in the drying of fruit and vegetables, and also show why we may use a higher degree of this kind of heat than of air in drying delicate fruits, milk, etc., and still not injure them. I have dried apples in a heat of 239° and still they showed no indications of being cooked by the process, but came out very white and beautiful.

But before I close I will bring into juxtaposition superheated steam and other modes of drying, in order to show the advantages of superheated steam by comparison.

The air dries only. Superheated steam seasons and dries at the same time. The air dries slowly—steam quickly. The air produces decay and wastes heat while drying. Superheated steam adds strength and beauty of finish and saves heat. The interest on lumber while air drying must be for years—steam for days. Air can never shrink lumber so thoroughly that steam can not shrink it more, either in size or weight.

Common steaming, kyanizing, paynizing, and burnetizing, all season lumber, but swell it to its utmost capacity, and leave it wet and soaked. It would require more fire to dry this soaked lumber by the hot air process than to season and dry it from the green by the new mode. If the lumber is to be immediately shipped the difference in weight will be from 1,400 to 2,000 pounds per thousand feet board measure.

One month's stock of lumber for a manufacturer having a proper steam dryer, will give him better seasoned lumber than a four year's stock in the air, thus saving the interest on stock, storage, checks, splits, warps and decay, incident to open air drying. The interest at 10 per cent on lumber costing only 40 cents per M. will be $16 while air drying for four years, and then that same lumber is not fit for good work unless kiln dried. It can be seasoned and dried by superheated steam, in a better manner than any other, at a cost of 50 cents to $1 per M., according to the expense of fuel.—*Scientific American.*

OLD CLOTHES.

The streams of old clothes that hour by hour are seductively drained, either by floral exchange, attractive advertisement, or by the downright pestering of "Old Ikeys," culminate in the great old clothes mart in Houndsditch where Hebrews most do congregate. To the question of what now becomes of them, we might answer that the greater part of them are now about to set upon their travels, to enter new circles of society, and to see life both savage and civilized under a thousand new phases.

Those that are intended to remain in this country have to be tutored and transformed. The "clobberer," the "reviver," and the "translator" lay hands upon them. The duty of the "clobberer" is to patch, to sew up, and to restore as far as possible the garments to their pristine appearance; black cloth garments pass into the hands of the "revivers," who rejuvenate seedy black coats, and, for the moment, make them look as good as new. The "translator's" duty is of a higher order; his office is to transform one garment into another—the skirts of a cast-off coat being the least worn part of the garments make capital waistcoats and tunics for children, &c. Hats are revived in a still more wonderful manner, they are cut down to take out the grease marks, re-lined, and appear in the shops like new ones. The streets surrounding the old clothes' market are full of shops where these "clobbered" and "revived" goods are exposed for sale, and really a stranger to the trade would not know but that they were new goods. There is a department of the market also dedicated to old clothes, male and female, "clobbered" and revived. It is a touching sight to see the class of persons who frequent the men's market and turn over the seedy black garments, that are doing their best to put on a good appearance—the toilworn clerks, who for some social reason are expected to apparel themselves in black, and the equally care worn members of the clerical profession, chiefly curates whose meagre stipends do not permit of the extravagance of new suits of clothes. The ladies' market is a vast wardrobe of silk dresses, but if we are to believe the saleswoman the matrons of England are more thrifty than we gave them credit for. "Servants come here to purchase, Sir! No, indeed, Sir, ladies worth hundreds of pounds," was the reply we got to our inquiries as to the class of purchasers.—Black cloth clothes that are too far gone to be "clobbered" and "revived" are always sent abroad to be cut up to make caps. France takes the best of these old clothes for this purpose. The linings are stripped out and in this condition they are admitted duty free as old rags. Russia and Poland, where caps seem to be universally worn by the working population, are content with still more threadbare garments to be cut up for this purpose. The great bulk of our cast-off clothes of all kinds, however, find their way to two markets,—Ireland and Holland. The old clothes' bags of the collectors may, in fact, be said to be emptied out in the land of Erin, as far as the ordinary order of clothes go, while to Holland only special articles of apparel are exported. Singularly enough, the destination of the red tunics of the whole British infantry is the chests of the sturdy Dutchman. There seems to be some popular belief or superstition in that waterlogged country that red cloth affords the best protection against rheumatism, consequently these jackets all find their way to the land of dykes. The sleeves are cut off, and they are made to button in a double-breasted fashion; thus remodelled they are worn next to the skin like a flannel waistcoat by all careful Dutchmen among the labouring classes. The Irish chiefly favour corduroys, and we suspect the worn-out legs of British pantaloons of this material are cut off and converted into breeches for Pat.—Where he gets those wonderful swallowed-tailed coats with brass buttons is a puzzle to all dealers; it is very certain they do not come from this side of the Channel, and it is equally clear they are remnants of costume two generations back. Our readers will perhaps have noticed the special avidity the dealers in old clothes evince for all kinds of regimentals, full dress liveries, Volunteers' uniforms, beadles' coats, &c. Anything especially splended in this line is marked by the collectors as a sportsman marks any rare and brilliantly plumaged bird, and ultimately it is sure to be bagged by them. These are the great prizes of the profession—and their barbaric splendours are destined for a special market—the South Coast of Africa, where nature puts on her most gorgeous apparel, and the great ones of the land are determined to have something to match. Travellers often tell us of the marvellous appearance of the chiefs of these parts when in full mufti, but we scarcely expected to find our old clothes dealers the regular *costumiers* of these sable dignitaries, transmitting regimentals, liveries and cocked hats, as regularly to them as a London tailor sends his clothes to his country customers. It is just possible that the Lord Mayors for these last dozen years would be able to recognize their own splendid liveries on the backs of these potentates if they could ever be got together for any purpose whatever. We ourselves saw an assortment of well preserved liveries of the heir to the proudest throne in the world, just being packed for exportation to the grand destination of all fine liveries we have just mentioned. The vast majority of the scarlet coats of our officers that are a little worn find their way to the great annual fair at Leipsic. The pepper and salt great coats of our infantry go to our agricultural districts and to the Cape, but the heavier and more valuable artillery cloaks find their way to Holland, and that country and Ireland absorb between them the cast off clothes of the police. There is one odd item of old clothes that has a singular history. There are still a certain class in the community addicted to the use of silk velvet waistcoats. This class is generally to be found among the well-to-do tradesmen of country towns. The longevity of a black silk velvet waistcoat is proverbial; it will not wear out. After adorning the respectable corporation of some provincial grocer until he is thoroughly tired of it, what does our reader think is its ultimate destination—the pate of some street German or Polish Jew! In obedience to a Rabbinical law it is not considered right by some of the more conscientious Hebrews to go uncovered, and these second-hand waistcoats are bought up to make skull caps for their use.

But old clothes, after they have served the purpose of two or three classes of society, are yet far from closing their career; when they have seen their worst they take altogether a new lease of existence. When old clothes are too bad for anything else they are still good enough for Shoddy and Mungo. It is not many years since Mr. Ferrand denounced the "devil's dust" of the Yorkshire woollen manufacturers; this "devil's dust" arises from the grand translation of old clothes into new. Batley, Dewsbury, and Leeds have been described as the grand centres of woollen rags—Tatterdemallion capitals, into which are drawn the greasy, frowsy cast-off clothes of Europe, from whence issue the pilot cloths, the Petershams, the beavers, the Talmas, the Chesterfields, and the Mohairs in which our modern ladies disport themselves. The old rags, after being reduced to the condition of wool by enormous toothed wheels, are mixed with a varying amount of fresh wool, and the whole is then worked up into the fabrics we have mentioned, which now have the run of fashion. It is estimated that shoddy and mungo supply the materials for a third of the woollen manufactures of this country. Here is a grand transformation. No man can say that the materials of the coat he is wearing has not been already on the back of some greasy begger. In one corner of the "animal products department" in the South Kensington Museum the visitor can see hundreds of specimens of this shoddy and mungo—a perfect resurrection of the old clothes from every country in Europe. The cast-off wardrobes of civilized man by a law of commerce are sucked into this country, and mainly into this metropolis, and we distribute it in perfect fabrics, destined to go once more the round of civilization; woollen fabrics are hard to die, and, for all we know, clothes are thus ground up over and over again.—*London Times.*

To remove Rancidity.

Add a little nitric ether to the rancid oil. A few drops preserve oils and fats from turning.

DAVY AND THE "LAUGHING GAS."

The dangers which enthusiastic men of science will voluntarily undergo for the sake of the testing new principles have never been more strikingly exemplified than in the history of Sir Humphrey Davy's early experiments on the effect of nitrous oxyd, popularly known as "laughing gas." Davy began his chemical studies in March, 1798, when a youth of 19, and only two years later appeared his Researches,' which immediately gave him high rank, not as a mere chemist, but as an original discoverer. Herein, for the first time, the properties of nitrous oxyd and the wonderful effects of that gas in respiration were disclosed to the astonishment of the public. Hitherto it had been regarded among natural philosophers with a sort of vague horror, and from its deadly effects upon small animals it was suspected that it was the very principle of the plague itself, that terrible visitation which, from time to time, swept over Europe. Nothing daunted by this, the young philosopher boldly resolved to try its effects upon his own system. He could not have been ignorant of the terrors of Spallanzani's experiments upon the gastric juice, and only a short time before the brave Pelletier, the French chemist, had lost his life in the attempt to breathe another kind of poisonous gas.—But the boy philosopher thought it necessary to compare the effects of nitrous oxyd with those of common stimulants, and he was resolved to pluck knowledge out of this dangerous trial. With this view, he shut himself up, and first submitted himself to intoxication so extreme as to produce distressing and alarming symptoms. To ascertain the effects of an atmosphere containing large quantities of the same gas, he inclosed himself in a box, and at three successive intervals, for an hour and a quarter (during which time he remained in the box), had sixty quarts of the gas thrown in, finally constituting a large proportion of the air which he was breathing. When the last twenty quarts were thrown in, his emotions became similar to those produced by a moderate dose of the pure gas; but, not satisfied with this, immediately after coming out of his cage, he began to breathe in twenty quarts of nitrous oxyd, probably the most effectual trial ever made of this wonderful agent.

In his own account of this audacious experiment Davy observes:—"A thrilling, extending from the chest to the extremities, was almost immediately produced—I felt a sense of tangible extension highly pleasurable in every limb; my visible impressions were dazzling and apparently magnified; I heard distinctly every sound in the room, and was perfectly aware of my situation. By degrees, as the pleasurable sensations increased, I lost all connection with external things; trains of vivid, visible images rapidly passed through my mind, and were connected with words in such a manner as to produce perceptions perfectly novel. I existed in a world of newly connected and newly modified ideas. I theorized; I imagined that I made discoveries. When I was awakened from this semi-delirious trance by Dr. Kinglake, who took the bag from my mouth, indignation and pride were the first feelings produced by the sight of the persons about me. My emotions were enthusiastic and sublime, and for a minute I walked around the room perfectly regardless of what was said to me. As I recovered my former state of mind, I felt an inclination to communicate the discoveries I had made during the experiment. I endeavored to recall the ideas; they were feeble and indistinct.—One collection of terms, however, presented itself, and with the most immense belief and prophetic manner I exclaimed to Dr. Kinglake:—"Nothing exists but thoughts!—the universe is composed of impressions, ideas, pleasures, and pains!"'

The impunity with which Davy had passed through these wonderful trials emboldened him to attempt the breathing of the deadly fumes from charcoal. His first attempt was made upon four quarts of carburetted hydrogen gas, of which he made three inspirations. "The first inspiration (he tells us) 'produced a sort of numbness and loss of feeling in the chest and about the pectoral muscles. After the second inspiration I lost all power of perceiving external things, and had no distinct sensation except a terrible oppression on the chest. During the third inspiration this feeling disappeared; I seemed sinking into annihilation, and had just power enough to drop the mouth-piece from my unclosed lips. A short interval must have passed during which I respired common air before the objects about me were distinguishable.' On recollecting himself he faintly articulated, 'I do not think I shall die.' Putting one finger on his wrist, he found his pulse threadlike, and beating with excessive quickness.—Extreme giddiness, loss of memory, and numbness succeeded, with excruciating pains in the forehead and between the eyes, and transient pains in the chest and extremities.

Davy was, as far as his philosophical learning went, entirely self-instructed.—He was born at Penzance, in Cornwall, on the 17th of December, 1778. Though some attempt has been made to conceal the fact, there is no doubt that his father, Robert Davy, followed the humble occupation of a wood-carver; Robert was known in that town as 'little carver Davy,' and his son (Humphrey) when young, was always spoken of there as 'carver Davy's boy.' His father dying when the lad was only sixteen, his mother commenced the business of a milliner, and apprenticed her child to an apothocary at Penzance, where, for the first time, he began to show an interest in his favourite study.

"His means, of course," says his brother, Dr. Davy, "were very limited; not more extensive than those with which Priestley and Scheele began their labors in the same faithful field. His apparatus consisted chiefly of phials, wine-glasses, tea-cups, tobacco-pipes and earthen crucibles, and his materials were generally the mineral acids and the alkalies, and some other articles which are in common use in medicine." He began his experimental trials in his bedroom, in a friend's house, in which he was a favorite inmate. Here there was no fire, and when he required it he was obliged to come down to the kitchen with his crucible. His biographer, Dr. Paris, states that Davy was indebted to the accident of a wreck on the coast for a case of surgical instruments. This included a clumsy clyster apparatus which he turned into an air pump. The sacred vessels and professional instruments of the surgery were, without the least hesitation, put into requisition for any chemical experiments.

It can hardly be doubted that Sir Humphrey Davy's constitution, which was so vigorous in youth, withered and decayed long before he reached old age from the effects of injuries sustained by these early experiments. He died in 1829, at Geneva, of an attack of apoplexy, but his end was singularly peaceful. When his brother (Dr. Davy) entered the room, Sir Humphrey said: "I am dying! When it is all over, I desire that no disturbance of any kind may be made in the house. —Lock the door, and let every one retire quietly to his apartment." The mortal remains of the woodcarver's son—the great philosopher and discoverer —were honored with a public funeral, and deposited in the cemetry outside the walls of Geneva.—*American Artizan.*

DISCOVERY OF A BED OF EMERY.

Dr. Charles T. Jackson, of Boston, recently read a paper before the Boston Society of Natural History, in which he announced a discovery of a mine of emery. He said it afforded him great pleasure to announce the discovery of an inexhaustible locality of excellent emery in the central part of the State of Massachusetts, in the town of Chester, Hampden county.

On the 11th October last Dr. Jackson revisited Chester, and was surprised to find that one of the beds, which all had supposed to be magnetic iron ore, and from which hundreds of tons had been taken and smelted with the ores of iron found in Berkshire county, was really composed chiefly of pure emery—one part of the bed being properly iron ore. Had not the occurrence of Margarite and Chlorotoid called his attention to the probable existence of emery at this locality, it would have been overlooked to this day, and no one knows how much longer.

The principal bed of emery on the South Mountain, in Chester, is from four to ten feet in width, and is now quarried at the base of the hill. Its course is nearly N. 20 deg. E., S. 20 deg. W., and its angle of dip is 70 deg., and to the eastward. The bed widens rapidly as it rises in the mountain, and in one place where it is associated with a bed of iron ore, 17 feet wide, the emery itself not being less than ten feet in the clear. The highest point where it crops out is 650 feet above the immediate base of the mountain, and the bed goes through both the north and the south mountains, and has been traced in length four miles. The depth to which it penetrates below the lowest point seen must be very great, so that we may say, without exaggeration, that it is really inexhaustible.

Dr. Jackson next mentioned several interesting scientific facts as to the condition in which the emery was found, and the means necessary to be taken in breaking it up by fire, it having been found while quarrying it for iron, that many drills were broken and rapidly used up on account of the hardness. On the North Mountain, which is separated from the South Mountain by a branch of Westfield river, there are found three large beds of rich magnetic ore, six feet wide. Dr. Jackson mentions as a singular fact that, although one of the hardest minerals known, it has been smoothed and polished by the agency of drift grinding. The principle bed of emery on this mountain is seven feet in thickness. It is probable that all three of these beds of iron ore will be found on the South Mountain, for they run directly towards it, and it is not far distant.

Practical trials of the Chester emery by skilled workmen have proved that it is fully equal to the best London prepared emery from Naxos, and in one of the fairest trials it was found to exceed that emery in the work it performed in grinding hardened swordblades in the ratio of twenty to fifteen. The Chester emery after grinding twenty swords, was far from being used up, while never more than fifteen had been ground by the wheels armed with the London emery.

Machinery and Manufactures.

Twist Drills.

At a recent meeting of the Polytechnic Association of the American Institute a Mr. Watson introduced some samples of twist drills manufactured by the Manhattan Fire Arms Co. of Newark, N. J., and used by machinists in boring holes in metals. Mr. Watson said:—

"The perfection to which we have attained in metal-working is one of the miracles of modern times. In all of our large machine shops iron is planed and turned in large masses with a speed and accuracy unknown in former times. I have here one of the modern tools used for working metal which is, as may be seen, not only externally beautiful, but constructed on sound principles. I have here also a common flat drill, such as is ordinarily used, and I deem it unnecessary to more than show you the two, side by side. The advantages resulting from the use of such drills as this twisted one, are, that the work can be done in less than half the time. To say nothing of the first cost of the two tools—which is largely in favor of the twisted drill—it commends itself to mechanics by reason of its perfect accuracy in all that affects size, uniformity of quality and temper. These are standard tools, and as such have a very great value even beyond their intrinsic worth. When I say *standard* I wish to convey the impression that they are all alike. A hole drilled by a thirteen-thirty-second drill to-day, will be the same as one drilled last year by any other drill of that size from the same factory, so that work which is laid off and executed by them can be reconstructed in case of breakage with the certainty that the bolts or other fixtures belonging to the job will fit. Beyond this mechanical advantage there is the very great additional moral one of having in daily use tools that are calculated to excite emulation and stimulate mechanics to do good work instead of poor.

"These drills are of all sizes, from three-eights, varying by thirty-seconds of an inch up to one inch and a quarter, with turned taper shanks and sockets to match and with straight shanks, made of Stubb's wire, from three-eights down to a sixty-fourth of an inch, or from No. 1 wire to No. 60 wire.

"I can easily conceive what an immense advantage these drills will be to all metal-workers. I have always thought that twist drills should be sold in the stores as cheaply as augurs for carpenters; and when I speak of the price it is almost incredible to see how they can be sold for it. Why, sirs, this inch-and-a-quarter drill, turned from end to end with a taper shank, accurately ground and tempered, sold ready to drill a hole on the spot, costs but five dollars. No man could go to work and make one like it for three times the money. The four sockets cost but $10. I know something of metal-working, and these tools could not be afforded at any thing like the sum, unless the company worked upon a regular system and had ingenious machines constructed for this very purpose.

The manufacturers spare no pains or expense to make a perfect tool, and I would advise every one interested in metal-working to send for samples."

Drilling and Turning Glass.

Glass may be readily drilled by using a steel drill, hardened but not drawn at all, wet with spirits of turpentine. Run the drill fast and feed light. Grind the drill with a long point, and plenty of clearance, and no difficulty will be experienced. The operation will be more speedy if the turpentine be saturated with camphor gum. With a hard tool thus lubricated glass can be drilled with small holes, say up to three sixteenths, about as rapidly as cast steel. A breast or row drill may be used, care being taken to hold the stock steady, so as not to break the drill. To file glass, take a 12 inch mill file, single cut, and wet with the above mentioned solution, turpentine saturated with camphor, and the work can be shaped as easily, and almost as fast as if the material were brass.

To turn glass in a lathe, put a file in the tool stock and wet with turpentine and camphor as before. To square up glass tubes, put them on a hard wood mandrel, made by driving an iron rod with centers through a block of cherry, chesnut or soft maple, and use tne flat of a single cut file in the tool post, wet as before. Run slow. Large holes may be rapidly cut by a tube-shaped steel tool, cut like a file on the angular surface, or with fine teeth after the manner of a rose-bit—great care being necessary, of course, to back up the glass fairly with lead plates or otherwise to prevent breakage from unequal pressure. This tool does not require an extremely fast motion. Lubricate as before. Neat jobs of boring and fitting in glass may be made by those simple means. I have endeavored to turn glass rods with diamond pointed steel tools, etc,, but without success. The whole secret lies in good high steel, worked low, tempered high, and wet with turpentine standing on gum-camphor.—*Scientific American.*

Crossley's Carpets.

The largest carpet manufactory in the world is that of Crossley and Sons, at Halifax, England. This firm has a capital of one million six hundred and fifty thousand pounds sterling, and employs four thousand four hundred work people. Nearly all their immense business is carried on within one inclosure. In their mills are eighteen and a-half acres of flooring, and they employ two thousand horse-power. They manufacture nearly every description of carpet, and the product is estimated at many millions of yards annually.—*Boston Commercial Bulletin.*

The Linen Manufacture in Ireland.*

"Of all branches of industry, however, that which is of the most importance to Ireland, from the amount of capital it represents, and the number of persons to whom it gives occupation, is the linen trade. I am indebted to the kindness of Mr. M'Ilwrath, secretary to the linen trade of Belfast, for much valuable information on that subject, and also to Mr M'Call, of Lisburn, for many interesting particulars, of which I shall endeavour to lay before the Society such general heads as our limited time may allow.

"The linen trade of which Belfast has been the long established head quarters in Ireland had been rather falling off in amount, until the interruption of the supply of cotton by the American war called it into immensely increased activity. The contrast in this regard is well shown by the following figures:—In 1859 there were in Ireland 82 flax-spinning mills containing 651,872 spindles, of which 91,230 were unemployed; whilst in 1864 there were 74 spinning mills with 650,744 spindles, of which but 8,860 were unemployed, whilst 50,638 additional spindles were in May last being set to work. Further, in addition to the above there were employed in 1864, 14,648 spindles occupied in making thread, and five mills were in course of erection to contain 45,000 spindles. In regard to power loom factories for linen, a similar remarkable increase is shown for the same period. Thus, in 1859, there were 28 factories with 3,633 looms, of which 509 were unemployed; whilst in 1864 there were 42 factories with 8,188 looms, of which but 258 are unemployed; 1,685 additional looms about being set to work at the date of the reurn in May last. The introduction of the factory system into the linen trade, and especially the power-loom, is comparatively modern, the first spinning mills for flax in Ireland having been established about 1828, previously to which time cotton spinning was much more extensively carried on in Belfast than it has since been.

The great extension of trade and the benefit to the operative classes which followed this change may be illustrated by the following fact,—When spinning and weaving were done by hand, the firm of Richardsons, of Lisburn, turned out from 15,000 to 20,000 pieces of goods in twelve months; that firm can now deliver 250,000 piees of bleached goods in the same time.

As to wages in the old day of spinning on the domestic wheel, the earnings were from 2s. 6d. to 4s. (62 cts. to $1.00) weekly, whilst at present in spinning mills the ordinary work-women make from 3s. 6d. to 6s. (86ct. to $1. 50) per week, and superior hands from 6s. to 8s. ($1 50 $2). The best hand loom weaver can only make 6s. per week, out of which he has to pay charges which leave him only 5s. ($1 25) whereas an expert girl, who can attend to two power looms, can make 10s. ($2 50) per week clear. Thus the earnings of individuals have been materially increased by the introduction of steam machinery in the linen trade; and in regard to the total amount of employment, there were ten years ago, 17,000 persons employed in this trade in and about Belfast, whereas in the present year the number employed in the mills is 25,000, exclusive of the vast number of outsiders who indirectly derive their subsistance from that branch of manufacture.

Coupled with this development of the linen trade there has taken place a great increase in the quantity of flax cultivated in Ireland. During the Crimean war, when the Baltic trade was subjected to certain impediments, the quantity of land under flax was increased, and amounted, in 1853 to 174, 579 acres, but on the restoration of peace, the Baltic trade being resumed the demand for home grown flax diminished, and the cultivation fell off to 91,646 acres in 1858. Since that time it has progressively increased, and has now assumed proportions entirely unprecedented, the quantity in 1863 having been 214,099 acres, and in the present year having increased to 301,942 acres, which at an average of 35 stone of clean scutched flax to the acre, gives the produce of fiber at 10,557,070 stones or 66,050 tons; and at an average price of 7s. 6d. per stone, the total value of the crop of the present year is £3,962,989. This great increase of production is accompanied of course with corresponding increase of the export trade.

* From a paper by Sir Robert Kane, F. R. S., read before the Society of Arts.

Cotton v. Flax.

A Mr. John McNally, of the Stark Mills, Manchester, N. H., writes as follows to the *Scientific American*:—

"These mills here have some 1500 looms which in former times were employed in cotton, and now the companies have invested in linen as an addition to their business and not at all as a substitute for cotton. We make about 1500 seamless, 2 bushel grain bags per day, one half has cotton warp and tow filling and the other half, say 750, has flax warp and tow filing. This last bag is really a first class article and far superior to any I have seen in England for quality of material used. From tests of strength I have made of the yarn I find that the flax warp stood the strain of 20 lbs. weight to three threads stretched 57 inches; the filling stood about the same, while cotton warp broke at 5 lbs."

Cement for Leather.

The *American Artizan* says:—"Mr. W. Bramhill of 69 Fulton street, New York, in response to our article on this subject, has shown us some shoes and other articles made by himself experimentally without sewing, and fastened wholly by a cement which is waterproof. He has worn a pair for nearly a year, and finds them durable; and he is confident that the cement will make a joint as strong as solid leather. A sample of thin morocco cemented to cloth is interesting, as it promises a useful material for coachmakers, being impervious to water. He has cemented belts for machinery, and believes that they will last better than riveted belts. He is now getting up a pair of boots for his own use, in which he will test certain ideas that he entertains; and, if they are confirmed, he intends to patent the material and its application to various uses. From the appearance of these articles, we are confident that a great improvement may be made in the fabrication of shoes and other articles of leather by the use of cement. He has also made steam packing, by mixing powdered cork with this cement, and spreading it between two layers of thin hempen or brown flax cloth. This packing is used by the Rogers Locomotive Works, and by others, whose use of it is good evidence of its utility."

Paraffined Wood.

The *American Artizan* says: Mr. Stuart Gwyne has experimented in the preparation of wood for fine work, in which quality is of more importance than cheapness, and has found that paraffine is the best substance with which to saturate it. It resists moisture, acids, alkalies, and the prevalent causes of decay and change of dimensions, and is easily forced into the pores, as it fuses at a moderate heat; and it does not injure other substances. He thinks it will preserve the panels which artists paint upon, so that they will not warp and split; and will be applicable for coach and joiner's work. But the work he has applied it to is engineers' work, such as the teeth of wheels, for which it appears to have all the qualities desired. He intends to patent the use of it for such purposes if further trials confirm his present views of it.

The "Twa Handed Wheel" and Hand Loom Weaving.

(From the Canada Farmer.)

SIR,—When a man makes up his mind to go into any new undertaking, the first, and all engrossing question is, will it pay? Now, it can be shown beyond a doubt, that spinning with the "twa handed wheel," and weaving with the hand loom, will not only pay, but pay well in Canada. In order to show that this would be the case, I have made a very careful calculation of the Scotch flax reel, as compared with the cotton reel; and find that about two spindles of yarn of the Scotch reel, will give about as much warp as a bunch of cotton warp. Now, it was the common task for a lass in Scotland, to spin two and a half spindles of yarn every week; or ten spindles in four weeks. And ten spindles is equal to five bunches of cotton, so far as warp goes. Now five bunches of cotton costs fifteen dollars and five york shillings. A bunch is five pounds weight. Well this would require twenty-five pounds of fine lint, to be equal to five bunches of cotton. And if five dollars is allowed as the price of the lint, there still remains ten dollars and five york shillings. Now where is the Canadian lass who can earn as much as this in four weeks spinning wool? Would not this sum pay a farmer, even to hire the spinning of his lint and tow? But I would remark further, that if the farmer grew the flax, then the quantity of flax which would yield twenty-five pounds of lint, would also yield a good deal of tow, the value of which would go a long way in paying for scutching and heckling the flax.

Fine lint yarn, to take the place of number 8, 9, and 10 cotton warp, has been much wanted this good while back, for the winter dresses of women especially. A dress all cotton is too cold, and a dress all woollen is too heavy, therefore, they want the lint yarn, because they cannot get the cotton, it is so scarce and dear.

Sir, I was highly delighted in reading the article in your last number, headed "Hand Loom Weaving."* I have always had the hand loom in view, but I thought that it was no use saying one word about it until it could be seen whether or not lint and tow yarns could be got to set it agoing. At the present time, there are as many hand looms as work up all the yarn that the people want to put into cloth. But where these looms were made, and the price of them, it would be hard to tell The only supposition is, that when a district became a little cleared up, some handy, ingenious weaver made the loom himself, or superintended the making of it. A Canadian carpenter, who never made a loom before, could not do it. In my own case, when I came to the place where I now live, better than twenty years ago, I and my son went to work and made a loom, and it wrought first rate. For the encouragement of others, and to get the "twa handed wheel" started, I may mention that I made it a point to clear a hundred dollars every winter, for a good number of years. In fact, all the payment for my farm, came through the eye of the shuttle. With regard to the price of looms, so far as I remember, they were about two pounds ten shillings sterling, before I left Scotland, all made of American pine. But the making of a loom appears to me to be such a simple matter, that I will show any man the way to make one, and give all the information I can to any one, about the manufacturing and weaving of flax, for I was engaged at the trade for more than thirty years in the old country.

JAMES BUIK.

Nichole, Feb. 23, 1865.

Preservation of Cheese.

The preservation of cheese is a most important point to those engaged in the manufacture of them. Their consistence and their state of fermentation, more or less advanced, should serve as a guide. The method of manufacture also affects largely their preservation. Those cheeses which have received pressure in a too fresh state, and from which the whey is not entirely separated, are liable to rise, and have in their centres holes, or receptacles of air, which give to the paste a spongy and disagreeable appearance. When this accident arises during the manufacture, and if the fermentation be considerable, remove the cheese to a cool and dry place, and pierce it with iron skewers in the spot where it rises most; by these openings the gases escape, and the cheese subsides. To prevent this accident, mix intimately together one pound of nitre and one ounce of powdered Armenian bole; and before salting the cheese, and while it is about being placed in the press, rub in an ounce of this mixture. The addition of the salt, on the one hand, and the preparation or perfection in the storehouse, on the other, succeed in procuring a gentle fermentation, or a gradual reaction between the elementary substances of the cheese. This reaction proceeds so much the more rapidly as the cheese is softer, and the place warmer and more moist. In proportion as the fermentation

* Copied from this *Journal* page 3.

has been gentle, so much the more is the flavour of the cheese sweet and agreeable. It is at this precise moment, when the reaction between the elements has produced combinations agreeable to the taste, that it is necessary to perfect the cheese —sooner than this, it is not finished; later it is in a state of decomposition more or less advanced.

The insects which attack cheese are:—

1. The fleshworm or cheesemite (*acarus sira*), which devours the cheese when partially dried. These animals are so much the more dangerous because they hatch beneath the crust, whence they spread throughout the interior, causing great injury. Brushing the cheeses frequently, wiping them with a cloth, and washing the shelves on which they lie with boiling water, constitutes some sort of protection; but the most certain method is, after having rubbed the cheeses with a brine, to let them dry, and smear them over with sweet oil. It is in this way that Gruyère cheese is treated when attacked by this destructive insect.

2. The larvæ of the gilded green fly (*musca cesar*), of the common fly (*musca domestica*), and, above all, of the fly of putrefaction (*musca putris*). These larvæ introduce themselves into the cheese and commit ravages. All these animals may be destroyed by vinegar, by the vapour of burning sulphur, or by washes of chloride of lime. When these insects are numerous, take up the cheeses and scrape and wash the shelves with water holding in solution chloride of lime; then scrub the floor and whitewash the walls. When the cheese-room is dry replace the cheeses. If the cheeses have arrived at an advanced stage of decomposition, they should be put into powdered charcoal, mixed with a small quantity of chloride of soda, which destroys the offensive odour. Haste must also be made to finish their manufacture before they become entirely putrid. Mildew can be prevented by scraping the cheese, by brushing it, and by rubbing it with oil.

Practical Memoranda.

ALLOYS, OR MISCELLANEOUS METALS.*

Chaudet's Medal Metal.

Copper 100 parts; tin 4·17. Cast in moulds formed of cupel bone ash.

Lead in Grains.

Lead, melt it, and pour it in a small stream from a height of three or four feet into cold water.

Bell Metals.

1. Copper 25 parts; tin 5. Mix.
2. Copper 79 parts; tin 26. Mix.
3. Copper 78 parts; tin 22. Mix.

Common Bell Metal.

Copper 100 par tin 50. Mix.

Parisian Bell Metal.

Copper 72 parts; tin 26½; iron 1½. This alloy is used for the bells of small ornamental clocks.

Bath Metal.

Brass 32 parts; spelter 9. Mix.

*Haslitt's Hand Book.

Another.

Brass 35 parts; zinc 9. Mix.

Brass.

Copper 3 parts. Melt, then add zinc 1 part.

Button Makers' Fine Brass.

Brass 8 parts; zinc 5. Mix.

Button Makers' Common Brass.

Button brass 6 parts; tin 1; lead 1. Mix.

Bright Brass Color.

Brass reduced to fine powder.

Red Brass Color.

Copper filings 3 parts; bole 2. Mix.

Fine Brass.

Copper 2 parts; zinc 1. Mix.

Brass for Wire.

Copper 34 parts; calamine 56. Mix.

To give Plates of Copper a Brass Color.

Expose the plates, after being sufficiently heated, to the fumes of zinc.

To Brass Copper Vessels.

Argol 1 part; amalgam of zinc 1; muriatic acid 2; water to fill the vessel. Mix.

Brass or Hard Solder.

Brass 2 parts; zinc 1. A little tin is occasionally added.

Jewllers' Metal.

Copper 30 parts; brass 10; tin 7. Mix.

Fusible Alloys.

1. Bismuth 8 parts; lead 5; tin 3. This is fusible at boiling water heat.

2. Zinc, lead, and bismuth equal parts. This may be fused in a bit of writing paper, and will melt even in hot water.

3. Lead 3 parts; tin 2; bismuth 5. Mix. This alloy melts at 197° Fah. In using this composition to make casts of seals, gems, &c., it should be employed at the lowest possible temperature at which it will keep fluid; for this purpose it is as well to let it become pasty, and then forcibly impress the substances together.

4. Bismuth 2 parts; tin 3 parts; lead 5. Melt. This alloy fuses in boiling water.

German Silver.

1. Nickel 1 part; zinc 1; copper 2.

When intended for rolling into plates, use the following:

2. Nickel 25 parts; zinc 20; copper 60; to which may be added 3 of lead.

3. Pure copper 55 parts; nickel 23; zinc 17; iron 3; tin 2.

Fine White German Silver.

Iron 1 part; nickel 10; zinc 10; copper 20. Mix.

German Silver for Castings, &c.

Lead 3 parts; nickel 20; zinc 20; copper 60. Mix.

Genuine German Silver.

Copper 40½ parts; nickel 31½; zinc 25½; iron 2½. Mix

Gilding Metal.

Copper 4 parts; brass 1: tin 1. Fuse together.

Another.

Copper 14 parts; zinc 6; tin 4.

To Separate Gold from Gilt Copper or Silver.

Take a solution of borax in water, apply to the gilt surface, and sprinkle over it some finely powdered sulphur; make the article red hot, and quench it in water: then scrape off the gold, and recover it by means of lead.

Gold in Grains.

Gold 3 parts; silver 1. Granulate by pouring it in a small stream, from a moderate height, into cold water; then dissolve the silver with nitric acid, and wash well in pure water; next heat the grains, to give them a proper lustre.

Common Gold.

Spanish copper 16 parts: silver 1: gold 2. Melt together.

Onian's Fusible Metal.

Tin 2 parts: lead 3: bismuth 5. Melt. This alloy melts at 197° Fah. The addition of a little mercury renders it still more fusible.

Pewter.

1. Tin 100 parts; antimony 17. Mix.
2. Zinc 1 part; copper 3; lead 8; tin 60. Melt the copper, then add the rest.
3. *Fine.* Tin 50 parts; antimony 4; bismuth 1; copper 1. Mix, as before.
4. *French.* Lead 9 parts; tin 41. Mix.

Keller's Medal Alloy.

Tin 9 parts; copper 89; zinc 2.

Gun Metal.

Brass 100 parts; spelter 13; tin 6. Mix.

Another.

Copper 9 parts; tin 1.

Tin Filings.

Take grain tin, and melt it in an iron vessel, and stir it, while cooling, until it becomes a powder; then sift.

ALLOYS.

One metal does not alloy indifferently with every other metal, but it is governed in this respect by peculiar affinities; thus, silver will hardly unite with iron, but it combines readily with gold, copper and lead. In comparing the alloys with their constituent elements, the following differences may be noted. In general, the ductility of the alloys is less than that of the separate metals, and sometimes in a very remarkable degree; on the contrary, the alloy is usually harder than the mean hardness of its constituents. The mercurial alloys or amalgams are, perhaps, exceptions to this rule.

The specific gravity is rarely the mean between that of each of its constituents, but is sometimes greater and sometimes less; indicating, in the former case, a closer cohesion; and, in the latter, a recedure of the particles from each other in the act of their union.

Density of Alloys.

Alloys having a Density greater than the Mean of their Constituents.	Alloys having a Density less than the Mean of their Constituents.
Gold and zinc.	Gold and silver.
Gold and tin.	Gold and iron.
Gold and bismuth.	Gold and lead.
Gold and antimony.	Gold and copper.
Gold and cobalt.	Gold and iridium.
Silver and zinc.	Gold and nickel.
Silver and lead.	Silver and copper.
Silver and tin.	Silver and iron.
Silver and bismuth.	Iron and bismuth.
Silver and antimony.	Iron and antimony.
Copper and zinc.	Iron and lead.
Copper and tin.	Tin and lead.
Copper and palladium.	Tin and palladium.
Copper and bismuth.	Tin and antimony.
Lead and antimony.	Nickel and arsenic.
Platinum & molybdenum	Zinc and antimony.
Palladium and bismuth.	

The melting point of an alloy cannot be inferred from that of each of its constituent metals. An alloy of 8 parts bismuth, 5 of lead and 3 of tin, melts at the heat of boiling water, 212° Fah., while the melting point deduced from the mean of its components should be 514 Fah., a little mercury added to this alloy renders it still more fusible.

The colours of alloys do not depend in any considerable degree upon those of the separate metals; thus, the colour of copper, instead of being rendered paler by a large addition of zinc, is thereby converted into a rich looking metal, brass. By means of alloys, we multiply, as it were, the number of useful metals, and sometimes give usefulness to such as are separately of little value.—*Ure.*

NEW METHOD FOR COMPUTING INTEREST.

J. H. Goldsmith, principal of the Detroit Business College, gives the following methods of computing interest at any rate per cent. for any length of time, as follows:—"Rule—reduce the years and months to months, to half the months annex one-sixth of the days, multiply that number by one-sixth the principal, that will give the interest at one per cent., which multiplied by any rate per cent. you wish, will give you the interest in mills. Example—interest on $12 at seven per cent for one year, eight months and twenty-four days, half the months with one-sixth the days annexed, 104, multiplied by one-sixth the principal (2) equals 208 multiplied by seven (rate per cent.) equals $1,456. Second method—$12 divided by three equals four, one-fourth the months with one-twelfth the days annexed is fifty-two, multiplied by one-third the principal (4) equals 208, multiplied by seven equals $1,456.

DENSITY OF STEAM AT VARIOUS TEMPERATURES.

The experiments of Messrs. Fairbairn and Tate on the density of steam, are described in a paper which was read to the Royal Society of London, as the Bakerian lecture, on the 10th of May, 1860, and published in the "Philosophical Transactions" for that year. The results of those experiments give what is called the relative volume of steam; that is, the ratio which its volume bears to that of an equal weight of water at the temperature of greatest density. 39°·1 Fah.; but in the following table of comparison, each of those relative volumes is divided by 62·425, the weight of a cubic foot of water at 39°·1 in lbs., so as to give the volume of one lb. of steam in cubic feet. The numbers of the experiments are the same as in the original paper; those made at temperatures below 212° being numbered from 1 to 9, and those made at temperatures above 212° from 1′ to 14′.

No. of Experiment.	Temperature Fahrenheit.	Volume of 1 lb. of Steam in Cubic Feet. By Theory.	By exper.
1.	136·77	132·20	132 60
2.	155·33	85·10	85·44
3.	159·36	77·64	78·86
4.	170·92	60·16	59 62
5.	171·48	59·43	59.51
6.	174·92	55·18	55·07
7.	182·30	47·28	48·87
8.	188·30	41·81	42·03
9.	197·78	33 94	34·43
1′.	242 90	15·61	15·11
2′.	244·82	14·77	14·55
3′.	245·22	14·67	14·30
4′.	255·50	12·39	12 17
5′.	263·14	10·96	10·40
6′.	567·21	10·29	10·18
7′.	269·20	9·977	9·703
8′.	274·76	9·158	9·361
9′.	273·30	9·367	8·702
10′.	279·42	8·539	8·249
11′.	282·58	8·145	7·964
12′.	287·25	7 603	7·340
13′.	292·53	7·041	6·938
14′.	288·25	7·494	7·201

DISCHARGE OF WATER OVER WEIRS.

TABLE,—*containing the Quantities of Water, in cubic feet, that will be discharged over a Weir per minute for every inch in its breadth, when the depth of the Water from the surface to the top edge of the wasteboard do not exceed eighten inches.*

Depth of the Water in inches.	Cubic feet per minute, according to Du Buat's formula.	Cubic feet per minute, according to experiments made in Scotland	Depth of the Water in inches.	Cubic feet per minute, according to Du Buat's formula.	Cubic feet per minute, according to experiments made in Scotland
1	0·403	0·428	10	12·748	13·535
2	1·140	1 211	11	14·707	15·632
3	2·095	2·226	12	16·758	17·805
4	3·225	3·427	13	18·895	20·076
5	4·507	4·789	14	21·117	22·437
6	5·925	6·295	15	23·419	24·883
7	7·466	7·933	16	24·800	27·413
8	9·122	9·692	17	28·258	30·024
9	11·884	10·564	18	30·786	32·710

NUMBER OF PLANTS TO THE ACRE.

The following table shows the number of plants to the acre, at any of the distances mentioned:

Dist. Apart.	No. of Plants.	Dist. Apart.	No. of Plants.
1 foot.......	43,560	5 feet........	1,742
1½ "	19,360	6 "	1,210
2 "	10,890	9 "	537
2½ "	6,969	12 "	302
3 "	4,840	15 "	193
4 "	2,722	18 "	134

Statistical Information.

Exports and Imports of Canada.

The *Canadian Quarterly Review* furnishes a table of imports and exports of Canada for the last 14½ years, differing very slightly from the tables we furnished in the last No. of the *Journal*. Our estimate of the annual average excess of imports over exports for the last 14 years was nearly $9-000,000; the *Review* gives it for 14½ years at an annual average of $8,623,162. It concludes with the following summary:

"The above table of imports and exports shows, first, that for the first 6 months of 1864, after adding to the exports $750,000 for short returns, we have imported $11,148,280 more than we have exported. Second, that we have in 14½ years bought $125,035,879 more than we have sold. That the interest that would accrue on those over-importations at the rate of 6 per cent, paid annually would be $48,100,331. Of those over-importations we have paid the Americans $36,611,388 in gold, moreover, we have paid them in lumber and timber, which is the same as gold to us, $14,000,000, in round numbers, making $50,000,000 for products we could, and would, with sound legislation have produced ourselves."

The Largest English Farm.

The largest farm in England consists of three thousand acres, and belongs to a man with the Yankee name of Samuel Jones. In its cultivation he follows the "four course" system, the whole extent of the farm being divided into four great crops—750 acres to wheat, 750 to barley and oats, 750 to seeds beans, peas etc., and 750 to roots. His live stock is valued as follows: Sheep, $35,000; horses, $15,000; bullocks, $12,000; pigs, $2,500. The oil cake purchased annually amounts to $20,000 and artificial fertilizers about $8,000. The entire cost of manure, in various forms used, annually costs about $25,000. Sheep are claimed to be the most profitable stock he keeps, from which he realizes about $20,000 a year. His income from the whole farm, though not stated can be little less than $50,000 per annum.—*Germantown Telegraph.*

Grand Trunk Railway.

This is said to be the largest railway in the world, extending from Portland to Quebec and the river Du Loup, east, to Sarnia, at the foot of Lake

Huron, west, with several branch lines, including a total of 1396 miles under one management. It is to be further extended to Chicago, in a direct line from Sarnia, by way of Lansing, the capital of Michigan, a distance of 320 miles—making a total of 1716 miles in all.

Cities in Great Britain.

The population of London is 3,015,494, of Liverpool 476,368, of Manchester 467,763, of Glasgow 423,723, of Birmingham 327,842, of Dublin 254,-803, of Leeds 224,025, of Edinburgh 174,180, and of Bristol 171,809. All of these cities have overflowed their corporate limits, and it is proposed to extend their boundaries.

Miscellaneous.

Petroleum Trade in Canada.

Happily for all concerned, and for many who have the remnants of old oil properties, it has become an established fact, and allowed to be so by even the best Pennsylvanian authorities, that the Canadian oil, refined as it can now be, is at any rate equal to their own; and they moreover admit that in point of body it is superior by 15 per cent. The main point being established, Canada has the following advantages over other districts:—Her oil regions are in close proximity to railways, and to the Lake ports where vessels can load and clear for Buffalo, Oswego, Montreal, and other Lake ports, and even, as has often been done, actually direct to a European port. Then there is one very significant advantage in favor of Canada, and that is, that the oil both crude and refined is free from any tax, whereas all produced in the States is taxed, for refined, 20 cents per gallon with drawback, and for crude, 6 cents per gallon with no drawback—on shipments there are, besides, endless taxes, on sales, incomes, &c. It is little wonder, then, in the face of those facts, that the petroleum business promises to revive in this Province. If the oil is found in large quantities the trade may take immense proportions, as the market of the world, long looked for, is now open to us. The article has only been known some six years, and already the government returns in Pennsylvania alone, of the exports of petroleum for 1864, amounted to sixty millions of dollars, being four millions in excess of those of coal. In adverting to the oil fields, we should not forget to mention the Bothwell region, which promises to yield as largely as Enniskillen. The wells in course of construction all promise a large yield, and those completed have been pumped with great success. One, the company's well, has produced 6,000 barrels, and Licks' is at present pumping 50 barrels a day. Already Americans have bought up a considerable portion of the developed lots in this district, and extensive operations are about to commence. Bothwell is well situated on the river Thames, which is navigable for shallow craft to Louisville, a distance of some twenty miles, where vessels of three hundred tons can load and clear for any part of the world. As to the oil having been exhausted at Enniskillen, there need no longer be any fears; for old wells which have lain idle for a long period, being again tested with approved appliances, are proving themselves still to have rich stores of oil; and as to the question of the existence of the oil at a greater depth than that at which it has been heretofore found, that has been set at rest within only the last ten days by the striking of a rich spring said to be equal to 100 barrels a day, at 540 feet, which is double the depth of the old flowing wells. This augurs well for the results in this district.

We know it is a bad time, considering the condition of our local money market, to urge our capitalists to embark in new enterprises. But unless some interest is taken by Canadians in this branch of trade, what promises to be an important resource of the country, will be absorbed by American dealers, and our Province lose the greater part of the profit which should belong to them.—*Trade Review.*

The way to raise Blackberries.

The vines are planted in rows three feet apart, and three feet apart in the rows. Over each row is stretched a stout wire at the height of about four feet, with stakes at proper intervals to support it at this height. As the vines grow they are tied to the wire, and bent down along the wire all in the same direction—that is, all toward the south, all toward the north, or in such direction as may be most convenient.

The berries are borne on the wood of the previous year's growth. In the Spring of each year, the bearing wood of the year before is cut out and removed, and the new shoots are tied to the wire, the lateral shoots of the new wood being at the same time cut back within a foot of the main stalk. Thus the whole labor of trimming and training the vines is performed at one operation. It is better to manure in the Fall, and this all important matter should be attended to every year.

What a Boy ought to Learn.

One of the Government Inspectors of the National Schools, in England, says:—

"A boy of fair average attainments at the age of twelve years, in a good school, has learned—

"1. To read fluently, and with intelligence, not merely the school-books, but any work of general information likely to come in his way.

"2. To write very neatly and correctly from dictation and from memory, and to express himself in tolerably correct language.

"3. To work all elementary rules of arithmetic with accuracy and rapidity. The arithmetical instruction in good schools includes decimal and vulgar fractions, duodecimals, interest, etc.

"4. To parse sentences, and to explain their construction.

"5. To know the elements of English history. The boys are generally acquainted with the most important facts, and show much interest in the subject.

"6. In geography the progress is generally satisfactory. In fact, most persons who attend the examinations of good schools are surprised at the amount and accuracy of the knowledge of physical and political geography, of manners, customs, etc., displayed by intelligent children of both sexes. Well-drawn maps, often executed at leisure-hours by the pupils, are commonly exhibited on these occasions.

"7. The elements of physical science, the laws of natural philosophy, and the most striking phenomena of natural history, form subjects of useful and very attractive lectures in many good schools. These subjects have been introduced within the last few years, with great advantages to the pupils.

"8. The principles of political economy, with especial reference to questions which touch on the employment and remuneration of labor, principles of taxation, uses of capital, etc., effects of strikes on wages, etc., are taught with great clearness and admirable adaptation to the wants and capacities of the children of artisans, in the reading-books generally used in the metropolitan schools. I have found the boys well acquainted with these lessons in most schools which I have inspected in the course of this year.

"9. Drawing is taught with great care and skill in several schools by professors employed under the Department of Science and Art."

If any boy in Upper Canada has failed, either through his own neglect or want of opportunity, to attain to anything approaching the above standard, he should now avail himself of the facilities afforded by well appointed Mechanics' Institutes in several of the towns and villages, to perfect himself as far as possible in the most useful of these studies, through the instrumentality of the evening classes. The exercises are generally conducted in an interesting manner, the fees for instruction are but nominal, and no excuse can exist for not profiting by them.

Fresh Beef from Salt Junk.

If a piece of salt meat be put in water either in a vessel the bottom of which is made of a bladder, or in a bag made of untanned skin, and this placed in another vessel of water, the salt will be gradually drawn out of the meat, and pass through the parchment or skin, but the juices of the meat will be left behind in the first vessel. Brine in the beef barrel contains a considerable portion of the juice of the meat, which may be saved by filling the inner vessel with it; the salt from both brine and meat will pass through the membrane. The process is to be continued until salt enough is extracted to leave the meat and liquor palatable. This method is known and practised upon by sailors in the Mediterranean Sea, who inclose their salt junk and a portion of the brine in a "water skin"—that is, a bag made of goat skin for holding water. This is attached to a line, thrown over-board, and towed through the water until the meat and liquid are freshened to the same degree as sea water. The liquid is then used for soup, and the meat cooked as wanted. A similar operation may be made very useful by soldiers in camp where fresh meat is unobtainable, and families where salt junk forms the staple diet several months in the year.—*Grocer.*

Superphosphates for Bread.

When 10,000 lbs. water, 1,000 lbs. oil of vitroil, and 1,400 lbs. burnt bones, are agitated together briskly for 18 hours, then drawn off and lixivated, the result is a liquid superphosphate of lime, free from gypsum. This is patented, and so are others by the same inventor. "These superphosphates are used in the preparation of self-raising flour, by sifting intimately together 1·66 lbs. of carbonate of soda, 3.69 lbs. of the diluted superphosphate, and 191 lbs. of flour. They are also used in the manufacture, of what is called yeast powder, or baking powder, by intimately mixing superphosphate and bicarbonate of soda, in the proportion of 20 parts of the former to 9 of the latter. It is also proposed to prepare packages containing parcels of equivalents of soda and superphosphates for given weights of flour—as for 25 lbs. for example." —*English Patent dated Feb.* 10, 1864.

Presence of Mind and Common Sense.

If a person swallow poison deliberately or by chance, instead of breaking out into multitudinous or incoherent exclamations, despatch some one for the doctor; meanwhile, run to the kitchen, get half a glass of water in anything that is handy, put into it a teaspoonful of salt, and as much ground mustard, stir it an instant, catch a firm hold of the person's nose, the mouth will soon fly open—then down with the mixture, and in a second or two up will come the poison. This answers better in a large number of cases than any other. If, by this time, the physican has not arrived, make the patient swallow the white of an egg, followed by a cup of strong coffee, because these nullify a larger number of poisons than any other accessible article, as antidotes for any poison that may remain in the stomach. If a limb or other part of the body is severely cut, and the blood comes out by spirts and jerks, be in a hurry, or the man will be dead in five minutes; there is no time to talk or send for a physician—say nothing, out with your handkerchief, throw it around the limb, tie the two ends together, put a stick through them, twist it around tighter and tighter, until the blood ceases to flow. But to stop it the tie must be above the wound, or it does no good. Why? Because only a severed artery throws blood out in jets, and the arteries get their blood from the heart; hence, to stop the flow, the remedy must be applied between the heart and wounded spot—in other words, above the wound. If a vein had been severed, the blood would have flowed in a regular stream, and, on the other hand, the tie should be applied below the wound, or on the other side of the wound from the heart; because the blood in the veins flows towards the heart, and there is no need of so great a hurry.

Tinder.

When a piece of paper is set on fire, it all burns up except the tinder—which comes from the hot blaze unburned. And yet, if a spark fall upon this tinder it will catch fire and burn far more readily and surely than paper will. Why does it not burn in the blaze with the other portions of the paper?

Paper is made mostly of vegetable fiber, which is composed principally of carbon, oxygen and hydrogen. The three elements when combined in this substance are all solid, but if they are separated, the oxygen and hydrogen take the gaseous form, while carbon continues solid. By the application of heat the vegetable fiber is decomposed, when the oxygen and hydrogen expand into gases. As the hydrogen at the high temperature comes in contact with the oxygen of the air, it combines with it to form water; in other words, it burns in the form of a blaze.

Could the carbon come in contact with the oxygen of the air at the high temperature of red heat, it also would be burned, but the volume of hydrogen envelopes it, thus preserving it from contact with the air. The body of hydrogen itself burns only upon its outer surface.

The heat absorbed by the hydrogen in its change from the solid to the gaseous state cools down the carbon below the temperature at which it will combine with oxygen, so that as the last of the hydrogen passes away, the fire is extinguished, leaving the carbon in the form of tinder. If paper is kindled in sufficient mass to keep up the temperature of the carbon to the combustion point, it also will combine with the oxygen of the air to form carbonic acid, which will pass off as a gas, leaving only the incombustible ash, which is the small quantity of mineral matter contained in the paper.

Travelling Bottles.

Captain Beecher, editor of the English *Nautical Magazine*, has compiled within the last ten years the following curious record of voyages of bottles thrown into the sea by unfortunate navigators:—"A good many bottles, cast into the sea next to the African coast, found their way to Europe. One bottle seems to have anticipated the Panama route, having traveled from the Panama isthmus to the Irish coast. Another crossed the Atlantic from the Canaries to Nova Scotia. Three or four bottles thrown into the sea by Greenland mariners, off Davis Straits, landed on the northwest coast of Ireland. Another once made a curious trip—swam from the South Atlantic Ocean to the west coast of Africa, passed Gibraltar, went along the Portuguese coast of France, and was finally picked up on Jersey Island. One bottle was found after sixteen years' swimming, one after fourteen, and two after ten years. A few only traveled more than one year, and one only five days. This was sent off by the captain of the *Race-horse*, on the 17th of April, in the Caribbean Sea, and was found on the 22d, after having gone through some three degrees of longitude (two hundred and ten miles), western direction. Capt. McClure, of the *Investigator*, threw a bottle into the sea in 1850, on his way to Behring's Straits. It swam three thousand five hundred miles in two hundred days, and was picked up on the Honduras coast."

The Decay of Conversation.

The ancient art of talking is falling into decay. It is an ascertainable fact that, in proportion to an increased amount of population, the aggregate bulk of conversation is lessening. People now-a-days have something else to do than talk; not only do they live in such hurry that there is only leisure for just comparing ideas as to the weather, but they have each and all a gross quantity to do, which puts talking out of the question. If persons remain at home, they read; if they journey by rail, they read; if they go to the seaside, they read; we have met misguided individuals out in the open fields with books in hand; young folks have been seen stretched underneath trees, and upon the banks of rivers, pouring over pages; on the tops of mountains, in desert, or within forests—everywhere men pull printed sheets from their pockets, and in the earliest, latest, highest occupations of life, they read. The fact is incontestibly true, that modern men and women are reading themselves into a comparatively silent race. Reading is the great delusion of the present time; it has become a sort of lay-piety; according to which, the perusal of volumes reckons as good works; it is, in a word, the superstition of the nineteenth century.—*Chambers' Journal.*

Why Boots Should be Polished.

Brightly-polished boots are cooler in warm weather and warmer in cold weather than dull and dusty boots; for in warm weather they reflect the sun, which dusty and dirty boots absorb; and in cold weather the clean boot does not allow the warmth of your foot to radiate freely, whereas the unclean boot does. Clean, bright boots are consequently more comfortable, as well as respectable, both in warm weather and cold. Not only will different substances, as iron and wood, give out heat or take it in, more or less, but the same substance radiates heat more or less actively, as it is bright or dull, rough or smooth. Now, dirty boots are rough as well as dull. They have a surface of many little hills and valleys, so that in truth, there is more surface for the heat to pass through either way. As a rough surface is a larger surface, more heat from within and without always passes through dull and dirty boots than polished ones.

Artificial Sunlight.

Uudoubtedly the civilized world is on the whole deeply indebted to analytical and experimental chemistry. It is quite true that their disciples very frequently enter with great patience into elaborate inquiries and laborious investigations for the mere purpose, as it seems, of deducing facts which, though startling and curious, have no practical value. Those facts, however, though they may lie dormant for a long time, in the end often fructify, and new experimenters reap from them harvests of knowledge useful to humanity and profitable to themselves. It would not be difficult to sustain this assertion by irresistible evidence gathered from the annals of chemical discovery. As, in regard to mechanical inventions, it is next to an impossibility to apportion to each indivdidual inventor the exact meed of praise due to him, so is it beyond human power to assign exactly to each chemist the precise amount of merit to which he is entitled. A distinguished writer has recently said that, "We know no more of the men who really invented our railway system, or our steam engines than we do of the inventors of Gunpowder, or the Mariner's compass;" and there is much truth in the assertion. The idea of one mind becomes the food upon which another mind subsists, and a third realizes, in a practical form the dreams of both. This is essentially the case in respect of chemistry; and one of the most recent illustrations of its truth is to be found in the alleged discovery of a means of producing artificial sunlight. We know that for many years past attempts have been made to evolve from natural elements a gas or flame which, on a small scale, should equal in quality and intensity the light emitted from the sun. Abroad as well as at home, this has been a haunting thought in the brain of chemists. Innumerable experiments, with more or less success for their results, have been made from time to time, and there is no doubt that eventually perseverance will meet its almost unfailing reward ---achievement of the object sought.

So long back as 1859, Professor Bunson and Professor Roscoe suggested that the fusion of the metal magnesium might prove to be the solution of the philosophical problem, and now Mr. Sondstadt is actually commencing to manufacture that metal on a large scale for photographic purposes. It has been demonstrated that, by burning magnesium wire in a spirit or oil lamp an illuminating power of great brilliancy might be gained. The two professors named long since examined the photo-chemical action of the sun, compared with a terrestrial source of light, and this latter was that effected by the combustion of magnesium wire. The application of this light may become, it is easy to perceive, of vast importance beyond its photographic uses. A burning magnesium wire, of the thickness of 0.297 millimetre, evolves as much light as seventy-four stearine candles, which five go to the pound. In order to produce a light equal to that of seventy-four such candles burning for ten hours, and in which 20 lbs. of stearine would be consumed, 72.2 grammes of magnesium wire would be required. The magnesium wire is prepared by forcing out the metal from a heated steel press, having a fine opening at the bottom. For the purpose of consumption, it may be rolled up in coils on a spindle, which, by the agency of clock work, or weights above, could be made to revolve. A pair of feeding rollers would push the end of the wire forward at a rate commensurate with the speed of its combustion.

Magnesium is not in itself costly at present, but there is no doubt that the efforts of Mr. Sondstadt and others who are devoting attention to the subject will lessen the expense of its production by improved manipulation.

So far as the usefulness of the discovery is concerned in relation to photography, we have the following testimony from Mr. Brothers, of Manchester:—"The result of an experiment I have just tried, is, that in fifty seconds, with the magnesium light, I have obtained a good negative copy of an engraving—the copy being made in a darkened room. Another copy was made in the usual way, in daylight, and in fifty seconds the result was about equal to the negative taken by the artificial light." Who shall say, therefore, that at some not distant day, nature and science may not place at our disposal a substitute for the bright orb of day—an artificial sun.

Silvering and Gilding on Wood.

The process of silvering and gilding on wood consists, first, in giving the wood or moulding a thin coating of glue size (bonnet glue), combined with a little English washed whiting (gilders), which is free of sand. The object is to fill up the pores of the wood, and render it non-absorbant to some extent. Then a composition of white glue and whiting of thicker consistency, resembling white house-paint is applied, coat after coat as it dries. From five to seven coats are used; parts to be burnished require a thickness of at least the 16th of an inch of this composition. The surface is then smoothed down with pumice and water, and finished with fine sand paper when dry. It is very important to know if the whitening composition is of the right strength. Apply the nail of the finger as a test; if the composition can be scratched, it is right, if the nail makes no impression, more water and whiting should be added; for if too strong and hard it will not burnish well and the composition will in time crack and peel off. If too weak it will blister when gilding it, the water used will soak through it too easily to the wood, neither will it burnish but chip off.

Second. From five to seven coats of a composition styled burnish gold size, are now applied. This composition consists of best London pipe clay, free of sand, ground in water with best black lead, red chalk and a little grease, and combined when to be used with weak glue size. This mixture is smoothed down with fine emery paper and sometimes washed with cotton cloth and water. In America the gold size composition is used very weak in glue, while in Great Britain it is used very strong. Equally good work is made by both modes.

Third. The work is now coated with a very weak solution of glue, so weak that when quite cold the liquid will not more than set into a jelly. Parts to be burnished get two extra coats, and are not rubbed down with emery paper. The surface is now ready to receive the silver or gold leaf. Pure water, or better, new rum, is used to wet the work, and while wet the silver or gold leaf is cut into suitable pieces, and applied with a brush styled a gilder's tip. After the work is covered with gold or silver, and dry, a very weak glue size is used over the metal leaf, except on the burnished parts; such parts are burnished in about two hours after gilt. The dead work is rubbed down (styled mat silvering on gilding), with a little cotton wool, and then small pieces of silver or gold leaf as may be are applied with new rum to all little omissions. When dry it is again rubbed down with cotton, if the work should now prove perfectly covered with leaf, say silver, it is then coated with gold lacquer, receiving from three to four coats, and is known as German moulding or gilding. Gold leaf is not lacquored. To give a minute description of the process would require many pages.

Soap from Coal-oil.

The editor of the *Oil City* (Pa.) *Register*, has seen a good article of soap manufactured from coal-oil. It is claimed that soap manufactured from this oil will remove all kinds of stains and dirt, and do more work than any other and in less time.