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A STANDARD HORSE POWER FOR STEAM ENGINES.

It is customary to value steam engines by the conventional unit of horse power. A manufacturer will build an engine of so many horse power for so much money, but if you ask for the dimensions you will hardly find two makers who will give the same figures. In Britain the manufacturers have approximated to a common standard, but in Canada and the States, "*nominal horse power,*" as a commercial unit of capacity, or power of performance is an exceedingly vague expression; so much so that scarcely an individual manufacturer can be found whose practice is uniform. It signifies but little what a horse power is defined to be, so long as it is uniform, but at present the same sort of confusion exists as would be introduced if every mechanic were to adopt a different length for his foot rule, one making it twelve inches, another thirteen, and so on.

A recognized uniform standard of power is a desideratum which, if established, would enable buyer and seller to deal with greater confidence and certainty, and is, therefore, a legitimate subject for legislation.

For an article which is every year becoming more essential as an adjunct to the most important industrial pursuits, there should certainly be a common unit of measure. If we bargain for a bushel of wheat, a barrel of flour, a yard of calico, or a ship of so many tons burden, a legal standard determines with the utmost nicety the quantity we are to receive; but if we contract for a ten-horse steam engine there is room for a hundred different interpretations as to the actual size and practical value of the article. This uncertainty is the fruitful cause of dissatisfaction and not unfrequently of litigation. We were recently called upon to give evidence in a case where the dispute hinged on the capacity or actual force to be understood by so many horse power. A dozen witnesses, all of them professing to be experts, were examined, but no two of them held the same opinion, further than that a horse power should indicate the ability to elevate 33,000 lbs. one foot high in one minute. Beyond this not very convenient constant, laid down by Watt in the very infancy of the steam engine, no one appeared to have advanced. As to how the power thus demanded was to be developed there was no fixed opinion. Whether in a small cylinder with high speed and high pressure, or in a larger cylinder under opposite conditions, was apparently as unsettled as in the days of the Marquis of Worcester; nor was there any greater concord as to the size of cylinder and pressure of steam which would best produce the required force.

This uncertainty must tell materially against the extension of the use of steam power by prejudicing the interests of both manufacturer and purchaser, and in our opinion both would be served if a legal definition were given to a "*horse power*" as a commercial unit. Exception may be taken to the interference of the Legislature in questions of this kind by those who look with jealousy upon any interference in trade transactions, but we can see no good foundation for such objections. It is as reasonable, and quite as necessary, to establish a standard "Horse Power" as a "Standard Bushel," a "Standard Yard," or a standard for determining the tonnage of ships. Leave the contracting parties to make their bargains by nominal or actual horse power, or by specific dimensions as they think best, but where a contract is made for an engine of so many horse power let us have a legal definition of its meaning.

The rather odd number 33,000 lbs. raised one foot high was adopted by the fathers of the steam engine as expressing the *force* which a good horse, working under favorable circumstances, could exert in one minute of time. The expression was convenient when horses rivalled steam engines, and is now retained because it would be inconvenient to change that which has continued for so great a length of time. One-horse power is therefore equivalent to 33,000 foot pounds—that is 33,000 units of work in a minute. This "*is actual horse power,*" and was formerly synonymous with "*nominal horse power,*" but at the present time these terms have widely different meanings. The divergence first arose in a desire to give full measure, just as the *cwt.* of 112 lbs. is given for 100 lbs.; or the heaped bushel for the actual bushel. Later the competition among manufacturers and the wonderful march of improvement in this branch of mechanism, whereby the development of power in a cylinder of given capacity has been doubled, and even quadrupled, has increased the discrepancy, until the constantly widening difference between nominal and actual power culminated in the *Great Eastern,* whose engines of 2,600 nominal horse power have developed an *indicated* or actual power of 8,300 horses.

Actual horse power is liable to many disturbing causes, some of which vary with every change in the dimensions of the machinery, and its final determination can never be arrived at with exactness until the engine is at work and an indicator attached to the determined point at which the force is to be delivered. Numerous attempts have been made to establish a formula for determining from given dimensions and a stated pressure of steam the actual power which an engine will develope, but so much depends on workmanship and on the arrangement and proportion of parts that all these attempts have only modified the value attached to the nominal power.

Where the same rule obtains for determining the nominal power, it is the excess of force developed over the power so determined that forms the true index to the comparative value of the engines produced by different makers, and were a reliable formula for expressing the actual power of an engine arrived at to-day, it is certain that a year would not elapse without the introduction of some improvement whereby a greater development of force would be effected in engines of the same dimensions. This implies no more than that absolute perfection has not yet been attained, but it shows the practical inutility of endeavouring to settle for commercial purposes the exact force to be developed by an engine of stated dimensions.

Friction is one of the principal causes which affect the development of force; this again is influenced by workmanship, by the due proportion of parts, and by the choice of material. One maker, by the use of well-adjusted self-acting machinery, may succeed in reaching a perfection of workmanship which no amount of individual manual skill can equal. It is this which commonly gives a superior value to engines produced in large establishments where every appliance exists for ensuring perfect adjustment and thorough workmanship.

Back pressure is another element which must be taken into account in estimating the effective force, and this again is largely influenced by the adjustment of the valves and the due proportion of the escape passages. The reduction of pressure occasioned by friction in the steam pipes and condensation of steam during its passage from the boiler to the cylinder is also to be considered, and the allowance to be made therefor is dependent on the distance which the steam has to travel, the extent of radiating surface to which it is exposed, and the amount of wire-drawing to which it is subjected in obtaining access to the cylinder.

The value of the power developed after all these deductions from the normal pressure in the boiler are made, is determined by the *Friction-dynamometer* which measures the force expended in overcoming the friction of a brake applied to the main shaft of the engine. The effective force exerted by the steam in the cylinder is ascertained by the *indicator diagram*, which shews the average steam and back pressure during each stroke of the piston. These diagrams give the data from which the effective force exerted by the steam in the cylinder may be calculated, and from the ease with which such diagrams can be taken, it is at this point that the *indicated* or actual horse power is calculated.

There are several contrivances for taking the indicator diagrams, but all are based on similar principles; that is, the trace made on a coil of paper by a pen, acted on by a piston of definite area, exposed to the pressure of the steam, and resisted by a spring, or weight of known force.

If the pressure thus acting on the pencil is uniform a straight line parallel to the axis of motion is produced, and the area embraced between it and the zero line will at once measure the force exerted during the stroke of the piston. But in practice the lines of positive and negative pressure are curves, and these curves are sometimes very irregular, consequently the area of the diagram must be reduced to an average quantity. Let each pair of diagrams, the one representing the pressure at the back and the other on the front or steam side of the cylinder, during each stroke be divided by a series of vertical lines, with a scale graduated to lbs., measure the height of each line above the zero or atmospheric line, and the sum of the lines divided by their number will represent the mean pressure per unit of surface for the whole diagram, and deducting, in non-condensing engines, the result for the negative or back pressure from that taken on the positive or steam side of the piston, we have the mean effective pressure exerted during the stroke represented by the pair of diagrams.

In condensing engines where the negative side of the piston is a vacuum the curve on the diagram falls below the atmospheric or zero line, and in effect becomes positive pressure. In this case the mean unit of force is arrived at in the same manner, but instead of deducting we either draw the lines across both portions of the diagram and measure the whole together, or add the negative side to the power indicated on the positive or steam side of the piston. The total effective power thus arrived at shews correctly the actual force developed in the cylinder, but a considerable portion of it is consumed in the air-pump. This loss may be approximately represented by the difference between the vacuum pressure in the condenser and the atmospheric pressure plus the weight of the column of water on the pump bucket multiplied by the space traversed by the bucket in each unit of time.

The same process is continued through any number of strokes, and if there are several cylinders attached to the same shaft separate diagrams are taken from each. These diagrams are taken during a determined period; in important cases where the power of very costly engines is to be estimated the process is continued uninterruptedly for days together, and sometimes in steamships during an entire voyage.

The preliminary reduction of the diagrams having been made the formula for obtaining the indicated horse power is simple enough. Multiply the effective mean pressure per unit of surface thus formed by the area of the piston in the same units of surface, say square inches, and by the length of stroke in feet. The resulting product represents the effective force exerted on the piston during one stroke, and when multiplied by the number of strokes per minute and divided by the constant, 33,000 the quotient will give the indicated horse power of the engine.

From the above it will be evident that no measure of power convenient as a commercial unit can be based on the actual force that an engine will develope when at work, and hence the adoption of a nominal horse power for this purpose.

It has already been stated that in the early history of the steam engine the nominal power was intended to, and did approximately represent the actual power developed. Now, however, various rules are adopted by the manufacturers in different districts of Britain, where they have the "*Glasgow Rule*," the "*Manchester Rule*," the "*Leeds Rule*," and the "*Bolton and Watt Rule*." These rules again vary for "condensing" or "non-condensing" engines.

For non-condensing engines, *Bolton and Watt's* rule assumes the speed of the piston to be 128 feet per minute, multiplied by the cube root of the stroke in feet; the mean effective pressure of the steam is assumed to be 7 lbs. per square inch

Then the nominal horse power

$$= \frac{\sqrt[3]{\text{Stroke in feet}} \times \text{diameter}^2 \text{ in inches}}{47} \text{ nearly.}$$

In the south of England this formula is much used, substituting as the divisor 60 for 47. The Admiralty formula is somewhat similar, except that a different speed for the piston is adopted according to the stroke of the engine:—Thus, when the stroke is 3 feet the speed is taken at 180 feet per minute; when the stroke is $5\frac{1}{2}$ feet the speed is assumed to be 216 feet per minute. The effective pressure is always taken at 7 lbs. per inch, and the formula is thus expressed:

$$\text{H. P.} = \frac{\text{Area of cylinder in inches} \times 7 \times \text{by speed of piston in feet per minute.}}{33{,}000.}$$

It is evident that neither this nor the following rules express the actual power of the engine, the result being irrespective of the pressure of steam in the boiler, but they all define with tolerable accuracy the *size*, and consequently the commercial value of the engine so far as the latter is dependant on the capacity of the cylinder.

The *Manchester* rule allows 23 square inches of piston to each nominal horse power without taking any account of the length of stroke, the speed of the piston being considered as a constant quantity, thus:

$$\text{Nominal H. P.} = \frac{\text{Area of piston in inches}}{23}$$

The *Leeds* rule is based on the area of the piston in circular inches, and in practice produces the same result as the Manchester rule, as the area, 30 circular inches, allowed to each horse power is equal to 24 square inches. It is thus expressed:

$$\text{Nominal H. P.} = \frac{\text{Diameter of cylinder in inches}^2}{30}$$

For non-condensing engines the *Manchester* rule allows ten square inches of piston per horse power; or:

$$\text{Nominal H. P.} = \frac{\text{Area of piston in inches}}{10}$$

In *Leeds* sixteen circular inches are allowed, thus:

$$\text{Nominal H. P.} = \frac{\text{Diameter}^2 \text{ in inches}}{16}$$

The *Glasgow* rule is to "square the diameter and point off the unit figure," a process identical in form with the Manchester rule, but less liberal, as it gives circular instead of square inches, the proportion being as 7.854 to 10.

Where compound engines are used, having both a condensing and non-condensing cylinder, it is customary in Leeds to take no account of the small or non-condensing cylinder, but to base the estimated power on the larger cylinder alone.

In estimating indicated horse power, neither the power expended in working the air-pumps, of condensing engines the friction of the machinery, nor the force expended in working the valves, has usually been considered, the power in the cylinder being alone expressed by the ordinary formula:

Indicated horse power =

$$\frac{\text{Mean effective pressure} \times \text{diam.}^2 \times .7854 \times \text{stroke} \times 2 \times \text{No. turns per min.}}{33{,}000}$$

Or indicated horse power =

$$\frac{\text{Effective pressure} \times \text{area piston in in.} \times \text{stroke in ft.} \times 2 \times \text{No. turns per m.}}{33{,}000}$$

In any standard that may be adopted in this country, whether for the engine or for the boiler which supplies it, it is evidently desirable that we should conform as nearly as may be to the average standard which obtains in Britain. The approximation of our unit of measure to that most commonly used by the principal manufacturers is more to be desired than any convenience likely to accrue from the adoption of a standard intended to express more accurately the actual power of an engine. For while in nearly all reliable books of reference on the practical application of steam machinery the calculations as to the *size* of engine requisite for driving a given quantity of machinery are founded on nominal horse power as commonly accepted in Britain, it is not likely that we shall succeed in establishing a totally different standard that will more satisfactorily express the *size* and consequently the cost of production.

For these reasons we propose in determining a standard to adopt a uniform limit for the effective pressure of the steam, and also for the speed of the piston, similar to the limits accepted in England. The determination of the horse power as a commercial unit then becomes a very simple process, and the calculation is based entirely in the area of the piston. Taking the average of British practice the following formula will give us the required standard for condensing engine:

$$\text{Horse power} = \frac{\text{Diameter}^2 \text{ in inches}}{40}$$

$$\text{And, Horse power} = \frac{\text{Diameter}^2 \text{ in inches}}{12}$$

will give the standard for non-condensing engines.

The practice in respect to boilers is even more vague than in respect to the engines; it is usually, however, decided by the number of square feet of heating surface, the quantity allowed varying from four square feet of horizontal area in cylindrical boilers without internal flues, to twenty or even twenty-four feet of surface actually exposed to the action of the fire in multitubular boilers of the locomotive type.

It is obvious that in the above rules the nominal horse power of the engine is altogether irrespective of the boiler, but the indicated power is entirely dependent on the supply of steam, for it is on this that the number of revolutions or strokes of the engine mainly depend. If the steam passages are sufficiently large to permit the flow of the steam to the cylinder without becoming throttled or wire drawn, the indicated power may be increased to the utmost limit which the machinery is capable of withstanding, by increasing the volume and pressure of the steam. This of course involves a corresponding consumption of fuel, and when a certain point is reached this source of power becomes the reverse of economical. Hence it is important that the boiler should be duly proportioned to the size of the cylinder and the speed of the piston.

We shall not now attempt to determine what proportion a boiler should bear to the engine it is intended to supply, for we think that in any standard to be adopted the engine and boiler should be considered separately. But inasmuch as it is a common practice to value the boiler as well as the engine by horse power, a definite meaning should attach to the term.

It is not so easy to determine a convenient standard for boilers as for engines, inasmuch as the value of the surface exposed to the action of the fire is varied by its position and distance from the furnace. The vertical sides of flues are of less value than their upper surface, the bottoms of flues being generally covered with cinders and ashes are of hardly any value for the generation of steam; hence the practice of allowing so many horizontal feet of sectional area of the whole boiler to each nominal horse power; and although the contrary practice has obtained in proportioning boilers of the locomotive type, we think it much better to base all calculations on the *horizontal* sectional area of the flues and tubes when they are placed horizontally, and on their vertical section when placed vertically, rejecting from our estimate all vertical surfaces except those in the furnace and in immediate contact with the fire. Adopting these principles, although boilers may be divided into several classes, such as cylindrical with and without internal flues, multitubular with either horizontal or vertical tubes, and so on. The following general rule may be applied to all classes, and will very nearly accord with the practice of the best makers' Measure :—

1. The whole internal surface of the fire box above the grate bars, and forming part of the boiler.
2. The horizontal sectional area of so much of the boiler as may be exposed to the action of the fire beyond the fire bridge.
3. The horizontal sectional area of all flues of six inches diameter and upwards.
4. One-half the internal surface of all tubes under five inches when the water surrounds them, or,
4. One-half the external surface of all tubes containing water and exposed to the direct action of the fire.

Add the areas in superficial feet thus obtained together, and divide by *five* for the nominal horse power.

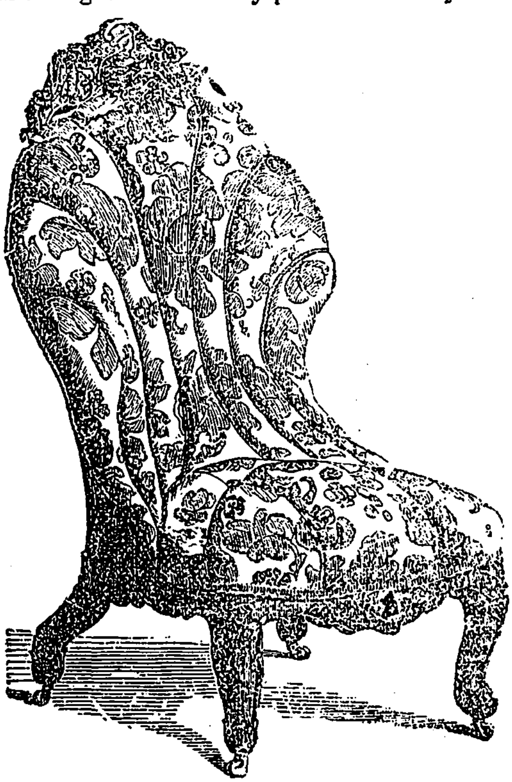
It is not pretended that the quantity of heating surface thus obtained wi'l in all cases be in due proportion to the engine; nor is it possible to frame any rule that would produce such a result. The *quantity* of boiler requisite to drive an engine of a determined size depends very much on the '*actual*' horse power it is proposed to develope, and it might become necessary to order a 20-horse power boiler to accompany a 15-horse power engine, or the reverse proportion might obtain; but in either case the proposed standard would shew the comparative value of the article bargained for, and this is all we at present design.

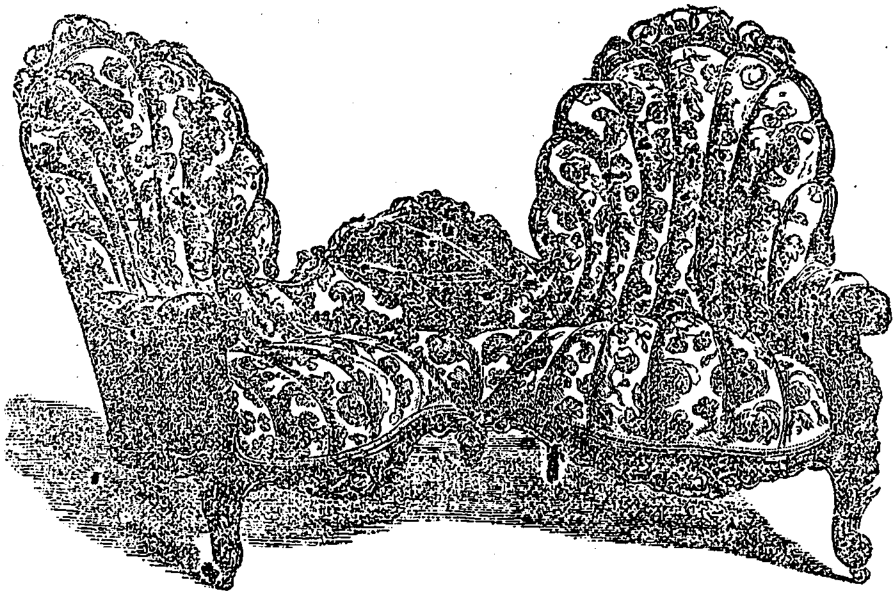
IMPROVEMENTS IN CANADIAN MANUFACTURES.

There are some people who think we have no manufactures; there are others who do not think it necessary that we should have any, because we can obtain the articles we require cheaper from Europe or the States, and by imposing duties raise means to carry on the government of the country.

It is not our intention to discuss either of these views at present; it is sufficient to know that we can point with pride to medals and honourable mentions at the last International Exhibition held at London, for articles of Canadian manufacture, as illustrations that such as we have are appreciated: and it is well and widely known that many of our manufacturers shrink from sending their goods to London in 1862, not because they do not think they would obtain high commendation, but because they feel that such an exposition of their progress would serve to point out to the British manufacturer the character of the goods most suitable to the country, and the style in which they should be furnished. In Europe all stand on equal or nearly equal ground, and it is a race in intelligence and adaptation which competitors have been running side by side for centuries. In Canada we have our manufactures to build up from a strong youth to a healthy manhood; and while adapting them to the circumstances of the country, to endeavour to secure all the advantages which taste and art can bestow, without lessening other valuable qualities especially suited to the physical and social condition of our country.

Compare the elegant and chaste articles of furniture, which were sent from Canada to London in 1851, with the coarse, heavy, and not less costly, conveniences, for they were nothing more, universal throughout the country previous to that year.





CANADIAN FURNITURE EXHIBITED AT LONDON IN 1851.

We need not reproduce the "old arm chair," or heavy lounge or sofa, which used formerly to be thought highly creditable to our manufacturing industry. And so no doubt they were in the infancy of the country, for we only began to have a youth in 1851. It is a matter of deep regret, nevertheless, that many manufacturers should decline sending to London, because they think it would injure their interests. Perhaps it would injure them by leading after a while to successful competition from Britain. It is a well-known fact that for general adaptation to this country Canadian cloths are manufactured in several parts of the Province, which are superior to those imported at the same price, and which command a ready sale, and are inducing greater efforts to meet the growing demand. The demand is met quietly, without any ostentation such as would be likely to draw too close an attention to what is doing here. Hence in this department of our industry we cannot expect to be properly represented at the Exhibition of 1862. Many enterprising private individuals are benefited, but the country at large is the loser.

Of several other departments of industry in Canada the same tale may be told; those who have made the most progress, and are capable of producing the best work, shrink from a reputation which they would acquire in Britain, to be succeeded soon, perhaps, by a dangerous or impoverishing competition.

While, therefore, for reasons which are sufficiently indicated in the foregoing paragraphs, we do not think that the articles sent to London this year will be a fair representation of our progress since 1851, and of our present civilization; yet if we are to rest satisfied with an imperfect impression abroad of the actual condition of the country, as far as home-manufactures are concerned, there is no reason why all Canadians should not contribute their best to the Provincial Exhibition to be held in Toronto in September next; it will engender a local rivalry beneficial to all, and there is much less fear that general admiration will be associated with future dangerous competition.

BRITISH MERCANTILE STEAM FLEET.

The steam fleet of Great Britain has contributed incalculably to her pre-eminence as a commercial nation. Indeed, few have any adequate conception of the rapid growth of this important interest, or the extent already attained. It appears from an official return, that at the commencement of the present year, 1,945 steamers were registered in the United Kingdom, of a gross burden of 686,417 tons, being an increase of 82 vessels and 19,904 tons, as compared with the corresponding date of 1860. The number of paddle steamers was 1,312; of screws, 601. As regards the materials of which they were constructed, 860 were built of wood, 1,080 of iron and five of steel. Of the whole number of steamships, 515 are owned in London and 214 in Liverpool. The scale of operations entered upon by some leading steamship companies of England are enormous. First in importance, as concerns the United States, is the "Cunard fleet," comprising no less than thirty large steamers, averaging not far from 2,000 tons. The largest of these is the new steamer "Scotia," which measures 4,000 tons, and three more powerful ships will soon be added.—*Hunt's Merchant Magazine.*

ROWAN'S MACHINE FOR SCUTCHING FLAX, &c.

This invention, introduced by Messrs. J. Rowan & Sons, of Belfast, consists in scutching flax, hemp, and other fibrous materials by means of a revolving cylinder fixed in a frame, round which cylinder are placed combs and beaters, and to which the flax or other fibrous material is pressed by the hand through an opening provided for the purpose in the front of the machine. After having been sufficiently acted on, the flax is withdrawn and reversed end for end; this done, it is then put through the same operation, when it is finished. Sometimes rollers are used to pass the flax or hemp into the machine.

FIG. 1.

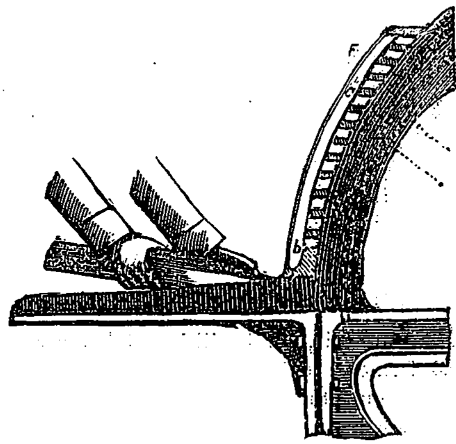


FIG. 2.

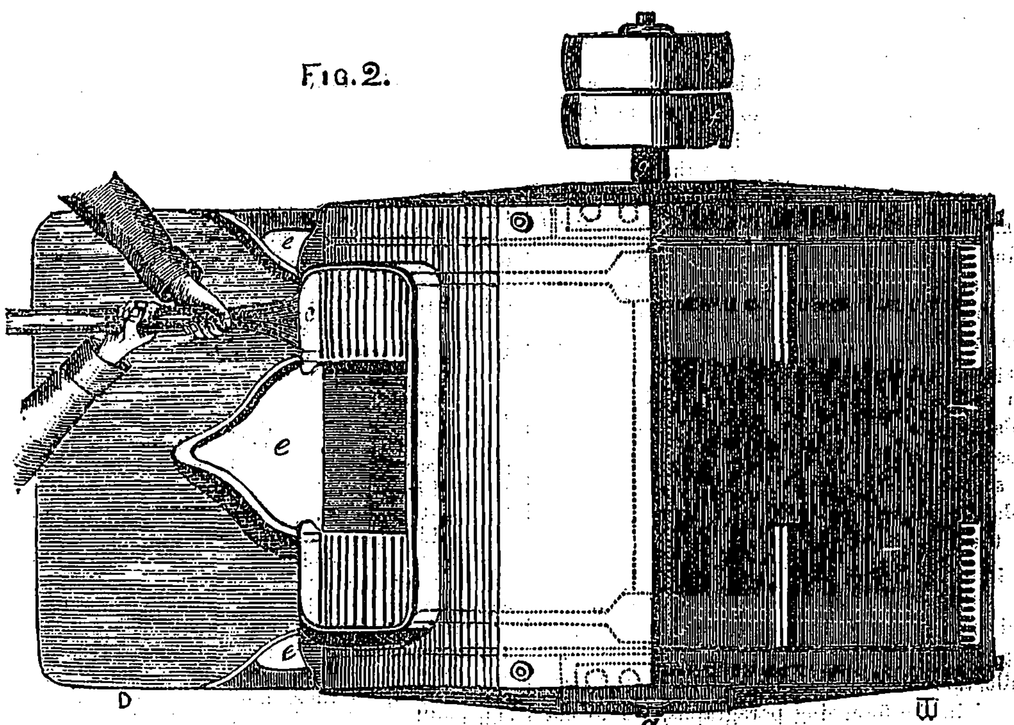


FIG. 3.

FIG. 4.

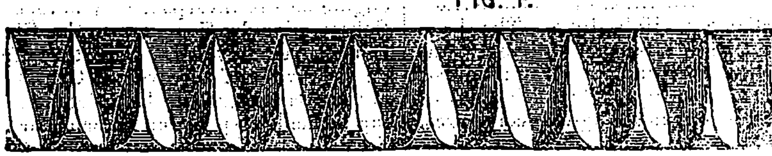


Fig. 1 of the accompanying engravings is a partial side elevation, and Fig 2 a plan of the machine.

a, a, is the revolving drum or cylinder mounted on a shaft or spindle *g*, and fitted with a comb *h*, and with beaters *s, s,* round its periphery. One comb and five beaters, are found to act well, but the number of either may be altered. Figs. 3 and 4 are views on an enlarged scale in front elevation, and plan, of a comb detached, B is a side or framework enclosing the upper part of the drum; *C, C,* are louvre plates inclining downwards to allow of the broken boon or woody particles detached from the flax or other fibre under treatment passing off freely, and being blown down to the floor by a current of air passing from the cylinder through the louvres. The object of the louvres is to prevent the boon getting embedded with the fibre. *D* is the feeding board; it is made as shewn to enable the attendant to feed and handle the straw and flax during the operation with safety. A set screw is connected to the plate *b* for the purpose of regulating the distance thereof from the comb and beaters, which distance requires to be modified according to the nature of the fibres being operated on. *F* is the front plate of the louvre casings, *c*, c, are passages or channels by which the boon is led to the openings *e, e,* through which it falls to the ground; *f f* are fast and loose pullies mounted on the spindle *g*. The flax, hemp, or other material to be scutched is fed by the hands of an attendant to the drum or cylinder by means of the board *D*, and is submitted to the action of the comb and beaters; the material is allowed to pass on into the machine until one hand of the attendant comes nearly in contact with the front plate *F*, when the material is withdrawn, turned upside down, re-inserted, and submitted to the same operation, and so on until it is sufficiently scutched.—*Mech. Mag.*

COMMERCIAL PROGRESS OF THE NINETEENTH CENTURY.

The discoveries, inventions and progress noted in three centuries, ending with the year 1800, have all been eclipsed by the astonishing events of the present century. The application of steam as a propelling power may be considered as the most important of these changes. The next of importance to the world may be said to be the rail-road —not only in developing production, but as a means of civilization, and in bringing together remote interests. The vast commercial interests of the world have been more fully promoted by the invention and use of the magnetic telegraph—an invention for which the civilized world is largely indebted to the genius of Professor Morse. While the progress and changes in the physical world have been greater than at former periods, the reform and changes in the science of law and government, and in the social condition of men, have been still greater. Among these revolutions we may name—first, the modification of the Corn Laws of England, after centuries of obstinate legislation; second, the introduction of cheap postage; third, the adoption of general laws for corporations, in lieu of special charters. Science has at the same time demonstrated the importance of gutta percha to the world. Steamboats and steamships have been introduced into the waters of all parts of the world. Twenty-five thousand miles of rail-road now penetrate the remotest corners of the United States. The population of the United States has increased from 5.300.000 at the opening of the century to about 30,000,000 in the year 1858. The number of post-offices has increased in the same time from 903 to 27,000, and their revenue from $280,000 to $8.000.000. The tonnage of the Union has increased from 1,000.000 tons to 5,000,000—the foreign imports from $91,000,000 to $350,000,-000, and the customs revenue from $9,000,000 to $64,000,000. The discovery of gold in California and in Australia has led to the further development of commerce, navigation, manufactures and trade; and the rapid changes still going on would indicate that the next fifty years will be as prolific as the last half century.

1801—1810.—Embargo laid (January, 1801) on all Russian, Danish and Swedish vessels in English ports. 1802. Santee Canal, South Carolina, completed. 1803. Louisiana sold by France to the United States for $15,000,000. The first printing press in New South Wales established at Sydney. Caledonian Canal opened for travel. Trial of steamboat on the Seine, by Robert Fulton, 9th August. The first bank in Ohio chartered. 1804. Wilberforce's slave-trade bill rejected by the House of Lords. The Code Napoleon adopted. Ice first exported from the United States to the West Indies. 1805. The Gregorian calendar again adopted in France. 1806. The Cape of Good Hope surrendered to the English. Abolition of the slave-trade by English Parliament, 10th June. The loom invented by Jacquard, a mechanic of Lyons, purchased by the French Government for public use. East India Docks opened at London, 4th August. 1807. Milan decrees against English commerce, 11th November. Fulton's first voyage on the Hudson. The Bank of Kentucky chartered. First manufactory of woollen cloths in the United States established at Pittsfield, Massachusetts. Middlesex Canal, Massachusetts, completed. 1808. Manufacturing districts of Manchester, &c., petitioned for peace. 1810. Deaths, by suicide, of Abraham Goldschmidt, Francis Baring and other English merchants.

1811—1820.—English guineas publicly sold for a pound note and seven shillings. 1811. Mr. Horner's proposition for resumption of cash payments in England rejected. First Steamboat built at Pittsburgh. 1812. Serious riots in the manufacturing districts of Lancashire and Yorkshire. Declaration of war by the United States against England, 18th June. 1814. London *Times* first printed by steam, 20th November. 1815. Veto of the United States Bank bill by President Madison; bank re-chartered for 20 years. 1816. The new Russian tariff prohibited the importation of nearly all British goods. Bank of England advanced £3,000,000 further to government, making a total of £14,000,000. 1817. Paris first lighted with gas. First steamboat from New Orleans to Louisville. 1818. First Polar expedition of Captain John Franklin left England. Steamboats built on Lake Erie. 1819. Emigration to Cape of Good Hope encouraged by the British Government. The steamship *Savannah* arrived at Liverpool from the United States, 15th July. Commencement of the suspension bridge over the Menai by Telford. The first bank in Illinois chartered. 1820. Florida ceded to the United States by Spain. Suspension bridge over the Tweed. First steamer ascended the Arkansas River.

1821—1830.—Captains Parry and Lyon's expedition to the Arctic Ocean left England, 30th March. 1821. Bank of England resumed specie payments. 1822. Funeral of Coutts, the London banker, 4th March. The first cotton mill in Lowell erected. 1823. Revival of business in the English factories. 1824. Advance in the prices of agricultural produce in England. Act passed for the Thames Tunnel, 24th June. Fauntleroy, banker, hung for forgery, 30th November. Champlain Canal, New York, completed. 1825. Panic in the English money market, December. Failure of numerous country banks. Erie Canal completed. 1826. Mr. Huskisson's free trade policy advocated in the House of Commons by vote of 223 to 40. Coin in Bank of England reduced to £2,460,000, 28th February. 1827. Commercial confidence restored in England, and employment for the poor. "Society for the diffusion of Useful Knowledge" established, at the instance of Lord Brougham. Union Canal, Pennsylvania, completed. Quincy Rail Road completed. 1828. Delaware and Hudson Canal, Syracuse and Oswego Canal, New York, completed. India Rubber goods manufactured at Connecticut. 1829. Increase of silk manufactures in England, and reduction of duty on raw silk. Prize awarded to Mr. Stephenson for his locomotive engine on the Liverpool and Manchester railway. Subscription by Congress to the Chesapeake and Ohio Canal, May 3rd. Departure of Captain Ross on his voyage of discovery. Chesapeake and Delaware Canal opened, 17th October. 1830. Opening of the Liverpool and Manchester Railway, 15th September. Free navigation of the Black Sea opened to the United States by treaty, 7th May. Charles X. fled from Paris, 31st July. West India trade with the United States opened to British vessels. Independence of Belgium acknowledged. Pennsylvania State Canal finished.

1831—1840.—Parliamentary reform bill introduced in 1831 by Lord John Russsll; rejected by the House of Lords, 8th October. Free trade convention at Philadelphia, October 1. Stephen Girard died, 20th December, aged 84. Insurrection in Jamaica, 28th December. 1832. Veto of United States Bank Bill by President Jackson, 10th July, New tariff act passed by Congress, July. Ohio State Canal finished. Albany and Schenectady Rail Road, Columbia Rail Road, Pennsylvania Rail Road, Newcastle and Frenchtown Rail Road, completed. 1833. Ice first exported to the East Indies from the United States, 18th May. Opening of the China trade to the English. East India Company charter renewed; ceased to be a commercial body. Bank of England charter renewed. Usury restrictions removed in England from all commercial paper having less than three months to mature. Mr. Clay's tariff bill passed by Congress. Removal of the deposits from the United States Bank, September. 1834. The Chinese suspend intercourse with the English at Canton. The first bank in Indiana chartered. London and Westminster Bank commenced business, March 10. Resolution of the United States Senate condemning President Jackson for removal of deposits, March. Nomination of Roger B. Taney as Secretary of the Treasury, rejected by vote of 28 to 18. Abolition of Slavery in British West Indies. Baltimore and Ohio Railroad opened for travel to Harper's Ferry, 1st December. Bank of Maryland failed, 24th March. 1835. French Indemnity bill passed, 18th April. Baltimore and Washington Railroad opened for travel 23rd August. Bank of Maryland Riots in Baltimore, 8th August. Loss of $20,000,000 by fire in New York, 16th December. Boston and Providence Rail Road, Boston and Worcester Rail Road, completed. 1836. Charter of United States Bank expired, March 4, and succeeded by Pennsylvania United States Bank. Reduction of the newspaper stamp duty in England, 15th September. Failure of the Commercial and Agricultural Bank of Ireland. Anthracite coal used for steamboats on North River. Independence of South American Republics acknowledged by Spain, 4th December. 1837. Panic in the London market, June. Failures of American bankers in London. Further modifications of the usury laws of England. Failure of banks in the city of New York, May 10. Grand Junction Railway, England, opened, 4th July. Revolt in Canada. Mont de Piété, Limerick, established. 1838. Railway opened from London to Southampton, 17th May. Wreck of the *Forfarshire;* heroism of Grace Darling, September 5. Royal Exchange, London, burned, 10th January. Resumption of specie payments in New York, May. Sub-Treasury bill defeated in Congress, June. United States Exploring Expedition, under Captain Wilkes, left Hampton Roads, 19th August. Imprisonment for debt abolished in England. 1839. British trade with China stopped, December. Second suspension by the banks at Philadelphia, 9th September, followed by bank failures in the South and West. Western Rail Road, Worcester to Springfield, opened, 1st October. Union Bank, London, commenced business. 1840. Penny postage adopted in England. Antartic continent discovered by Wilkes, 19th January. First steam vessel at Boston, arrived from England, 3rd June. First Cunard steamer (the *Britannia*) arrived at Boston, 18th July; and the *Acadia*, 17th August. Fiscal Bank Bill vetoed by President Tyler, 16th August. Bankrupt bill passed by Congress, 18th August. Bill for distribution of public lands passed by Congress, 23rd August. Fiscal corporation bill vetoed by President Tyler, 9th September. Loan of $12,000,000 authorized by Congress.

1841—1850.—The island and harbor of Hong Kong ceded (1841) by the Chinese to England. Pennsylvania United States Bank failed third time, 5th February, and made an assignment, 4th September. Union of Upper and Lower Canada, 10th February. Foreign trade of Canton suspended, and hostilities with the English renewed, 21st May. Canton taken, 27th. American clocks exported to England. 1842. Anti-corn law movement in Parliament by Sir R. Peel. Capt. Wilkes returned from his exploring expedition, 11th June. Ashburton treaty ratified by the Senate, 20th August. British treaty with China, (29th August,) by which it was agreed to open five free ports. 1843. Return of Captain Ross from the South Pole, 6th September. Treaty of commerce, by Sir H. Pottinger, with China. 1844. Treaty of annexation of Texas to the United States rejected by the United States Senate, 8th June. Anti-rent riots in New York, August. Re-charter of Bank of England. Magnetic telegraph between Baltimore and Washington. Cheap postage act of United States went into operation, July 1. 1845. Treaty between United States and China ratified by United States Senate, 16th January. Sir John Franklin left England, 25th May, on his Arctic expedition. Anti-corn law league at Manchester. Steamship *Great Britain* arrived at New York, 10th August. Treaty of annexation of Texas ratified by the United States Senate, 1st March. Loss of $6,000,000 by fire in New York city, 19th July. Peel ministry resigned, 11th December. 1846. Oregon treaty between England and the United States, signed in London, 17th July. Second failure of the potato crop in Ireland. Steamship *Great Britain* stranded in Dundrum Bay, 22nd October. Declaration of War with Mexico by the United States, 12th May. New tariff bill passed by Congress, 28th July. Veto of French spoliation bill by President Polk, 8th August. 1847. Gold in California discovered. United States ship *Jamestown*, left Boston, 28th March, and frigate *Macedonia*, 18th July, with provisions for the relief of the Irish. Great commercial distress throughout Great Britain, September to November. 1848. The State of Maryland resumed payment of interest, 1st January. Treaty of peace between Mexico and United States, signed 30th May. Suspension bridge at Niagara Falls completed, 29th July. Edict to incorporate Bank of France with nine branches, 27th April. India-rubber life-preservers invented. 1849. Penny postage adopted in Prussia. First experiment of a submarine telegraph at Folkstone. 1850. Invasion of Cuba by Lopez. £20,000 reward offered by Parliament for discovery of Sir John Franklin, 8th March. Collins' line of steamers to Liverpool commenced operations. Steamer *Atlantic* left New York, 27th April. The celebrated Koh-i-noor diamond, valued at $2,000,000 brought to England, July

1851.—The London exhibition opened, May 1. Contract of Pacha of Egypt with Mr. Stephenson for a rail-road from Alexandria to Cairo. Railways completed between St. Petersburgh and Moscow, Dublin and Galway. Collins' steamer *Pacific*, arrived in Liverpool, May. Yacht *America* won the race at Cowes, 22nd August. Hudson River Rail-road opened to Albany, 8th October. Dr. Kane returned from the Grinnell expedition, October.

1852.—Construction of French Crystal Palace ordered, February. Expedition of United States naval forces to Japan, March. Dr. Rae returned from his search for Sir John Franklin, February. Ship *Prince Albert* returned from search for Sir John Franklin, 7th October.

1853.—Trial trip of the caloric steamship *Ericsson* from New York to the Potomac, 11th January. Second Arctic expedition left New York, 31st May. American expedition arrived at Japan, 8th July. Loss of the steamship *Humboldt*, 5th December.

1854.—Combined fleets of England and France entered the Black Sea, 11th January. Loss of the steamer *San Francisco*, 5th January. Steamer *City of Glasgow* lost, March. Declaration of war by England against Russia in behalf of Turkey, 28th March. Commercial treaty between United States and Japan. French loan of 250,000,000 francs, announced March 11, and Turkish loan of £2,727,400. London joint-stock bankers admitted to the clearing-house, June 7. Crystal Palace at Sydenham opened, 10th June. Bombardment of San Juan by ship *Cyane*, 13th July. Loss of steamer *Arctic*, 27th September. Captain McClure returns from Arctic discovery, 28th September.

1855.—Discovery of Captain Franklin's remains. £10,000 awarded Captain McClure by Parliament. Paris exhibition opened 15th May. Submarine telegraph wire laid in Black Sea. Resistance by United States to payment of Sound Dues. First rail-road train crossed the Suspension bridge at Niagara, 14th March. French loan of 500,000,000 francs taken, 18th January. Suspension of Page, Bacon & Co., Adams & Co., San Francisco, 22nd

February. English loan of £16,000,000 taken by Rothschilds, 20th April. Ships *Arctic* and *Release*, Captain Hartstein, left New York for relief of Dr. Kane and party.

1856.—The Arctic discovery-ship *Resolute*, was delivered to the British authorities at Portsmouth, 30th December.

1857.—Expulsion of James Sadleir from the House of Commons, for fraud, February 16. Trial trip of the United States frigate *Niagara*, April 22nd. Count D'Argent, Governor of the Bank of France for 21 years, resigned, May. Suspension of Ohio Life and Trust Company, New York, August 24. Suspension of the banks of Philadelphia, Baltimore, &c., September 25. New York banks suspended October 14. Suspension of Wilson, Hallett & Co., Liverpool; Hodge & Co., Liverpool; John Monroe & Co., bankers, Paris, and numerous others, November. Suspension of Bank of England charter, November 12. Severe storm on north coast of Scotland, November 23. Resumption of specie payments by New York banks, December 14. Canton bombarded by the English and French, December 28.

1858.—Attempt to assassinate the Emperor Napoleon, 14th January. Loss of the *Ava*, mail steamer from Calcutta to Suez, 1st February. The Livingston exploring expedition sailed from Liverpool, 10th March. Conference at Shanghai of the representatives of Great Britain, France, Russia and the United States, 30th March. Great fire at Christiana, Sweden, destroying three-quarters of the city, 13th April. Forts at the mouth of the Peiho, near Pekin, captured by the English and French forces, 20th May. Treaty between Great Britain and China, signed at Tietsin, 26th May. A new boundary treaty between Turkey and Persia, signed at Constantinople, 29th May. Convention agreed to for the suspension of hostilities between the Turks and Montenegrins, 5th June. Jeddah bombarded by the British ship *Cyclops*, 23rd July, and again on 5th August. Second treaty between United States and Japan signed, July 28. Lord Elgin landed and negotiated, at Jeddo, a treaty between Great Britain and Japan, 12th August. Important financial reforms adopted by the Sultan of Turkey, 18th August. Message by Atlantic Telegraph, from Queen Victoria to President Buchanan, 22nd August. The Hamburg screw-steamer, *Austria*, burned at sea; upwards of 400 of the passengers and crew were lost, 13th September. Crystal Palace at New York destroyed by fire, 5th October. Royal proclamation issued throughout India, announcing transference of authority of the East India Company to the home government, 1st November.

1859.—Death of Baron Humboldt, aged 92 years, May 6. English and French forces accompany the English and French ambassadors to the Emperor of China; repulsed on attempting the passage up the Peiho River, with a loss of about 450 men, 25th June. The island of San Juan, Oregon, taken possession of by Gen. Harney, in the name of the United States government, 1st July. Terrific gale, causing extensive loss of life and property, over England, and on the coasts, October 26. Severe gale through the southern districts of England, 1st November. The steamship *Indian*, from Liverpool, wrecked upon Seal Ledge, 65 miles east of Halifax; 24 of the passengers and crew lost, 21st November. First train passes over Victoria Bridge in Canada, 24th November.

1860.—Peace is concluded between Buenos Ayres and the Argentine Confederation, January 5th. Falling of the Pemberton Mills at Lawrence, Mass., 10th January. United States five per cent. loan, $1,100,000, negotiated, January 31st. First silver bullion received from the Washoe silver mines. A treaty signed between France and Sardinia for the annexation of Savoy and Nice to France, 24th March. The Japanese Embassy arrives at San Francisco, 29th March. First pony express reaches Carson Valley in 8½ days from Missouri, 12th April. Attack on the Bank of England by Messrs. Overend, Gurney & Co., bankers, defeated, April. Fraud in Union Bank of London discovered, April 23rd; loss £263,000. Fraud in Pacific Mail Steamship Company stock discovered at New York, May 18. News received in London of the failure of the Red Sea telegraph, May. President Buchanan vetoes Homestead Bill, and it is lost, 23rd June. Failure of Streathfield, Laurence & Co., and other houses in the leather trade, London, July. The Taku forts at the mouth of the Peiho are taken by the Allies, after a strong resistance by the Chinese, 21st August. United States ten million five per cent. loan taken, 22nd October. Great panic in New York stock market, November 12. Georgia Banks suspended payment, November 30. Steamer *Persia* arrived at New York from Liverpool with $3,000,000 in gold. South Carolina secedes from the Union, 20th December. Fort Moultrie evacuated by Major Anderson, 26th December. Castle Pinckney and Fort Moultrie seized by State authorities, 28th December. John B. Floyd resigns as Secretary of War, 29th December. Bank of England raised rate of discount from five to six per cent., 31st December. Robbery of $173,000 belonging to English bondholders, by the Mexican government, December. Prospectus of Turkish six per cent. loan issued by M. Mires, Paris.

[The preceding sketch is mainly from *The Cyclopædia of Commerce and Commercial Navigation*, published by Messrs. Harper & Brothers, N. Y., 1859,]—*Hunt's Merchants' Magazine.*

Board of Arts and Manufactures
FOR UPPER CANADA.

PROCEEDINGS OF THE BOARD.

The first meeting of the Sub-Committee elected for the current year, was held at the Board Rooms, Toronto, on the 29th of January, at 1 P. M. The members present were the President (Dr. Beatty), the Vice-President (Dr. Craigie), and Messrs. Professor Buckland, A. Brunel, T. Sheldrick, W. H. Sheppard, Professor Hind, R. Bull and P. Freeland.

Minutes of annual meeting, and letters from the agents for the Journal were read, and some accounts passed.

The Secretary submitted an estimate of necessary working expenses of the Board for the current year, exclusive of any appropriations for Books for the Library of Reference, amounting to $1,935 00, which was received.

Moved by T. Sheldrick, seconded by R. Bull, and resolved:—

"That Professor Buckland, A. Brunel, P. Freeland, Professor Hind and the Secretary, do constitute the *Journal and Book Committee*, for the current year."

Resolved:—"That the sum of two hundred dollars be appropriated to the *Journal and Book Committee* for the purchase of books for the Library."

Moved by A. Brunel, seconded by T. Sheldrick, and resolved:—

"That in order to induce contributions to the Journal, the sum of five dollars ($5) be offered for each page of original matter accepted by the Editor—only such articles as treat on Mechanics, Manufactures, and the production and preparation of raw material for manufacturing purposes to be accepted."

Moved by Professor Hind, seconded by Mr. Sheldrick, and resolved:—

"That the President, Mr. Freeland, Mr. Brunel and the Mover, be a committee to draw up an address to the Government relative to the renewal of annual grants to the Mechanics' Institutes and Arts Associations throughout Canada, in accordance with the instructions of the Board."

Resolved:—"That Mr. J. E. Pell be requested to act as agent for the Journal of the Board in the City of Montreal."

"Resolved:—"That at the meeting of Delegates to be held on the 30th instant, to consider the Act introduced during the last session of the Legislature to amend chap. 32 of the Consolidated Statutes of Canada, the President and members attending be instructed to advocate the adoption of the several clauses proposed by this Board, as published in the Journal of the Board for April of last year."

The meeting then adjourned.

W. Edwards.
Secretary.

CONVENTION OF DELEGATES.

In accordance with a resolution adopted at the Annual Meeting of the Directors of the Provincial Exhibition Association, held in London in September last, a Meeting of Delegates of the various County Agricultural Societies, Horticultural Societies, and Board of Arts and Manufactures in Upper Canada, was held in the Lecture Hall of the Toronto Mechanics' Institute, on Thursday the 30th of January.

About sixty Delegates were present at the Meeting, including the President, Secretary, and Members of the Board of Agriculture; and the President, Vice-President, Secretary, and Messrs. Rice Lewis, Thos. Sheldrick, W. H. Sheppard, H. E. Clarke, W. S. Lee and H. Langley, of the Board of Arts and Manufactures.

Col. Thomson, President of the Board of Agriculture was elected Chairman, and explained that the Meeting was called to take into consideration a Bill introduced to the Legislature during its last session, to amend the Act under which the several Agricultural Boards and Societies, Horticultural Societies, and Boards of Arts and Manufactures are now constituted; and that the Bill referred to had passed the Legislative Assembly, and after two readings in the legislative council had been submitted to a special committee, who had not reported the Bill on account of its altogether doing away with the Agricultural Association, that have been in existence for so many years, and allowing the Boards of Agriculture, and the Boards of Arts and Manufactures, each to hold Provincial Exhibitions, with power granted them under the proposed bill to unite whenever they may see fit so to do; and also providing for the Election of the Members of the Board of Agriculture by twelve Agricultural Districts in each section of the Province, according to a schedule annexed to the Bill. The Chairman requested the Meeting to make its views known in respect to these two important changes, and also upon the bill generally.

Major Campbell, M. P. P., attended on behalf of the Board of Agriculture for Lower Canada, and at the request of the meeting gave some general explanations in connection with the changes proposed in the Bill under discussion. Major Campbell in his remarks applied himself principally to the Boards of Agriculture and the Agricultural Associations; but stated as a reason for the action of the Committee of the House in separating the Boards of Agriculture and the Board of Arts and Manufactures for Exhibition purposes, that it was thought that Agriculture was now strong enough to walk alone; and with regard to the dissolution of the Provincial Agricultural Associations, that certainly was discussed in the Committee, and it was felt that if the members of the Boards of Agriculture were elected in the manner he [Major Campbell] had stated, that they would then fully represent the agricultural population, and there would be no necessity for sending up delegates every year merely to choose the next place at which to hold the Exhibition and to elect the officers of the Society. Major Campbell concluded his remarks by assuring the meeting that the Lower Canada Society did not in the least desire to dictate. He merely appeared to explain the views they held.

The several clauses of the Bill were then taken up *seriatim* by the meeting, and a very interesting discussion took place thereon. Several minor amendments were adopted, but the three propositions upon which the principal and most interesting discussion took place, were:—

1st. The mode of electing the members of the Board of Agriculture.

2nd. Granting legislative aid to Horticultural Societies.

3. Abolishing the Agricultural Associations, and giving the Boards of Agriculture, and the Boards of Arts and Manufactures power to hold separate exibitions.

On the first of these questions it was moved by Mr. Ruttan, and seconded by Dr. Craigie, "that the present mode of electing the members of the Board of Agriculture is unsatisfactory, and that in future each County Agricultural Society shall at their annual meeting in January, elect one delegate, all of which delegates shall meet at——, on the first Tuesday in February, and then and there shall elect eight gentlemen who shall form the Board of Agriculture."

Mr. Barker moved—"That the several county societies shall at their annual meeting name two persons to act as delegates, who shall at the meeting of the Provincial Association have each a voice in the election of the Board of Agriculture, and the election of such member shall take place on the evening of Thursday in the first week of the exhibition."

Mr. Barker's amendment was carried by a majority of two.

On the second question it was moved by the Hon. Mr. Alexander, seconded by Mr. Beadell, and Resolved,—"That every Horticultural Society in any city, town or incorporated village, incorporated under this act, or which may have been incorporated under any other act of the Provincial Legislature, shall be entitled to a public grant, equal to the amount subscribed by the members of each society and certified by their Treasurer to have been paid into his hands in the manner provided by the section of the act relating to Agricultural Societies, provided that the whole amount granted to any such society shall not exceed $400 in any year.

On the discussion of the third proposition, Dr. Beatty (the President of the Board of Arts and Manufactures for Upper Canada,) said:—

The clause now under discussion provides for the separation of the Boards of Arts and Manufactures and the Boards of Agriculture, in both sections of the province, in regard to the Provincial Exhibitions—in the management of which, a Union of these Boards alone exists, under the present Act This separation is desired in Lower Canada, but not in Upper Canada. Some gentleman had indeed said that Arts and Manufactures are able to "walk alone." But how are they able to "walk alone?" Agriculture receives a public grant in each section of the Province of about $52,000 a year, and Arts and Manufactures only $2,000. Unless the Legislature bestows a more liberal grant on the Arts and Manufactures than heretofore, they can not walk alone just yet.

It has been stated by some gentleman present, that whilst the Agriculturist has to pay a rent for a miserable shed for his cattle, the funds of the Association are expended in erecting a Palace for the accomodation of the Arts and Manufactures.

He wished gentlemen to recollect, that the Exhibition Buildings are not erected at the expense of the Association, but of the localities in which the Exhibitions are held; and further, that at least one-half of the main building is always occupied with Agricultural and Horticultural products and implements, and the manufactures of the farmers and their families; and in the matter of prizes, by referring to the published transactions of the association, gentlemen would see that no more than from one-sixth to one-fifth of the prizes at these exhibitions are awarded in the Arts and Manufactures department, and that a considerable proportion of this also is taken by the wives and daughters of our Agriculturists.

He would also caution the Agriculturists against cutting off what is, to a very large proportion of those who attend, one of the most attractive features of these exhibitions, and which brings in so large a revenue towards paying the prizes and general expenses. This fact is evidenced by the crowds of visitors that constantly press into the main building from the commencement to the close of the exhibition.

Dr. Beatty went on to defend the present Union on the ground of economy in the expense of managing one united exhibition, instead of two separate ones, and in the public being able to visit and inspect the Agricultural, Horticultural, and Arts and Mechanical productions of our country at one expense and loss of time from their business; and concluded by moving the following resolution, which was all but unanimously adopted by the meeting:—

"That this meeting disapproves of the separation of the Board of Arts and Manufactures and the Board of Agriculture, so far as relates to the holding of joint exhibitions in Upper Canada, as proposed by the bill under discussion."

Dr. Beatty read a number of clauses relating to the Boards of Arts and Manufactures, agreed upon by the Board.

Mr. Beadell, seconded by Col. Denison, moved that they be approved by the meeting. Carried.

[The clauses referred to were published in the April number of the *Journal*, and having been previously well considered elicited no debate.]

The meeting next proceeded to consider a number of clauses proposed by the Board of Agriculture and the Board of Arts and Manufactures for Upper Canada, as an addition to Major Campbell's bill, immediately following the clauses constituting the Boards of Arts and Manufactures. These proposed additions were also published in the April number of the *Journal*, and were adopted by the meeting without discussion.

Mr. Sheldrick moved, seconded by Mr. Solmes, that the Presidents and Secretaries of the Boards of Arts and Manufactures, and of the Boards of Agriculture, be a committee to draft a Bill in accordance with the action of this meeting, and to print a sufficient number to be distributed among the different Societies of the Province, the members of the Legislature and of this Convention.

Col. Denison moved that the draft be published in the *Journal* of the Society.

The Resolution with Col. Denison's amendment was carried.

Mr. Cooley moved, seconded by Mr. Barker:

"That Messrs. Allan, Christie and Denison be a committee to draft an address of condolence to Her Majesty, and that it be signed by the Chairman on behalf of the meeting." Carried.

The World's Fair.

Col. Thompson said he was one of the commission for collecting articles for exhibition in London. Parties desiring to exhibit were requested to send in their samples to London, C. W., by the 18th of this month; in Hamilton, by the 20th; Toronto, by the 22nd; Kingston by the 24th. A general selection would be made at Montreal by the commissioners. The goods have to be in England by 31st of March. The share allotted for the exhibition of Canadian products was not so large as in 1851, but it was to be feared that even it was more than would be wanted. The Government had only placed $6,000 at their disposal this year. In 1851 they placed $60,000, and for the Paris Exhibition $80,000. However, the Commission were determined to do the best they could.

Mr. Edwards stated that some few cases had come to his knowledge, of manufacturers objecting to send specimens of fine or expensive manufactures for the inspection of the Commissioners at the places named, if a selection would again have to be made by the Commissioners in Montreal, after a previous inspection and selection by the Commissioners for Upper Canada. He hoped it was not yet too late for the Commissioners to reconsider their decision in this matter.

The chair was then taken by Mr. Barker, when a vote of thanks was given to the Chairman, Col. Thomson, and the Convention adjourned, after a sitting of eleven hours.

INTERNATIONAL EXHIBITION OF 1862.

We call the attention of our readers to the day appointed by the Commissioners for Canada at the International Exhibition of 1862, to meet at Toronto, with a view to examine and approve of articles for transmission to Europe. The 22nd February is near at hand, when, according to their advertisement, the Commissioners will be present in this city. We hope that they will meet with encouragement from all parties able to uphold the character which Canadians obtained in 1851. Such an opportunity as the present will, in all probability, not occur for another ten years; and every mail from Europe brings accounts of the energy, activity and emulation exhibited, not only on the other side of the Atlantic, but in nearly all the British dependencies throughout the globe.

THE PROVINCIAL EXHIBITION FOR 1862.

Little, we fear, has as yet been done to make preparations for the next Provincial Exhibition; nevertheless the months between February and September will rapidly pass away. Spring is fast approaching with its busy days, when other subjects will engage the attention of those who are most able to work out the details of the plans which should be adopted without delay for securing an enlarged prize list, more ample accommodation, a considerably greater extension of time for the exhibition of arts and manufactures, and a new organization of judges and other authorities. Upon the nature and extent of these *preliminary* operations made months before the exhibition, much of its importance and superiority will depend.

TO SUBSCRIBERS TO THIS JOURNAL.

Our subscribers will please bear in mind that the price at which the Board of Arts submits this Journal to the public, whether to single subscribers, clubs of ten or more, members of mechanics' institutes or agricultural societies, is so low that that the proceeds of a circulation, however extended, could not meet even the bare cost of publication. In view of this they are respectfully requested to *transmit* their subscriptions to the Secretary of the Board, W. Edwards, Esq., at the earliest convenient period; as any attempt at the collection of subscriptions as a business transaction in the ordinary way is out of the question. The more extended the circulation becomes, and the more promptly the subscriptions are paid, the greater will be the efforts which the Board will be justified in making to advocate the cause of the manufacturer and the artizan in the Province.

CONTINUATION OF GEO. E. PELL'S REPORT.

(*Continued from page* 11.)

DUNDAS.

W. H. Gibson manufactures machinists' tools, cracker and biscuit machines, printing presses, copying presses, coffee and sugar mills, and machines for printers and bookbinders.

Mr. G. contemplates the manufacture of malleable hardware in addition to his present business.

John Gartshore, established in eighteen hundred and thirty-eight, manufactures all kinds of saw and grist mill machinery, woolen machinery, oil stills, worms, tanks, steam engines, boilers, burr stones, &c. &c.

The pumping engines in use at the Hamilton Water Works were erected at these works, and are the only ones of the kind in America; they combine the high and low pressure principles. The cast iron bed plates weigh ten tons, the beams thirteen tons, stroke eight feet. Mr. G. is prepared to construct marine engines, having fitted up several vessels.

The average number of men employed is one hundred, at an average wage of one dollar and twenty-five cents per diem. Yearly value of manufactures is $100,000. Possesses shop room and tools for two hundred men, and when busy employs from one hundred to one hundred and fifty men. During a large portion of the year water power drives the machinery, but in the dry season steam is brought into requisition.

W. A. Young & Co. manufactures lasts, trees, treeing machines, toe stretchers, crimps, pegs, crimping machines, &c. Annual value of manufactures $8,000. Mr. Young has improved the Boston improved crimp, by the introduction of rubber where it is desirable to have a pressure that will yield to the thicker portions of the leather being crimped, it thereby preserves the oil in the leather and obviates the liability to tear, which so frequently occurs when the solid metal crimps are used. He has also invented a boot-treeing machine which is very ingenious, combining the principles of the screw and wedge. It seems to be capable of doing the work in a very satisfactory manner. For these inventions Mr. Y. is securing patents.

Mr. Jas. McMicken carries on the paper making, using water power. He manufactures two kinds, viz., news and wrapping papers. Manufactures about eighty tons of each kind in the year. Mr. M.'s printing paper is, I believe, about the best used for newspapers in this country. It is of milky whiteness, and when inked shews the reading very clear. Its peculiar texture enables it to take the ink readily, giving a clear black impression and not the vexatious grey so tiresome to the reader.

The annual value of his manufactures is about $22,000. Messrs. J. Buntin & Co., of Hamilton, have contracted for the produce of this mill.

I visited the cotton factory of Mr. Wright, but on account of the full particulars lately given in the *Journal*, I did not seek further information than the following, viz.: That seamless bags would shortly be manufactured, and probably cloth. The amount of cotton yarn now manufactured is about 70,000 lbs. per annum.

This is certainly a fine establishment, and one of which Dundas has reason to be proud. The proprietor is an affable, courteous Englishman, and one who well knows how to control his factory. Everything has the appearance of the strictest order and cleanliness.

J. Hourigan manufactures chopping axes and edge tools to the yearly value of $10,000, and gained the first prize at the last Provincial Exhibition. Average wages of men one dollar and thirty cents per diem. Trip hammer and stones driven by water power, as also the furnace blasts.

Billington & Forsyth, manufacturers of agricultural implements, stoves, scales, &c. Annual value of manufactures $30,000; number of men employed fifteen; average wage per diem one dollar and twenty-five cents. Have made improvements in the New York reaper and the Ketchum mower. Are confident of their ability to cope with the American manufacturers in their own markets, were there no duty to prevent their exporting.

In this Town the manufacturers enjoy a good water privilege. About one hundred and fifty horse power is in use, and there are still unused privileges that in the aggregate would afford about the same power. It is an admirable locality for manufactories of almost any kind; raw materials can be laid down either by rail or water. It think it would answer to establish here a cabinet factory, lumber could be cheaply laid down, and the manufactured articles could be with equal facility shipped to the eastward by water and westward by the railway. Another advantage would be the cheap rents to the employees, and the cheapness of provisions and fuel.

ANCASTER.

Mr. Crane manufactures shirts, drawers, stockings, and yarns. Employs twelve men, at an average wage of one dollar per diem; consumes about twenty thousand pounds of cotton and wool of about equal quantities in the year. Has ten families employed out of the mill, seaming.

Manufactures about twenty thousand dollars worth in the year. Imports only cotton.

Water power is used in driving the machines.

Mr. Ellis has a cloth manufactory, and employs about ten persons at an average wage of one dollar per diem. Makes Canadian cloth and flannel. Yearly value twenty thousand dollars. Works driven by water.

BRANTFORD.

Ganson, Waterous & Co., manufacturers of steam engines, portable and stationary threshing machines, clover mills, smut machines, and general mill work. Average number of men employed ninety. Average wage one dollar and twenty-five cents. Consumes about $16,000 worth of iron, steel, coal, &c., in the year. Six men left the U. S. to enter their employ, with their families, numbering thirty persons. About two hundred and fifty persons are depending upon their establishment. The annual value of their manufactures is about $60,000.

P. Goold & Co., manufacture stone-ware, and employ nine men, at an average wage per diem of one dollar and twenty-five cents. Consume about $4,000 worth of clay, wood and salt. Four men left the U. S. to enter their employ, with their families, numbering twenty persons. Yearly value of manufactures twenty thousand dollars.

Are not aware that any clay suitable for the manufacture of their wares exists in Canada, have experimented with Canadian clay and find that they fail in the kiln, melting into a shapeless mass. The clay used is South Amboy, or New Jersey. Import about $3,000 worth per annum.

Wm. Buck, manufacturer of stoves and farming implements, employs forty men, average daily wage one dollar and twenty-five cents; consumes iron, tin, copper, coal, &c., to the yearly value of $16,000. Annual value of manufactures $30,000.

Messrs Butler and Jackson, manufacturers of stoves and plows. Average number of men employed ninety. Daily wage on the average one dollar and twenty-five cents. Annual value of manufactures $50,000.

Brantford possesses a prodigious amount of water power, little of which is used compared with the amount available. About two miles from the town is a paper mill, at which only wrapping paper is made. The building was formerly the saw mill of the late Mr. Bruce, and from it the writer has seen millions of feet of lumber being shipped for the eastern market. A little further down the canal is a new building recently erected by Mr. H. Finyalson, late of St. Jacobs, for the purpose of a woollen cloth manufactory. Two sets of machines will be in operation early in the spring. The premises are calculated for four sets.

There is probably no town in Upper Canada where manufacturers can secure the use of water power so cheaply as in Brantford. Those who have small capital, and who desire to engage in manufacturing, would do well to visit this town. There is no lack of water, a good fall and almost nothing else to do than erect the building, put in wheel machinery and gate, and turn on the water. I ought, perhaps, in justice to state, that in Paris also there exists admirable facilities for water privileges.

LONDON.

Samuel Brown, manufacturer of sewing machines, employs fifteen hands, at an average daily wage of one dollar and thirty cents. Five are from the United States. Turns out about four hundred machines during the year; value $10,000.

Mr. B. claims to have improved the Wheeler & Wilson machines by obviating difficulties which are common to them, viz.: Mr. B. adjusts the bobbin in a separate case, so that when a change in thread is made *it adjusts itself*, rendering alteration by the operation unnecessary. The wearing of the shaft endwise is likewise provided for, so that no derangement in the working of the machine takes place as the shaft wears. The frame is in one casting, and completely covers the working parts, thereby protecting them from dust; every part is, however, of easy access. In the Singer machines made by Mr, Brown, he introduces an adjusting screw to the feed wheel, avoiding the use of a winch, it being set to a nicety while the machine is in motion by a thumb screw.

Murray Anderson manufactures stoves, plows, cultivators, hay rakes, straw cutters, &c. Average number of men employed fifty, at an average daily wage of one dollar and twenty-five cents. Yearly value of manufactures $70,000. The cultivator, straw cutter, hay rake, and potato digger, are his own inventions, and have been patented.

J. & O. McClary, manufacturers of stoves, hollow ware, plows, cultivators, harrows, &c., keep on the average forty peddlers out selling their wares. Annual value of their manufactures $150,000. Collect about $18,000 worth of rags in a year. Manufacture the pressed tin ware.

Spending considerable of the time I was in London (two days) in the search of articles for the Exhibition, I did not get as full particulars as I might have done concerning the amount of manufacturing. Quite a number of establishments I did not visit at all, and consequently they are unnoticed.

In the report of Hamilton, I observe I have not given an account of the Plating Establishment of Messrs. McGivern, Helliwell & Co. Their principal business is in Saddlery and Harness Trimmings, which they manufacture. They import malleable goods and do the plating themselves; but all that their blacksmith can make at home, they have done. They have tried the malleable goods made in Montreal, but they were not suitable, not comparing favourably with the American manufactures. Mr. Gibson of Dundas, who contemplates entering upon the manufacture of such goods, will find good customers in this firm, should he manufacture successfully. Messrs. McG., H. & Co. manufacture of plated goods in the course of a year to the value of five thousand dollars—they plate anything that can be plated, such as spoons, forks, &c., &c. They entered upon this branch of manufacture on account of the heavy tariff on plated goods, the labour being a large item in their manufacture.

I also omitted the Factory of H. M. Melville & Co., who manufacture carriage hubs, spokes, &c., and common household furniture. They have gone into this business on account of the scarcity of building contracts, and having a large Factory and excellent machinery, were loth to have so much invested capital lying idle.

I will forward, as soon as I receive the particulars, an account of the G. W. R. Shops and the Port Dover Woollen Works.

I am, Gentlemen,

With respect, yours, &c.,

Geo. E. Pell.

To the Committee of the
Board of Arts and Manufactures for U. C.

PATENTS OF INVENTION.

Bureau of Agriculture and Statistics, Quebec, 15th January, 1862.

Josiah James, of the Township of Whitchurch, in the County of York, Machinist, "A Superficial Wedge Power."—(Dated 20th April, 1861.)

John Read Philp, of the Town of Cobourg, in the County of Northumberland, Shoemaker, "An improved mode of Lowering Boats from the Davits of Ships."—(Dated 22nd April, 1861.)

Elias Vernon, of the City of Hamilton, in the County of Wentworth, Physician, "An Economical Hot Air Apparatus."—(Dated 30th April, 1861.)

Richard Smith of the Town of Sherbrooke, in the District of St. Francis, Machinist, "An improved Extension Auger."—(Dated 8th May, 1861.)

Richard Smith, of the Town of Sherbrooke, in the District of St. Francis, Machinist, "A new and improved Belt Link."—(Dated 8th May, 1861.)

Laughlin M. Cole, of the City of Montreal, Shoemaker, "A Metallic Heel for Boots and Shoes."—(Dated 8th May, 1861.)

George H. Hinton, of the City of Montreal, Saw Manufacturer, "New and useful improvements in the Manufacture of Saws."—(Dated 8th May, 1861.)

Ashley Hibbard, of the City of Montreal, India Rubber Boot and Shoe Manufacturer, "Ventilating India Rubber Boots and Shoes."—(Dated 11th May, 1861.)

Andrew James Park, of the Village of Norwichville, in the County of Oxford, Physician, "An improved process of Tanning and Manufacturing Leather."—(Dated 20th May, 1861.)

James Stewart, of the City of Hamilton, Iron Founder, "A new and improved Pattern or Design for Cooking Stoves."—(Dated 20th May, 1861.)

John Thomas, of the city of Toronto, in the County of York, Piano Forte Maker, "An improvement in the construction of the Piano Forte."—(Dated 21st May, 1861.)

Heman Hazleton, of the Township of Townsend, in the County of Norfolk, Carpenter, "An improved Self Propelling Gate."(Dated 21st May, 1861.)

Thomas Fogg, of the Town of Brantford, in the County of Brant, Railway Inspector, "A Ballasting Car."—(Dated 21st May, 1861.)

Silas Welte, of the village of Princeton, in the county of Oxford, Cabinet Maker, "An improved Churn, termed the "Blenheim Churn."—(Dated 22nd May, 1861.)

Robert Kerr, of the Township and County of Waterloo, Yeoman, "A Grain and Seed Broad cast Sower."—(Dated 25th May, 1861.)

Thomas Davis, of the village of Marysville, in the township of Wolfe Island and County of Frontenac, Mariner, "A submarine Buoy Purchase."—(Dated 27th May, 1861.)

George A. Carman of the village of Morrisburgh, in the County of Dundas, Carriage Maker, "A Vegetable Root Cutter."—(Dated 28th May, 1861.)

William Cooley, Assignee of E. S. Perkins, both of the City of Montreal, "A new and useful improvement in the ordinary two arm Saw-Set."—(Dated 3rd June, 1861.)

Michael Clair, of the Township of Sophiasburg, in the County of Prince Edward, "The Excelsior Washer."—(Dated 4th June, 1861.)

James McKelvey, of the Town of St. Catharines, in the County of Lincoln, Tinsmith, "A Refrigerator termed the 'Prince of Wales Cupboard Refrigerator."—(Dated 25th June, 1861.)

Adam Young, of the Township of Crowland, in the County of Welland, Yeoman, "An improved Mill-Saw."—(Dated 9th July, 1861.)

James Dolby and Isaac Dolby, both of the Township and County of York, Farmers, "A new and improved Lath Cutting Machine."—(Dated 17th July, 1861.)

John Patterson, of the Village of Ingersoll, in the County of Oxford, Saloon Keeper, "A Drill for drilling holes in rock."—(Dated 17th July, 1861.)

David Bruce, of the City of London, in the County of Middlesex, Machinist, "An improved Sawing Machine."—(Dated 17th July, 1861.)

Elias Vanderwater, of the Township of Sidney, in the County of Hastings, Machinist, "An improved Reaping and Mowing Machine."—(Dated 17th July, 1861.)

Abimelech Hillman, of Stratford, in the County of Perth, Cabinet Maker, "A Spring Cushioned Seat for Waggons and other Vehicles."—(Dated 17th July, 1861.)

Henry Fryatt, of Aurora, in the County of York, Carpenter, "Rotary Tooth for Harrows."—(Dated 17th July, 1861.)

James Hilborn of the Township of Reach, in the County of Ontario, Millwright, "A Steam Locomotive for travelling upon public highways."—(Dated 17th July, 1861.

George Deans, of the Town of Port Dover, in the county of Norfolk, Mechanic, "A Challenge Washing Machine."—(Dated 18th July, 1861.

Almas A. Knowlton, of the Township of Brome, in the County of Brome, "A Washing Machine."—(Dated 18th July, 1861.)

John Pike, of Prescott, in the County of Grenville, as assignee of John G. Fraser, of the aforesaid place, Barber, "An improved Churn."—(Dated 30th July, 1861.)

Charles R. Parkes, of the City of Toronto, in the County of York, Turner, "An improved Churn."—(Dated 30th July, 1861.)

Peter McEwen, of Russell, in the County of Russell, Farmer, "An improved Plough."—Dated 30th July, 1861.)

Abiel O'Dell, of the Town of Bowmanville, in the County of Durham, Machinist and Builder, "A Self-regulating Spiral Spring Mangle and Washing Machine."—(Dated 3rd August, 1861.)

John Powers, of the Town of Stratford, in the County of Perth, Builder, "The Victoria Washing Machine."—(Dated 3rd August, 1861.)

Richard H. Oates, of the City of Toronto, in the County of York, Manufacturer, "A Self-revolving wind Mill House with circular foundations."—(Dated 9th August, 1861.)

Paul Taylor Ware, of the City of Toronto, in the County of York, Sewing Machine Agent, Assignee of John A. Cull and Edward L. Cull, both of the same City, "An improved Sewing Machine."—(Dated 9th August, 1861.)

David Elm Norton, of the Town of Bowmanville, in the County of Durham, Machinist, "An improved Churn, termed "Norton's Horizontal Screw Dash Churn."—(Dated 10th August, 1861)

Alfred Bigelow, of the City of Hamilton, in the County of Wentworth, Merchant, "A new and improved Rock Drill."—(Dated 10th August, 1861.)

Samuel Slater, of London, in the County of Middlesex, Boot-Maker "An adjusting Last."—(Dated 20th August, 1861.)

Andrew Whytock, of the City of Quebec, Manufacturer of Galvanized Iron, "Improvements in Coating Sheets of Metal with other metals and other substances."—(Dated 27th August, 1861.)

Jedediah Hubbell Dorwin, of the City of Montreal, Gentleman, "An improved Mercurial Barometer."—(Dated 18th September, 1861.)

Robert Webber, of the Township of East Zorra, in the County of Oxford, Yeoman, "Webber's Scarifier or Field Cultivator."—(Dated 20th September, 1861.)

William and Thomas Walker, both of the Township of Chinguacousy, in the County of Peel, Carpenters, "The Ocean Wave Washing Machine."—(Dated 29th November, 1861.)

C. S. Shannon, of the City of Hamilton, "An improved Driving Rein."—(Dated 20th November, 1861.)—

Henry Dodd, of the Township of Goderich, in the County of Huron, "Improved Sieves or Screens for Fanning Mills."—(Dated 29th November, 1861.)

Volney O'Brien, of the Town of Guelph, in the County of Wellington, "The Excelsior Churn."—(Dated 29th November, 1861.)

Amos Bowerman, of the Township of Whitchurch, County of York, Yeoman, Jacob C. and Willis D. Bowerman, both of the Township of Whitby, in the County of Ontario, Clothiers, "Bowerman's improved Carding Machine."—(Dated 29th November, 1861."

James G. Thompson, of the Town of Peterborough, Gentleman, "An Automatic Gate."—(Dated 29th November, 1861.)

Asa Jarvis Foote, of the Village of Tilsonburg, in the County of Oxford, "A new and useful Washing and Scouring Machine."—(Dated 29th November, 1861.)

Hugh McLaren, of Lowville, in the County of Halton, "A combined Seed Drill and Cultivator."—(Dated 29th November, 1861.

Thomas McIlroy, of Brampton, "An improved invalid Bedstead."—(Dated 29th November, 1861.)

N. H. Nutting, of the Township of Marysburg, in the County of Prince Edward, "The Ontario Washing Machine."—(Dated 29th November, 1861.)

William Depew, of Paris, County of Brant, Tinsmith, "A balance Gate."—(Dated 29th November, 1861.)

Edward Smith, of the Township of Edwardsburg, in the County of Grenville, Yeoman, "Egyptian Gas."—(Dated 29th November, 1861.)

We purpose publishing in each number of the Journal a selection from the London *Mechanics' Magazine* (a valuable periodical, with but limited circulation in this country) of abridged specifications of such English patents as may be deemed useful or interesting to our Canadian readers.

Full specifications of all English patents issued may be obtained on application to Bennet Woodcroft, Esq., Great Seal Patent Office, 25 Southampton Buildings, Holborn, London; the price of which—varying from 3d. to 5s. sterling—must be remitted by Post Office order, made payable at the Post Office, Holborn.

Lists of all specifications may be seen at the Free Library of Reference of the Board of Arts and Manufactures, Toronto, as published in the Commissioner of Patents Journal.

We shall use our best endeavors to obtain for publication abridged specifications of patents issued in Canada, so as to make this department of our Journal as interesting as possible to Canadian manufacturers and inventors.

ABRIDGED SPECIFICATIONS OF ENGLISH PATENTS.

1123. W. Rowan. *Improvements in machinery for scutching flax and other fibrous substances, appli-*

cable also for reducing flax, hemp and other fibrous materials into tow. Dated May 6, 1861.

This invention consists in scutching flax, hemp and other fibrous materials, by means of a revolving cylinder fixed in a frame, round which cylinder are placed combs and beaters, and to which the flax or other fibrous material is pressed by the hand through an opening provided for the purpose in front of the machine. After having been sufficiently acted on the flax is withdrawn and reversed end for end; this done, it is then put through the same operation, when it is finished. The patentee sometimes uses rollers to pass the flax or hemp into the machine. When hemp, flax or other fibrous material is to be reduced into tow, he then places round the cylinder by preference five combs or heckles. *Patent completed.*

(This machine is highly recommended by some leading flax manufacturers of Belfast, Ireland, as a useful invention.—Ed. Journal.)

1144. W. E. Newton. *An improved lubricating compound.* (A communication.) Dated May 6, 1861.

This consists in the preparation of a composition obtained by uniting an alkaline base, such as potash or soda, with oleine or stearine (the proximate acid principles of animal and vegetable oils, fats and tallow,) and wth erine (the acid principle of wax). *Patent completed.*

1170. H. Swan. *Improvements in lubricating apparatus for lubricating the journals and bearings of shafts and other frictional surfaces of machinery.* Dated May 8, 1861.

The patentee claims the use and application of lubricators having measuring delivery cups in which the capacity of the cup can be regulated and adjusted to the capacity of the bearing or part to be lubricated as described. Also the arrangement by which the oil passes from a measuring and delivery cup through its hollow supporting arm and is delivered as described. *Patent completed.*

1186. L. W. Roddewig. *Improvements in steam boilers.* (A communication.) Dated May 10, 1861.

This consists in the construction of boilers with an inner and an outer chamber, the inner chamber being in more immediate contact with the head of the furnace, and is surrounded with the outer chamber, the water level in the inner chamber being considerably higher than usual. There is a pipe communicating from the upper part of the outer chamber to the lower part of the inner chamber, through which the water passes from the former to the latter, when it has attained a sufficiently high level in the former. By this arrangement, the water being fed into the outer chamber is made to circulate around the inner chamber, in a direction contrary to that in which the heat passes along the flue around the outer chamber from the furnace to the chimney. By this arrangement, also, the sediment is caused to be collected in that part of the chamber which does not come in contact with the flue. *Patent completed.*

1195. J. Wareing. *Improvements applicable to Ryder's forging machine, which render it better adapted for forging mule spindles and articles of similar form.* Dated May 11, 1861.

This consists in making the acting forces of the swages or hammers narrow in the direction of the length, but broad or long in the direction across the rod or bar operated upon, and in forming and arranging them so that the space between the two faces at one side will be wide enough to admit the largest part of the intended taper, the space gradually diminishing to the other side, where the space between the faces is only sufficient to admit the smallest part of the intended taper. *Patent completed.*

1214. T. Bell. *Improvements in the decomposition of the compounds of aluminium, and in coating metals with aluminium or its alloys.* (A communication.) Dated May 13, 1861.

This consists in effecting the decomposition of the compounds of aluminium (for instance, the double chloride of aluminium and sodium) by the agency of galvanic electricity, and also in coating metals with aluminium by the same agency. By this process the patentee converts the surface of copper (for instance) into aluminium bronze. *Patene completed.*

1223. W. Clark. *Improvements in the manufacture of steel.* (A communication.) Dated May 14, 1861.

The patentee claims the simultaneous purification and conversion of iron by calcining it in the presence of coal or other hydrogenous or azoted matter, in combination with a carbonate, alkali or other subtances capable of absorbing sulphuretted hydrogen. *Patent completed.*

1228. R. A. Brooman. *Improvements in working sugar refineries, and in sugar moulds and apparatus for trimming the loaves therein.* (A commuication.) Dated May 14, 1861.

This invention consists in placing the pan or copper, from which the sugar for filling the moulds is to be taken, at the bottom or lower floor of the building, in forming the building with a shaft fitted at top with a hoisting and lowering apparatus, and communicating with each of the floors in which the moulds to be filled are kept. The pan is fitted with a valve commanding an outlet pipe in the bottom thereof, from which the sugar is run into a jacketted filling pot, formed by preference with a spout and fitted with a cover. The filling pot, after being charged, is run upon a truck into the shaft and hoisted to one or other of the floors where the moulds to be filled are placed; it is then put upon another truck, and is suspended from a tackle and blocks in such a manner that it may be tilted and the contents poured into the moulds. The moulds are formed at bottom with an aperture, which is threaded, and which is closed by a pointed metal spile which rises a slight distance inside the mould, and forms a hole in the head of the loaf of sugar; the spile terminates inside the mould in a button, on which a washer rests to make a tight joint. The moulds with the spiles screwed in are held in frames constructed of wood, with apertures for the moulds to be supported in. Double lines of rails are laid on each floor, and the frames with the moulds are run about for the purpose of filling, and otherwise in carriages on them. Water cans are also provided, and these, being filled, are wheeled in the carriages to the moulds, for the purpose of their being washed, so that they need not be taken from the particular floor on which they are placed; spouts for carrying off the water after having been used are provided for each floor. For the purpose of trimming the base of the sugar loaf, a dome shaped frame is placed over the mould, which frame carries on the end of a spindle, cutters or scrapers, which, on being rotated, make the base of the sugar loaf even, and at the same time give a bevel edge thereto. *Patent completed.*

1243. W. Jackson. *Improvements in mortising machines.* Dated May 15, 1861.

This invention consists in connecting the hand lever of a mortising machine to the apparatus which carries the cutting tool, by means of a link, so as to produce the required vertical motion of the cutter or chisel. The spindle to which the cutting tool is fixed passes through an upright casing or box or cylinder fixed upon the spindle. These two parts move together vertically, but the spindle has an independent axle motion, so that the position of the cutter may be altered when required. Into the casing, box, or cylinder, a pin which is connected to the upper part of a pendant link enters at the side and has a free motion within it. At the lower end of the link is another pin which enters into and has a free motion within the hand lever. The hand lever moves vertically to actuate the cutter or chisel; and is connected to the framing of the machine by a pin or stud which cuts as a fulcrum. When, therefore, the hand lever is raised or lowered, a corresponding motion is communicated by means of the link to the casing, box, or cylinder, and consequently, to the spindle which carries the cutter. The cutting operation is therefore effected by bringing down the chisel by means of the hand lever, and the wood under operation may be moved forward as required by means of the toothed gearing connected with the moveable bed on which the wood is secured. *Patent completed.*

INKS.

Printing Ink.—1 (Very fine.)—Balsam of capaivi, 9 parts; fine lamp-black 4 parts; indigo 1 part; dry yellow soap 3 parts. Grind perfectly smooth.

2. (Extemporaneous.)—Balsam of capaivi, lamp-black to color. Grind well together with a little soap.

3. Take linseed oil; heat in a proper vessel until it begins to boil, then remove it from the fire, and kindle the vapour; allow it to burn till it becomes stringy when tried between the fingers, then add gradually to every quart black resin 1 pound. Dissolve, and add very cautiously dry brown soap in shavings, 4½ ounces to every quart. Set it upon the fire, and stir the mixture until the combination is complete; next, put into a suitable pot, finely ground indigo 1 ounce; fine Prussian blue 1 1 ounce; fine lamp-black 18 ounces. For every pound of resin employed pour the liquid on the color, well mix, and lastly, subject it to the action of a mill.

To give an appearance of Age to Writing.—Infuse a drachm of saffron in a half pint of ink, then write with it.

Perpetual Ink for Tombstones, Marble, &c.—Pitch 11 parts; lamp-black 1 part; turpentine sufficient. Mix with heat.

Blue Ink.—Take sulphate of Indigo, dilute it with water till it produces the color required. It is with sulphate very largely diluted, that the faint blue lines of ledgers and other account books are ruled. If the ink were used strong, it would be necessary to add chalk to it to neutralize the acid. The sulphate of indigo may be had of the woolen dyers.

BOOKS ADDED TO THE FREE LIBRARY OF THE BOARD DURING THE MONTH.

CLASS II.

Antiquities of England, 4to plates .... *Anon.*

CLASS III.

Plans and Elevations for Public and Private Buildings, 2 vols. in one, folio, 1770 .... *Inigo Jones.*
Architectural Plans and Elevations from original Designs, 2 vols. folio, 1756 .... *Isaac Ware.*

CLASS V.

Catalogue of International Exhibition of 1851, 1 vol. folio .... *Art Union.*

CLASS VI.

Vases and Ornaments, designed for the use of Architects, Silversmiths, Jewellers, Modellers, Chasers, Die Sinkers, Founders, Carvers, and all Ornamental Manufactures, 1 vol., 1833 .... *Knight.*
Art Union Illustrated Exhibition Catalogue, 1 vol., 1861 .... *Geo. Virtue.*

CLASS VII.

Dictionary of Chemistry, Arts and Manufactures, 2 vols., Imp. qu. 1860 .... *Dr. Muspratt.*

CLASS XIV.

Chemistry as applied and relating to Arts and Manufactures, 2 vols., Imp. qu. 1860... *Dr. Muspratt.*

CLASS XVII.

Naval and Mail Steamers of the United States, 1 vol., folio 1858 .... *Chas. B. Stuart.*

BRITISH PUBLICATIONS FOR DECEMBER, 1861.

	£	s.	d.	
Adcock's Engineer's Pocket-Book for 1862	£0	6	0	*Simpkin.*
Alison (Sir A.) Lives of Lord Castlereagh and Sir Charles Stuart, 3 vols. 8vo	2	2	0	*Blackwoods.*
Anderson (Rev. James) Memorable Women of the Puritan Times, 2 vols. cr. 8vo	0	12	0	*Blackie.*
Baker (Charles) Circle of knowledge, a Scientific Class-Book, Gradation 4, fcap. 8vo	0	4	0	*Wertheim.*
Ballantyne (R. M.) Gorilla Hunters, a Tale of the Wilds of Africa, fcap. 8vo	0	5	0	*Nelson.*
Bannatyne (G. M.) Guide to Examinations for Promotion in Infantry, Part 1, cr. 8vo	0	5	0	*Smith & Elder.*
Beever (Rev. W. Holt) Notes on Fields and Cattle, post 8vo	0	8	6	*Chapman & H.*
Bohn's English Gentleman's Library, Walpole's Letters, V. 9, 8vo	0	9	0	*Bohn.*
——— Philological Lib., Lowndes' Bibliographer's Manual, by Bohn, V. 4. Part 1 post 8vo	0	3	6	*Bohn.*
Bradley (Thomas) Elements of Geometrical Drawing, part 1 fol	0	16	0	*Chapman & H.*
Braithwaite's Retrospect of Medicine, Vol. 44, July—Dec., 1861, post 8vo	0	6	0	*Simpkin.*
British Workman (The). 1855—1861. 1 vol. fol	0	12	0	*Partridge.*
Buckle (Henry Thomas) History of Civilization in England, V. 1, 3rd edit, 8vo	1	1	0	*Parker & Son.*
Bucknill (John C.) and Luke (Daniel H.) Manual of Psychological Medicine, 2nd ed. 8vo	0	15	0	*Churchill.*
Builders' (The) and Contractor's Price-Book for 1862, 12mo	0	4	0	*Lockwood.*
Carmichael (Peter) Science of Music Simplified, roy. 8vo, red. to 1s. 6d	0	1	6	*Simpkin.*
Carter (Thomas) Medals of the British Army. Div. 3. India, China, &c., 8vo	0	7	6	*Groombridge.*
Cassel's Illust. History of England during last 100 years, by W. Howitt, V. 2, imp. 8vo	0	6	0	*Cassell.*
Catalogue of MSS. in the Library of the University of Cambridge, V. 4, 8vo	1	0	0	*Cox.*
Chambers (George F.) Hand-Book of Descriptive and Practical Astronomy, post 8vo.	0	12	0	*Murray.*
——— Enclyopedia, a Dictionary of Useful Knowledge, V. 3, sup.-roy. 8vo	0	9	0	*Chambers.*
Copleston (Mrs. Edward) Canada: Why we Live in it, and Why we like in, fcap. 8vo	0	2	6	*Parker & Son.*
Couch (Jonathan) History of the Fishes of the British Islands, V. 1, roy. 8vo	0	17	0	*Groombridge.*
Culsha (Rev. Edward Widt) Eastern Lands and Eastern People, post 8vo	0	6	6	*Marlborough.*
Drew (Rev. W. H.) Solutions to Problems contained in Conic Sections, cr. 8vo	0	3	6	*Macmillan.*
Dumas (Alexandre) Historical Library: Black Tulip (Rosa), fcap. 8vo	0	2	0	*C. H. Clarke.*
Edwards (Rev. L. C.) Formulæ in Pure and Mixed Mathematics, fcap. 8vo	0	3	0	*Harrison.*
Hodgson (C. Pemberton) Residence at Nagasaki and Hakodate in 1859–60, cr. 8vo	0	10	0	*Bentley.*
Hollingshead (John) Underground London, 12mo	0	2	6	*Groombridge.*
Hullah (John) History of Modern Music, a Course of Lectures, cr. 8vo	0	6	6	*Parker & Son.*
Hunt's Yachting Magazine, Vol. 10, 1861, 8vo	0	14	0	*Hunt.*
Jones (Thos. Rymer) Outline of Organization of the Animal Kingdom, 3rd edit., 8vo	1	11	0	*Van Voorst.*
Kirby (Mary and Elizabeth) Plants of the Land and Water, 18mo, red. to	0	2	6	*Jarrold.*
——— Things in the Forest, fcap. 8vo	0	2	0	*Nelson.*
Levy (Matthias) History of Shorthand Writing, post 8vo	0	5	0	*Trubner.*
——— Poets and Prose Writers of France, with Biog. Notices, cr. 8vo	0	7	6	*Black.*
Millington (Ellen J.) Heraldry in History, Poetry and Romance, post 8vo, red. to	0	5	6	*Bickers & Bush.*
Pepper (John H.) Boy's Playbook of Science, new edit., cr. 8vo	0	6	0	*Routledge.*
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Rogers (Mary Eliza) Domestic Life in Palestine, post 8vo	0	10	6	*Bell & Daldy.*
Scott's Practical Cotton Spinner and Manufacturer, 5th edit., 8vo	0	11	0	*Simpkin.*
Transactions of the Linnean Society of London, Vol. 23, part 2	1	4	0	*Longman.*
Turner's Liber Studiorum, Photographs from the 30 Original Drawings, roy. folio	0	3	6	*Cundall & D.*
United States (The) and Canada, as seen by Two Brothers in 1858 and 1861, cr. 8vo	0	4	0	*Stanford.*
Vandenhoff (George) Art of Elocution, with Extracts, 3rd edit., fcap. 8vo	0	5	0	*Low.*
Westgarth (William) Australia: its Rise, Progress, and Present Condition, fcap 8vo	0	3	6	*Black.*

AMERICAN PUBLICATIONS FOR JANUARY.

	$	cts.	
Craighill—The Officer's Pocket Companion, principally designed for Staff Officers in the Field. Partly translated from the French of M. de Rouvre, Lieut. Colonel of the French Staff Corps, with Additions from Standard American, French, and English Authorities. By William P. Craighill, First Lieut. U. S. Corps of Engineers, Assistant Professor of Engineering at the U. S. Military Academy. 18mo. pp. 814	1	50	*D. Van Nostrand*
Hallam—Constitutional History of England from the Accession of Henry VII. to the Death of George II. 3 vols. 12mo	3	75	*Crosby & Nichols*
Irving—Chronicle of the Conquest of Granada. From the MSS. of Fray Antonio Agapida. By Washington Irving. Author's revised edition. 12 mo. pp. 548..			*G. P. Putnam.*
Jomini—The Political and Military History of the Campaign of Waterloo. Translated from the French of General Baron de Jomini, by Capt. S. V. Benet, Ordnance Department, U. S. Army. Second edition, 12mo. pp. 327	0	75	*D. Van Nostrand*
May—The Constitutional History of England since the Accession of George III., 1760—1860. By Thomas Erskine May, C. B. In 2 vols. 12mo. Vol. 1. pp. 484	1	25	*Crosby & Nichols*
Stevens—The History of the Religious Movement of the Eighteenth Century, called Methodism, considered in its different denominational Forms and relations to British and American Protestantism. By Abel Stevens, LL.D. Vol. 3. From the death of Wesley to the Centenary Jubilee of Methodism. 12mo. pp. 524...	1	00	*Carlton & Porter*

Selected Articles.

FLAX CULTURE IN CANADA.

(*Continued from page 23.*)

The mode of treating the crop in the best manner is practised about Courtrai, and the neighbouring district, and has hence received the name of the

Courtrai System.

This system is to dry the flax after pulling in the field, and to stack it up till the following spring. when it is considered fit for steeping. To ensure the preservation of the seed, which is required for sowing rather than feeding purposes, the straw is put in stooks, care being taken not to tie it into beets or sheaves, but to leave it in small wind-stacks in the field, These wind-stacks are placed on cradles, to keep them off the ground, and to secure them from vermin and damp; the seed-ends are placed in alternate layers, and the bulk comprises from four to six sheaves in height and from three to four in width, the whole being thatched with straw like a sloping roof. When perfectly dry, the crop of flax is stacked up in the field, or farm-yard, like ordinary grain; and if well gathered it is considered to be improved by three years' keeping, as it will scutch much easier and to more profits.

Rippling.

The Belgians carefully attend to the rippling of the flax, because they consider it handles much easier afterwards, and that the seed is the most valuable part of the crop. For speedy work, three ripples are applied to an acre of pulled flax in a day; they are placed in the middle of the field, on a winnowing cloth, and if a cloth is not at hand, the ground upon which the machine stands is cleaned and beaten until it is as hard as a barn-floor. Six men require two women, two children, and a horse and cart to bring forward the straw, to ripple an acre of flax daily; the ripplers are kept stationary, in order that they should loose no time, but do their work well, which is not always the case, if they are interrupted by moving about. The girls supply the ripplers with the untied flax, and carry off the straw, when rippled, to the female binders, who are placed on each side the ripple, and are capable of tying a bundle of fourteen inches span, which size is best adapted for steeping. The best ripplers invariably sit down, and keep both elbows closer to their sides, to lighten the labour; this position enables them to give the weight of the body, to assist the arms in pulling through the straw.

The bolls rippled off each day are passed through a coarse riddle or fan, then spread open in the field, either on the winnowing cloth, or on that portion of the ground beaten hard. A girl or boy then keeps continually moving, or rather shuffling through the flax-bolls, with bare feet. At night, or in moist weather, the bolls are raked into ridges, and covered with the weeds gathered from the combs, or with straw; in the morning they are spread out again. If the weather be wet, the bolls are taken in-doors; and if dried at a corn-kiln, the temperature is never raised above summer heat, as it is only by slow drying that the seed can imbibe all the juices from the husks, which is necessary for good ripening. The kiln, however, is avoided if possible. When dry the seed is generally thrashed out with common flails, and cleaned through fans; in this condition it is fit for crushing, when the heaviest and plumpest are picked out for sowing. The value of the seed, like that of the fibre, is, however, greatly dependant upon the proper saving of the straw.

The Courtrai flax is produced not merely from the plant grown about Courtrai, but from what is carted to that place from other districts of Belgium, many of them thirty or forty miles distant. The reason of this is, that the river Lys, which rises on the other side of the French frontier, flows by Courtrai, and falls into the Escaut at Ghent, possesses peculiar properties for the fermentation of flax, such as no other river is known to afford. It is found that flax straw steeped in this famous stream yields a fibre of a very superior quality to that which is steeped anywhere else; and as Courtrai is the chief seat of operations, all the flax steeped in the Lys is termed Courtrai flax, wherever may the locality of its growth.

There are several modes of steeping, or what may be termed rotting, the flax. The object is to separate the fibre from the woody and gummy portions of the straw, and this is generally done by cold-water fermentation. Sometimes it is effected by what is called dew-rotting, that is, the straw is left upon the grass; sometimes it is rotted stagnant, and at others in running, water. In Belgium there are persons employed as regular steepers of flax; and when the farmer sells his crop of flax, before it is dressed, to the merchant or manufacturer, these persons dress and prepare it for the market. There are two or three modes of steeping even at Courtrai. One party make an artificial basin on the side of the river, of sufficient size to contain the flax, in which it remains until steeped; proper care being taken to keep it in an upright position with the roots downwards, for which purpose it is placed in a kind of hurdle or basket. In the majority of cases, however, the flax is steeped in the open stream; and those who have chanced to visit the banks of the Lys in the months of Spring and Autumn, must have frequently seen it filled with wooden crates, containing flax straw, and anchored in the stream.

In other cases, a pool or cistern of water is formed in the field, in which the flax is immersed, fixed upright, and the ends of the plants are not allowed to touch the bottom of the cistern; the latter is so arranged that the water can be drawn off and renewed at pleasure, as the flax is considered to have more weight when cleaned in this way than by any other, which necessarily augments its value.

Great skill is required to determine the precise time when the process of rotting is completed, and the flax should be removed from the water, as a few hours frequently makes a difference in its colour. The ordinary time, however, is from eight to ten days, according to the weather; but it clearly depends upon observation and experience—care being taken in all cases that the water has no mineral substance in it, which would in all probability discolour the fibre.

The steeping of the flax has no doubt been suggested by the constituent properties of the plant. If we examine the fibre with a microscape, its structure will be found to consist mainly of three parts. First, there is the straw; secondly, there are bundles of capillary filaments running parallel to each other, and lying upon the straw; and thirdly, the outer rind, too frequently taken for the fibrous portion of the matter, called the cuticle. The cuticle, or rind, is composed of a resinous or gummy substance, which is nearly insoluble in cold water; but when heated to a proper temperature, easily separates from the other constituents of the plant. For this reason, all judicious steepers avoid putting their flax in spring water, or even in water sheltered from the sun's rays, because the object of steeping is to dissolve, or at least to soften the cuticle, and thereby allow the filaments to be separated from it. If it does not arrive at this state, the rind, becomes hard in the course of drying, and prevents the separation which is necessary to produce fine flax.

The breaking and scutching operations are done both by hand and by machinery. Among the small growers the hand is more commonly used than the machine. The two processes are conducted after the following manner:—A block of wood, about five or six feet in length, by ten or twelve inches in width, having deep groves extend-through its entire length, about an inch wide at bottom, and increasing in width, in order that the surface of each groove may present a sharper edge, forms the lower portion of the hand-break. Over this block of wood another is fitted, having one end made fast with a hinge, and the other shaped like a handle. This upper block has two longitudinal edges, shaped to fit in the grooves of the under part of the implement; the flax-breaker, taking in his left hand a quantity of flax, and holding the handle with the right hand, places it between the two surfaces of the break, which, being repeatedly raised and let down with considerable force, breaks the stem without injuring the fibres, and separates the latter from the woody particles and other extraneous matter.

The next operation is separate the fibres from the *shoves*, or woody particles, which is ordinarily performed by a scutching-bat and a scutching-board. The board is fixed firm and upright in the stand, and the handsful of flax are inserted in the notch, held in the left hand, and placed so as to project towards the right, when it is beaten with the scutcher several times against the upright board; the portion in the notch being continually changed with the left hand.

In the larger establishments, however, where more concentrated labour is required for the process of scutching, machinery is commonly used. This machinery, in general, does its work in a very effective and rapid manner; yet there is still a lingering prejudice in favour of hand labour, and of the productions of that labour, amongst several classes of the community.

The mill, in general requisition, is sometimes driven by horse-power, but where available by water-power. There are three fluted cylinders—one of which is made to revolve by the power mentioned, and carries the other two round. The flax is placed between these cylinders while revolving, and the stalk by this operation is completely broken, without injuring the fibre. The scutching is performed in the same machine, by means of four arms projecting from a horizontal axle, arranged so as to strike the stalk in a slanting direction, by means of which the outer cuticle and other extraneous matter are removed.

The crops of flax in Belgium, when reared upon the system we have just described, realize almost fabulous prices. From £40 to £60 per acre is an ordinary return; and for the finest quality of flax, from £80 to £100 per acre has been obtained. The export of flax fibre to France and England is, in fact, one of the chief resources of the little state of Belgium, and it averages nearly one million sterling per annum in value. Leeds and Belfast, especially the former, are the best customers for this fine fibre; and the higher numbers of yarn—those from one hundred and sixty leas (fifteen hanks to the lb.) and upwards—are most exclusively spun from Belgian flax. Some of the Leeds and Belfast spinners have their buyers in the Belgian market, with full authority to purchase on their account, and to select the qualities they may require for the mills at home.

The fineness and excellence of the Belgian flax may, however, be better understood by perusing the following facts:—In the contributions to the Dublin Exhibition, we remarked those of Messrs. Collings, Freres and Co., of Courtrai, and M. P. J. Verbeck, of East Flanders, and Baptiste Van Weil, of Grembargen, near Termonde. These specimens of flax we examined with the best attention we could command, aided by perhaps the highest practical experience in Ireland, and never saw anything to equal them for fineness, softness, and lustre, combined with neatness of handling. The series we examined included three samples from Lokeren, in the Pays De Waes, all of beautiful quality, some white and blue Bruges, and three fine specimens of Courtrai. Few of these qualities were worth less than £70 per ton; and some of them run as high as £150; while the finest of all was estimated at £200 per ton. But even this high price is considerably outdone by the fibre from which the Mechlin and Brussels lace is made, as it has been known to sell for £4 per pound weight, when hackled, or nearly £9,000 per ton! Yet, in this extreme case, so little does the value of the material enter into that of the exquisitely fine and tasteful product, that a lace handkerchief, weighing about two ounces, has been known to sell for 2,500 francs, or £100.

The Importation and Exportation of Flax.

It may not be superfluous to furnish the proportional quantities of flax supplied by each continental state. The return is for 1850, which will convey a pretty clear idea of the nature and and extent of our annual demands, upon the foreign grower; there is no statement published of a later date.

Imports of Flax and Tow, or Codilla or Flax and Hemp, into Great Britain and Ireland, for the year 1850.

From	Cwts.
Russia*	1,240,766
Prussia	263,271
Holland	133,240
Belgium	107,336

* The following note on the flax trade of Russia will, perhaps, be read with interest at the present moment. From a statistical report of M. Tegoborski, Privy-councillor to the Emperor, we learn these facts:—M. T. estimates the average annual value of the Russian flax and hemp crops at 36,523,000 *silver roubles*, or about

Egypt	46,505
Hanseatic Towns	20,593
France	3,374
Denmark	2,958
Hanover	2,452
Tuscany	713
Australia	81
Sardinia	58
Malta and Gozo	55
United States of America	30
West Indies	8
Channel Islands (for. flax)	2
Total	1,822,918

The relative importance of flax-cultivation and its subsequent conversions, in each country of Europe, may be seen by the following imports:—

Great Britain and Ireland imported, in 1851	59,709	£2,985,450
France	18,563	932,106
The Zollverein States	11,882	494,000
Belgium	4,562	260,600
Total imported by the four countries	94,716	£4,772,156

In round numbers, therefore, the United Kingdom annually works up of foreign flax, the value of £3,000,000, while the other three States' aggregate consumption amounts to £1,750,000: of this quantity, Russia, it will be seen, furnishes by far the largest portion.

The Exportation of Flax.

Belgium takes precedence as a flax-exporting country, and her largest customers are the United Kingdom and France. The latter country generally consumes from fifty to one hundred per cent. more of Belgian flax than we do, as she requires the finest quality of material for her exceptional kind of goods. The quantity, however, of the French and our own importations, were nearly equal, in 1851; the one amounting to 5,656 tons against 5,290 tons. Other countries took about 123 tons of the Belgian flax; while the value of the exports from the United Kingdom amounted to £172,866:—

The Zollvereign States exported, in 1851	10,530	£502,650
Belgium	9,127	571,960
Great Britain and Ireland	4,979	172,866
France	777	41,724
Making the total export of flax from the four countries	24,813	£1,289,200

£5,847,680. This is exclusive of the Asiatic Provinces, in which, however, little is produced. With reference to the manufacture of linen, M. T. remarks:—"The material for a web of 2,600 threads, costs, in the government Jaraslow, thirty to forty per cent. dearer than in Belgium. For a web of 3,400 threads, the difference is sixty per cent.; and for a web of 4,200 threads, it is sixty-eight to one hundred and ten per cent. The difference increases with the fineness of the fabric, and this difference arises from the cost of labour. Besides the greater cost of hand-spinning over the spinning by machinery, the Russian weavers are paid precisely double the Belgian weavers, while the latter work better and speedier."

EXTRACTS

FROM THE ADDRESS OF THE CHAIRMAN OF THE SOCIETY OF ARTS, NOV. 30, 1861.

Mosaic Art.

The simplest form of Mosaic, or what may be regarded as closely allied to that art, is the encaustic tile, which is said to have been in universal use in England from 1300 to 1500, but was not again revived until 1830, when a patent was obtained for the preparation of encaustic tiles, with which the name of Minton has been generally associated, and which have been extensively made by many manufacturers of pottery. The second stage in the revival of the art of mosaic was the invention of Mr. Singer, who sought to produce a perfect imitation of the ancient tessilated pavement of the Romans, by the employment of a very ingenious machine for producing clay properly manipulated in the form of tesseræ, or small cubes, uniform in size, colour, surface, and hardness, and which were burnt and partially vitrified. The third stage in the revival was the discovery, by Mr. Prosser, of Birmingham, in 1840, of an improvement which carried one branch of the art to a high point of perfection, and which consisted in subjecting china clay, when reduced to a dry powder, to strong pressure between steel dies, whereby it was converted into a compact substance of much hardness and density, less porous and much harder than porcelain uncompressed and baked in the furnace. This discovery was applied by Mr. Prosser to the to the production of shirt buttons, and has also been extensively employed for this purpose in France, but was employed by Mr. Blashfield in the formation of tesseræ, made for him by Minton, and used with much success in many large works, one of his earliest specimens being the pavement of the hall of this Society, which was jointly presented by Messrs. Blashfield and Minton.

May we not adopt the concluding passages of Mr. Wyatt's paper, and say that the noblest works of antiquity derive much of their beauty from form, much from carving, much from colour, but more from the perfection of industrial arts employed in their construction; and happy it is for this Society to be regarded as the nursing mother of such arts. The applicability of mosaic, as an essential element of decoration, can scarcely need argument. "Its glowing colours would revive our drooping taste for the rich and ornamental, and its imperishability would serve to perpetuate the fact that England once possessed and cherished a decorative art somewhat more enduring than compo."

Programme of Examinations.

The Society's programme of Examinations for 1862, has been published and widely circulated, and supplies ample details for the guidance of Local Educational Boards, as well as of students who may desire that their efforts for self-culture shall be tested by the Society's Examiners. The Council have been authorized to notify the intention of H. R. H. the Prince Consort to offer annually a prize of twenty-five guineas to the candidate who, obtaining a certificate of the first class in the current year, shall have obtained in that year, and the three years immediately preceding it, the greatest number of such certificates. This prize cannot be taken more than once by the same candidate. It will be accompanied by a certificate from the Society setting forth the special character of the prize, and the various certificates for which it was granted. Several friends of the Society have authorized the Council to offer additional prizes for Practical Mechanics; Animal Physiology in relation to Health; Agriculture; Botany; Mining and Metallurgy; Political, Social and Domestic Economy; and English History and Literature. The Council gratefully appreciate the thoughtful interest which His Royal Highness our President has always manifested in the labours of the Society, and the liberal encouragement to the work of self-instruction which the valuable prize now offered will give to the intelligent and persevering student. To win that prize will be the highest distinction within the reach of the candidates for the Society's rewards.

Evening Schools and Classes.

The importance of evening schools and classes is now universally recognized; and though the provision for those objects is, as yet, in no adequate proportion to the want, it appears from the report of the Committee appointed to inquire into the state of popular education in England, made in the present year, that there now exist 2,036 evening schools, containing 80,996 scholars, in which the instruction is almost entirely elementary. The school life of those children whose parents are employed in manual labour must ever terminate at a very early age, and the tendency of late years has been rather to accelerate than retard the removal from school to work, and to shorten the duration of school life.

It appears from the report of the Commissioners that 65 per cent. of the children in elementary public schools are between the ages of 6 and 12; few go before 6, very few before 3; that attendance diminishes rapidly after 11, and ceases almost entirely at 13, only 5 per cent of the children at our day-schools being over that age.

Very much of the instruction acquired before 13 in the day-school will be lost before 18 in the workshop, if not preserved and extended in the night-school; and in proportion as the day-school is extended, will be the growth of a consciousness on the part of our young people that the night-school should complete what the day-school has begun. It has been found, as the result of careful inquiry by the Commissioners, that two millions and a half of children are now on the books of week-day schools, and that upwards of two millions of the children of working men are receiving education on week days. Year by year, hundreds of thousands of children exchange school for labour, and yet of this vast array our night-schools provide for less than a hundred thousand young persons. Can Christian philanthropy present higher aims than the intelligent and religious teaching and training of these adolescents during those years when the passions are strong, and the allurements to vicious gratifications well nigh overwhelming. And without neglecting its other objects, the Society has sought to encourage every suitable agency for the systematic instruction of the adult student, rewarding the meritorious by certificates of excellence, distinguishing the most successful by prizes of a substantial character, and affording to all the opportunity, by judiciously conducted examinations, of measuring their strength, discerning their short-comings, and obtaining at length the just rewards of persevering study.

Sanitary Improvements.

The improvement of the metropolis, by affording a complete system of sewerage, and an ample supply of pure water; by diminishing atmospheric impurities; by embanking the river; and by facilitating locomotion within and between the several quarters of the wide area of the London of our day, has frequently occupied the attention of our Society, and been forced upon the notice of the public by papers and discussions in this room. In a single decade, 400,000 persons have been added to the population of the metropolis. Its thoroughfares are thronged, not only by its own population thus increased, and by the numerous passengers who daily arrive at and leave the termini of its various railways, but by the countless productions which are either consumed within its borders, or constitute its exports and imports. The magnitude of its commerce is attested by its railways, its docks, and its shipping; and it may suffice to state here that in the year 1860, nearly 20,000 vessels, of an average tonnage exceeding five millions of tons, entered inwards or cleared outwards to or from our colonies and foreign countries, and upwards of 27,000 vessels of an aggregate tonnage exceeding four millions of tons, entered or left with cargoes from or for places within the United Kingdom.

Locomotion.

Notwithstanding the great rapidity with which long journeys by sea or land may now be performed, so that a traveller may reach Dublin from London in 12 hours, London from Geneva in 26 hours, and Liverpool from New York in eight or nine days, it requires now as much time to cross the metropolis, whether from north to south, or east to west, as when the journey from Dublin to London occupied three days, from Geneva to London six days, and from Liverpool to New York six weeks or two months.

The thoroughfares and means of locomotion which sufficed for 1851, are wholly unequal to the wants of 1861; and to provide adequate accommodation for the transit of the metropolitan traffic, involves questions which have hitherto received no satisfactory solution In a few years districts have been added to the metropolis which would of themselves constitute large cities, and this extension proceeds in an accelerated ratio.

Meanwhile, considerable progress has been made in the construction of subways, which were regarded as visionary in 1851, when a discussion took place in this room on a proposal for combining with the embankment of the Thames a terraced highway with a railway arcade and tunnels for water, sewage and gas. What practical difficulties might prevent the completion of such an undertaking, I know not; but whether regarded for its combinations, its grandeur, or its usefulness, such a work would rank with those structures which, more than aught besides, even in their ruins, testify to the greatness and power of the Roman Empire.

Cotton.

There are few subjects to which the Council has more perseveringly directed the attention of our manufacturers, than the importance of lessening the dependence of this country on the American States for a supply of raw cotton. Two papers of much interest were, at the request of the Council, read by Dr. Forbes Watson; one in the session of 1858-9, on the "Growth of Cotton in India," and one in the session of 1859-60," on the "Chief Fibre-yielding Plants of India." The last paper is especially valuable for its large amount of information and its numerous illustrations, furnished at the expense of the Indian Government; but at present my chief attention will be given to the first, which describes the capabilities of our Indian Empire for the growth of cotton.

At the recent meeting of the British Association, it was said by a Manchester capitalist that a capital of two hundred millions is embarked in our cotton manufactories, and that four millions of people are in some way or other dependent on the trade in cotton; that the value of our cotton goods yearly manufactured is eighty millions, of which the portion exported is equal to fifty-five millions; that the cost of the raw material we consume is forty millions; and that of every 100 pounds of raw cotton consumed, we have been supplied by the United States with 85 pounds.

The actual weight of cotton imported into this country from all parts of the world was, in 1859, 1,225 millions of pounds, and the quantity annually grown in India is estimated by Dr. Forbes Watson at upwards of 2,400 millions of pounds, or double the average consumption of this country. He stated that in one province alone, Berar (where the quality of the cotton grown is second to none in India), a supply could be furnished to this country equal to one-third of our entire consumption; and that Indian cotton can be grown at a rate varying from 1¼d. to 1½d. a pound, and delivered in England at 4d. per pound, notwithstanding the present imperfect means for the transit of cotton from the interior to Bombay. In the address which I delivered from this chair in the year 1859, I ventured to anticipate a time when, by means of increased intelligence and capital, directed to the cultivation of the cotton plant in India, and improved communication with the interior of that country, we should receive from our own dependency, in large measure, a raw product of vast importance to our manufacturing community and the well-being of our population; thus cheapening a material supplied to Europe to a great extent by the United States, and in that country the product of slave labour. In a subsequent address I intimated that it was impossible to exaggerate the importance of the subject, inasmuch as millions of hands are engaged in or dependent on our cotton manufactures, and to them a stoppage in the supply of raw cotton would be equivalent to a food famine.

British Colonies and Dependencies.

The aggregate population of our colonies and dependencies is there stated at 195,000,000; their import and export trade at £176,000,000; their revenue at £44,000,000; and the amount of their imports from the mother country at £46,000,000, being nearly one-third of our total exports to all countries.

The most remarkable characteristic of our recent colonial history, is the rapid growth of those valuable possessions from infancy to manhood; from settlements, ruled by an administrative department in the mother country, to commonwealths, possessing native legislatures, and entrusted with the organization of their executive governments.

Their growth in population, trade and material wealth, has but few parallels. Thus, in South Africa the export of wool has increased from six millions of pounds in 1851, to 24 millions in 1859; and of wine, from 250,000 gallons in 1852, to nearly 800,009 in 1859.

In North America our colonial population has increased from 2½ millions in 1851, to 4 millions in 1859, and the imports from a sum less than 5 millions in 1850, to more than 9 millions in 1859.

On the western shores of North America, a province known as British Columbia has recently started into existence, and bids fair at no distant day to rival Australia. The gold fields of British Columbia will assuredly attract an active, energetic population, whilst its position on the shores of the Pacific must confer on the colony great importance as a naval station.

The noble Earl who presided with so much ability at the last aniversary dinner of the Society, mentioned, on that occasion, as a fact within his own knowledge, that between the year 1847, when he went to Canada as Governor-General of the North American Provinces, and 1855, when he left the country, the revenue and trade of those provinces had quadrupled.

In Australia the population has more than doubled in ten years, whilst the aggregate revenue has risen from a million and a quarter to six millions a year, and the imports and exports have increased from eight millions in 1850, to 47 millions in 1858; and it is computed that the gold obtained from Australia in ten years, has exceeded in value one hundred millions sterling.

Our colonies and dependencies, including India, will be well represented at the forthcoming Exhibition, as all, with the exception of the Cape, have entered with ardour into the industrial and artistic rivalry which the undertaking has enlisted.

ANALYSIS OF STAINS, SUPPOSED TO BE CAUSED BY BLOOD.*

It is a matter of the highest importance to know if stains, supposed to be caused by blood, can be correctly analysed; and also if it can be determined what animal the blood came from, but more especially if it is human blood. These questions generally bear reference to judicial cases, and often involve a matter of life or death.

It is the more necessary to examine these questions, as certain authorities have asserted that not only can blood stains be analysed correctly, but that even the animal from which the blood came can be firmly established.

I will examine, one by one, the tests given us by these authorities.

If the spots are upon some fabric, they must be cut out, but if not, they must be carefully scraped off. In either case, they must be placed in some clear water, keeping the spots in the water, but near the surface. If these spots are blood spots, a heavy stream will fall to the bottom of the water.

* By Thomas D. Toase, Esq., F.C.S., F.S.A., Jamaica.

This is the method given by my late much lamented master, M. Orfila, the celebrated toxicologist. I mention this, as Dr. Taylor, in his late work on Medical Jurisprudence, would seem to take the credit to himself of originating this simple mode.

Supposing that the heavy stream falls, there is certainly an indication of blood; but if there is no stream, an indication of the presence of blood is wanting, chemically speaking.

If the heavy fluid is formed, then take the pieces out of the water carefully: draw off the supernatant water with a pipette, so as to leave only what may be presumed to be blood: with care this can be easily managed (Orfila). Put this fluid into six test-tubes, and a portion on a glass slip to be examined later under the microscope; these portions to be tested in the following manner:—

The quantities, of course are so small that it would be useless to examine the spots for fibrine, important though such an examination would be, if possible. On an average, in a healthy body, blood is said to contain only two parts in a thousand of fibrine. Seeing the smallness of the quantities, the attention of the analyst must be directed to the albumen and the iron. It will be useless to seek for the characteristic colouring matter of the blood (hematosine) after the lapse of some days, these spots being, in all probability, several days old before they pass into the hands of the analyst.

Before examining the tests, I must draw special notice to this fact, in the two tests I shall first mention, the spots must be fresh, as these two tests do not shew themselves on blood that has been kept for some time. Indeed, in one case mentioned by Mr. Taylor, some true spots of blood which had been operated upon, refused to answer to these two tests after twenty-four hours in warm weather. I shall, however, mention them:

1st.—If the stains are recent, take a little of the red fluid that has been collected, and mix it with some water; if this fluid dissolves readily in the water, and imparts to it a rich red hue, the colouring matter of blood (hematosine) is indicated. I cannot but consider this test as valueless, not only because freshness is a necessity, but because other colouring matter may produce the same tint when dissolved in water, and the supposed blood-stains may be only stains produced by other colouring matter, not hematosine.

2nd.—To this solution add a few drops of weak ammonia, taking special care to add very little ammonia (a glass rod dipped in a weak solution of ammonia, shaken and dipped in the red solution, will be the safest). If the red solution becomes crimson or green, it is not blood; but if the solution remains unchanged, then the evidence is still stronger that this colouring matter is the hematosine of blood. This is certainly a most valuable test, *if* there are no red colouring matters, other than hematosine, which are unaffected by ammonia.

But I cannot dwell too strongly on the fact, that these two tests, indicating the presence of the colouring matter of blood, require that the stains be fresh.

In the following tests freshness is not necessary.

3rd.—Take some of the thick liquid, collected from the stains; add a quantity of concentrated ammonia, and see if the colour now changes to a brown tint; if so, I think we have reason to suspect iron, but we are far from having established its presence, to prove which we must apply all the known tests for iron, which our small quantities to be tested will not allow. We must, therefore rest contented with a mere indication. And even should we determine the presence of iron in the stains, that would not prove, of itself, that the stains were blood-stains. It is evident that this test possesses but little value, seeing that we can produce the same reaction from other stains besides blood-stains.

4th.—Boil a little of the red fluid, and see if it coagulates, if the colour is destroyed, and if a flocculent brown precipitate is formed. The coagulation will indicate albumen, but that is all.

5th—Take the flocculent brown precipitate, filter and dry it, and see if it becomes a black resinous substance, insoluble in water; if so, then add some caustic potash, boil again, and see if a green coloured solution is formed. This would lead us again to suspect iron.

6th.—Now take some of the suspected fluid, add to it some strong nitric acid, and if the fluid coagulates albumen is again indicated.

But I must protest against these tests; they are unchemical and unsatisfactory; we can obtain from them, at most, but indications of iron, albumen, and, if the spots are, fresh hematosine. I have purposely employed the term "indications," for I most emphatically assert, that no chemist has a right to say "such and such is the composition of such a body," if each material composing that body has been determined on the faith of one or two tests, and these tests the very reverse of conclusive; such reasoning could not be admitted in a chemical laboratory. As an analytical chemist, I would not do so in any commercial analysis, fearing a mistake on my part, leading to future exposure by some brother chemist, as in a case I well remember: a chemist had relied on two tests, and on them determined that a certain substance contained lead; another chemist examined the same substance more carefully, and found that it contained bismuth, and not lead. If a chemist dreads the exposure of a mistake, caused by an incomplete analysis of a mere commercial substance, how much more would he fear swearing a fellow creature's life away on mere indications.

For I assert, that to make a complete analysis of a fluid, suspected to be blood, that the iron, the albumen, the hematosine, and the fibrine should each be separated and each examined by all the known tests for each; and if one test fails, I maintain that the analysis is incomplete, according to laboratory practice.

But there is another important aid, the microscope, which determines the presence and the form of the corpuscles, if present, this is a most valuable test; but it is simply a microscopical test, unsupported by a satisfactory chemical analysis.

I, therefore, come to the conclusion that, considering the small quantity of matter to be acted on, we can only obtain presumptive evidence that blood is the cause of these stains. I must again remind the reader that the determination of these questions may involve a matter of life or death, and that the accused has a right to the benefit of a doubt, the more especially as such an examination as I have just described, made in a chemical laboratory, where only commercial interests are concerned, would not be received.

I am loath to leave this subject without giving a striking proof of how elementary our knowledge of blood is. Fowne's work on Chemistry, a text book in very general use, contains this assertion:—"The colouring matter of blood contains albumen, and coagulates by heat, and by the addition of alcohol; this albumen cannot be separated, and all attempts to isolate the hematine, or red pigment, have consequently failed. From its extreme susceptibility of change nothing is known of it in a state of purity." Now, Muller, in his "Manual of Physiology," says quite the reverse:—"When blood, coagulated by alcohol, is boiled in this re-agent, the hematine is dissolved, and we thus succeed in freeing it from the whole of the adherent albumen."

We have now to determine if human blood, submitted to a microscopic examination, can be distinguished from the blood of any other animal. The circular form of the globules confines our attention to mammiferous animals, to the exclusion of the dromedary and the lama. This subject has already been so satisfactorily discussed by Taylor, that I cannot do better than subjoin the following quotation:—"The only microscopic distinction between the blood of man and domestic animals, consists in a difference in the size of the blood globules. This, however, is only an average difference, for the globules are found of very different sizes in the blood of the same animal. In making use of this criterion, it would be necessary to rely on the majority of the corpuscles seen in a given area, and under the same power of the microscope. The corpuscles in man, the dog, the rabbit, and the hare, are nearly of the same size. In the blood of the sheep and goat, they are smaller than in that of any other animal. According to Gulliver, the measured diameter of the globules in human blood varies from 1-2000th to 1-4000th of an inch. From the examination of various specimens of human blood, I (Taylor) have found the average diameter of the globules to be the 1-3500th of an inch, the maximum size being 1-3000th and the mimimum 1-5000th. According to Guliver, 1-4267th in the ox, in the cow, according to my measurement, 1-4000th to 1-2000th. In the sheep, according to Gulliver, 1-5300th; according to my measurement, 1-5330th to 1-6000th. In the goat, according to Gulliver, 1-1366th.

"These measurements apply to recent blood, which has not been allowed to dry in animal and vegetable stuffs. In this case a distinction might be made between the blood of a human being and the sheep. When blood is dried on clothing, and it is necessary to extract the corpuscles by means of a liquid of a different nature from the serum, we cannot rely on slight fractional differences, since we cannot be sure that the globules, after having been dried, will ever re-acquire, in a foreign liquid, the exact size which they had in serum. Medical evidence must, therefore, be based, in such cases, on a mere speculation."

Many other considerations might be added, but they appear superfluous after the very conclusive summary I have just quoted.

HISTORICAL AND SCIENTIFIC FACTS ABOUT PETROLEUM.

Within the last three years there has sprung up in this country an important and extensive branch of industry—the refining of petroleum, or, as it is sometimes called, a mineral oil. This is already a staple article, and its use as an illuminator, is becoming every day more extended. When properly manufactured it is not explosive, it affords a brilliant flame, it can be furnished at a moderate price, and, moreover, its sources of supply in this country are abundant. The subject is one of so much general interest that we are induced to publish the following interesting article concerning this substance, which was sent to us by a member of the Chemical Society of Schenectady, N. Y.:—

Petroleum is not of constant composition, but is a variable mixture of numerous liquid hydro-carbons, as benzole, naphtha, kerosolene, &c., with paraffine, naphthaline and asphaltum, solid hydrocarbons. It is of a very dark green colour, and in density varies from a thin fluid, lighter than water, to a thick viscous liquid, heavier than water. The lighter qualities yield the larger proportion of burning oil.

The evidence of the most ancient occurrence of petroleum is among the ruins of Ninevah, whose existence dates back more than two thousand years before the Christian era. In the construction of this city, an asphaltic mortar was extensively employed, the asphaltum being obtained by the evaporation of petroleum.

A later mention is found in the accounts of Babylon, whose walls were cemented with asphaltum, which was poured, in a melted state, between the blocks of stone, and an indestructible mortar thus secured. This asphaltum was procured from the fountains of Is, which were about one hundred and twenty miles above Babylon, on the Euphrates. Together with saline and sulphurous water, it issued from a rock and was conducted into large pits. The oily matter was then skimmed off and solidified by atmospheric evaporation. These springs, from the abundance of their products, attracted the attention of Alexander, Trajan and Julian, and even at the present time, asphaltum procured from them is sold in the neigbouring village of Hits.

From time immemorial asphaltum has been found on the shores of the Dead Sea, and this is one of the most remarkable localities for it. This sea, as is well known, is of supposed volcanic origin; and is the probable site of the ancient cities of Sodom and Gomorrah. Its surface is thirteen hundred feet below the surface of the ocean, and it has been fathomed to the depth of two thousand feet. In several places no bottom has been reached, and, owing to internal convulsions, the depth changes from time to time. The water is very dense, holding in solution twenty-five per cent. of solid matter, of which seven per cent. is salt. The bituminous substance is up-thrown from below and towards the centre ot the sea it is found in a liquid state, like petroleum; but it is probably solidified by evaporation, as it appears upon the shores in hard compact masses. The explanation of this phenomenon is that a connection between the sea and some internal volcano exists, whence this substance is ejected.

In the vicinity of the Caspian, the Bakoo springs have yielded large quantities of oil, and are widely celebrated. Some of the Persian wells have furnished fifteen hundred barrels a day, and throughout this region this material, under the name of Naphtha, is very generally burnt for its light.

At Rangoon, in Burmah, petroleum has been obtained for many years, and at this time there are over five hundred wells, which annually afford four hundred thousand hogsheads. The oil occurs in a strata of blue clay; wells about sixty feet deep are dug, into which the petroleum oozes. This is sometimes used in it natural state, but more frequently it is first purified by distillation with steam. The raw material is also mixed with earth and used as fuel.

In Europe there are few abundant springs. On one of the Ionian Islands there is an oil fountain which has flowed for over two thousand years: and the oracular fires of ancient Greece have been attributed to similar sources. Oil springs also occur in Bavaria, in the Grand Duchy of Modena, at Neufchatel, at Clermont and Gabian in France, and near Amiano in Italy. Petroleum procured from the last-named locality is used for lighting the city of Genoa, but elsewhere in Europe it is not employed, to any extent, as an illuminator.

On this side of the ocean there is an enormous quantity of this substance. Upon the island of Trinidad, one of the West Indies, at a distance of three-fourths of a mile from the sea, is a lake of asphaltum three miles in circumference. Near the banks the asphaltum is hard and cold, but as you approach the centre the softness and the temperature increases, until finally it is liquid and boiling. From the bubbling mass proceeds a strong, sulphurous odour, which is perceptible at a distance of ten miles. Between the banks of the lake and the shore of the island is an elevated tract of land, covered with hardened asphaltum, upon which vegetation flourishes. The explanation put forward in connection with the Dead Sea, is equally applicable in this case.

Upon others of the West Indies petroleum has been obtained, as well as at several places in Central and South America; but it is in the northern portion of this continent that the abundant reservoirs of this substance are located; and it seems truly wonderful that their extent and richness should not have been discovered at an earlier period. For many years the Seneca Indians collected petroleum, and, under the name of Seneca oil, sold it as a remedy for rheumatic complaints. At numerous places in the Middle States it was found in salt borings, and was collected and burnt by the farmers, but it was not till August, 1859, that it was obtained in noticeable quantities. At this time oil was "struck" upon Oil Creek, Venango County, Pennsylvania, by sinking an Artesian well to the depth of seventy feet, and for many weeks a thousand gallons a day were pumped from it. The news of this discovery spread far and wide, and gave rise to an "oil fever." Thousands flocked to this vicinity in the hope of making their fortune. Before the close of 1860 there had been over a thousand wells bored, many of which were productive, but a large proportion returned nothing. Some of the adventurers have been very successful, and have made large amounts of money; but, as in all commercial "fevers," a large number of persons have been utterly impoverished by their speculations. The mere sinking a well by no means insures a bountiful flow of oil. The petroleum is stored in fissures formed by the upheaving of the earth's crust by volcanic action; and these fissures are perpendicular rather than horizontal in tendency, as is proved by the fact that at wells, but a few rods apart, the oil is "struck" at very different depths. The lowest parts of the fissures contain water, above which is the oil, while in the highest portion there is a quantity of gas. If, therefore, the well strikes the fissure at the lowest part, the water will be forced up by the pressure of the supernatant oil and gas. Persons ignorant of the formation sink a well at random, and perhaps strike a fissure; but obtaining nothing but water, they abandon the spot as worthless, whereas after removing the water by pumping, a large quantity of oil might be obtained.

In some localities in Ohio, as in the case in Burmah, the ground is saturated with the oil, and wells several feet in diameter are dug, into which the oil oozes. Porous limestone, containing petroleum, is found in some sections of the West, and has been subjected to distillation with profitable results.

In regard to the origin of petroleum, scientific authorities differ; but the theory most generally favoured is, that it is the product of the slow distillation, at low temperatures, of organic matter in the interior of the earth; the vapours being condensed in the previously-mentioned fissures and the surrounding soil. The lake of Trinidad and the bituminous matter of the Dead Sea may also be referred to a similar source. But for how many centuries must this operation have been going on to have effected such enormous results?

Of the many uses to which petroleum and its derivatives are applied, that of illumination is the most important; and the process of refining is exceedingly simple. The crude material is put into a large iron retort, connected with a coil of iron pipes, surrounded by cold water, called the condenser. Heat is applied to the retort, and from the open extremity of the condenser, a light coloured liquid of a strong odour soon flows. This is naphtha, and is very volatile and very explosive. Some refiners mix it with the burning oil, and numerous accidents have resulted from such mercenary indiscretion. It is usually run into a separate tank. After the naphtha has passed over, the oil used for illumination distills off. Steam is now forced into the retort and the heavy lubricating oil driven over. There now remains a black, oily, tarry matter, sometimes used to grease heavy machinery, and a black coke, employed as fuel. There are, therefore, five substances separated in this operation, but only the first three are of any economic importance.

The naphtha is used as a substitute for turpentine in paints, or by repeated distillations the benzole is separated from it and employed to remove spots from fabrics. This, however, is rather a drug in the hands of the refiner.

The burning oil, as it comes from the retort, is of a yellow colour, and in order to remove this, it is placed in a large lead-lined cistern, and agitated with about ten per cent. of sulphuric acid. After the acid and impurities have subsided, the oil is drawn off into another tank and agitated with four per cent. of soda lye. This last operation is to remove any acid remaining with the oil, and also to extract the residue of the colouring matter. In fact it is sometimes employed alone and a very good oil obtained. The oil is now agitated with water to remove the soda lye, and is then ready for consumption. The colourless oil is by no means the most economical, but on the contrary more light is obtained from the yellow article.

The heavy oil is cooled down to 30° Fah. when the paraffine crystallizes out, and is separated from the oil by pressing. It is further purified by another pressing and by alternate agitation, in a melted state, with sulphuric acid and soda lye. It is then moulded into candles. It is a curious fact that the composition of paraffine and good coal gas is exactly the same.

In Egypt a substance derived from petroleum was used in embalming bodies; and in Persia and the neighbouring countries asphaltum is used to cover the roofs of the houses and to coat the boats. In France asphaltic pavements have been successful in several cities, and for the protection of stone no material is better adapted. Mixed with grease the Trinidad asphaltum is applied to the sides of vessels, to prevent the borings of the teredo, and with quicklime it affords an excellent disinfectant. Among the products of the distillation of petroleum are naphthaline and keresolene. The former is the substance from which is obtained aniline, the base of the beautiful colours mauve, magenta, and solferino. The latter has been proposed as a substitute for chloroform and ether. Many other substances have been separated, but as yet none of them have been applied. As this is comparatively a new field many discoveries may be confidently expected in the course of a few years.—*Scientific American.*

THE OIL WELLS IN ENNISKILLEN.

A correspondent of the Toronto *Globe*, under the signature "Sigma," describes the flowing spring of Petroleum in the township of Enniskillen, which has been reached by boring to the depth of 208 feet. He says:—

"On the 16th of this month, a Mr. Shaw, lately of Port Huron, Michigan, a dauguerrean artist, and formerly of Kingston, Canada West, struck oil, as it is termed, near the road running between the second and third concessions of this township, on the north part of the east half of lot 18, in the second concession. The well is sunk about 208 feet below the surface of the earth, and measures four feet by five at the top, but gradually narrows, I presume, towards the bottom. The first fifty feet was a clay soil, and the remaining 158 feet was drilled into the rock. You can form some idea of the enormous pressure with which this liquid was forced up from the bowels of the earth when I tell you, that within fifteen minutes of the last drill of the chisel, the oil was overflowing the surface of the earth, the well being entirely filled. The great mystery then was, how they should controul this spontaneous flow, and it is remarkable how easly it was accomplished. An iron two and a half inch pipe was provided, and on the end which was to enter the cavity drilled into the rock, there was a leather bag twelve feet long, filled with flax seed wrapped around the pipe, and this was lowered to the bottom of the well, and by means of the seed swelling the cavity was tightly closed and oil was prevented from escape, except through the pipe. It rushed up this pipe after this had been accomplished, and spouted into the air twenty feet above the surface of the earth. Another pipe was provided only three quarters of an inch in diameter, and around one end was wrapped another seed bag, and this was inserted within the two and a half inch pipe, which reduced the flow by this means to the quantity that could pass through this three-quarter inch pipe. There are four large receiving tanks, capable of holding each 120 barrels or about 5,000 gallons each, placed at a distance of 30 feet from the well, and connected from the main upright pipe through which the oil flows, are four hose, one of which feeds each of the tanks, and from the tanks the oil is drawn off into barrels, containing 40 gallons each. I timed the filling of these barrels and found that in one minute and forty-five seconds each barrel was filled. From the time that the flow of oil was brought into partial subjection (which was on Friday evening) up to this time, upwards of 2,000 barrels have been taken away, and more than this quantity has been lost. The tanks are always overflowing, although they are constantly drawing it off into barrels, which proves that even although the yield is subdued to about one-fourth of its natural proportions by means of the three-fourth inch tube, that if additional tanks were provided the main pipe would feed them. You can easily estimate the quantity of oil that could be obtained from this well if the main feeder were three inches in the bore instead of being less than three quarters of an inch. The quantity is prodigious.

"The oil is sold here at two and a half cents a gallon, but in reality it is worth nearly ten cents in the crude state. Its colour is a beautiful dark bottle green. Its specific gravity is 42, and experienced men pronounced it a superior quality to the oil taken from the surrounding wells. Owing to the want of barrels and other conveniences respecting its removal, only some 670 barrels are taken from the well each day. They are preparing additional reservoirs for receiving it, and in a few days, it is to be hoped, this loss will be obviated.

"How long this spontaneous flow of oil will continue it is impossible to tell, but it shows no sign of diminution at present. There was no surface oil at any time in this well. That is to say, no indication of oil was manifest until the rock was drilled upwards of 100 feet.

"The next best well in this region is situated on lot 19 in the second concession, on the north end of the lot. It yields less than 30 barrels per day. There have been few, comparatively, who have drilled into the rock, and it is my opinion from the information I have received here, that all along this line rock oil will be found.

"Oil Springs is quite a village. There have been upwards of 100 houses erected here since last spring. Owing to the Southern rebellion, much less has been done here this last six months than would have been done had it not occurred. We are mainly dependent upon the capital and enterprise of the Americans to develope the rich resources of this trade. They have a settled population in the village of about 700 souls, I am told. A newspaper is to be printed here, the first number of which will issue shortly. Eighteen months ago this was a wilderness! A Buffalo company has purchased lot 23 in the third concession, and have made a partial commencement to sink a well. There are one hundred teams engaged in the oil business. The plank road from Wyoming to Oil Springs will be completed immediately. There is not more than one quarter of the wells in active operation, owing to the lack of demand.

"Upwards of 2,000 persons have already been to see for themselves the wonderful oil well in Enniskillen."

THE BUILDING FOR THE INTERNATIONAL EXHIBITION OF 1862.

General Description.

In the general design of the building, its suitability for future International Exhibitions has been kept steadily in view, and it has a much more permanent character than the famous Crystal Palace erected for the 1851 Exhibition.

It differs therefore from its predecessor in many essential particulars. It is more commodious, more imposing in its interior, more varied, more suitable for Exhibition purposes, while from without its aspect is of impressive magnitude and grandeur.

Here glass and iron are no longer the main features of the design, but are succeeded by lofty walls of brickwork, which surround the walls on all sides, and form the walls of the fine art galleries. The east end and west sides, by being continued past the southern arcade of the gardens, have a frontage of 750 feet, and that on the south is 1,150 feet. The north front is the lower arcade of the gardens, which is having a permanent upper story added to it. The interior space thus enclosed is entirely covered in by roofs of various heights, and is divided into nave, transepts, aisles, and open courts; the latter, occupying comparatively a very small portion, are roofed with glass as in 1851, but the other parts have opaque roofs, and are lighted by clerestory windows.

The interior supports are hollow cast-iron columns, as in 1851, of somewhat larger dimensions, being a foot wide, with half an inch of metal in them. They are so arranged as to come at intervals of 25 or 50 feet from centre to centre; in fact, 25 is the the unit here as 24 was in 1851, and you will find nearly all the leading dimensions, both vertical and horizontal, to be multiples of that number. The exceptions to this rule are the nave and transepts, which are 85 feet wide; the former runs east and west, and terminates in the centre of those fronts, having its central line 81 feet north of the centre line of the building; the latter extend north and south from the ends of the nave throughout the whole width. At the intersection of the nave and transepts are the great domes. The aisles are continued all round the nave and transepts, and the space enclosed by them forms the open or glass courts.

The columns are supported differently from what they were in 1851. On that occasion they were attached to connecting pieces, which, terminating in a large flat base plate, rested on concrete laid flush with the ground; these connecting pieces of course varied in height to suit the slope of the ground. This has been avoided in the present building by bedding the colums themselves on York slabs laid on brick piers, which are founded on concrete; the slabs being all adjusted to the same level throughout by varying the height of the brickwork, only one length of column is used, and the facility of setting them up is thus greatly increased.

At the north ends of the east and west fronts are the two annexes, temporary, supplementary structures, designed for the exhibition of machinery and other ponderous objects, which could not be conveniently placed in the main building.

The total area roofed in is 988,000 square feet; it is therefore, considerably larger than the 1851 Exhibition, which only occupied 799,000 square feet. It has also, when actual covered space is alone considered, slightly the advantage of the Paris Exhibition, which had a covered area of 953,000 square feet. But if we compare the total space covered and uncovered, occupied by each, Paris is considerably larger, for the better suitability of its climate for out of door display enabled the authorities of that Exhibition to increase the area of ground given up to exhibiting space by 547,000 square feet, while, with our variable climate, it has not been thought advisable to have more than 35,000 feet of ground unroofed; so that the total areas, covered and uncovered, occupied by the two exhibitions, are 1,500,0000 square feet for Paris, and 1,023,000 square feet for 1862.

The French Exhibition, therefore, considerably exceeded ours in size, but it was not nearly so compact in form, and its temporary annexes made up a very large portion of it, occupying 600,000 of the 953,000 square feet, while our two annexes do not amount to more than one-third of the total area.

In the construction af this magnificent building, there are 7,000,0000 bricks used; these have all been supplied by Messrs. Smeed, of Sittingbourne. Nearly all the cast-iron work has been supplied from the Stavely iron-works, in Derbyshire; there are upwards of 4,000 tons of this metal in the building; and to show what care has been taken with the castings, only four girders have proved defective, by breaking in the hydraulic press.

There are upwards of 820 25 feet columns, equal in length to 4 miles, and if the 1,266 girders used were placed end to end they would reach a distance of 6 miles. The wrought iron is chiefly supplied by the Thames Iron Company, the builders of the "Warrior." This firm has undertaken the supply of all the iron for the domes, the groined ribs, the 50 feet roofs, and the iron trellis girders which support them; the total quantity of wrought iron in connection with these parts amounts to 1,200 tons.

The timber work is executed partly at the works of Messrs. Lucas, at Lowestoft, and partly at Mr. Kelk's works at Pimlico; the former prepare all the window sashes, &c., &c., by machinery; and the latter constructs the heavy ribs of the nave and transepts. Upwards of 1,300,000 super feet of floor will have to be laid.

To cover the roofs 486,385 square feet of felt are used, equal to 11 acres; and to complete the whole of the glazing requires 553,000 super feet of glass, which weighs 247 tons, and would cover 12¾ acres.

THE MACHINERY DEPARTMENT OF THE EXHIBITION OF 1862.

CLASSES 5, 7, 8, AND 10.

No. I.

The business of the machinery department, in classes 5, 7, 8, and 10, is, perhaps, the most onerous of all the business of the classes into which the industrial products are to be distributed for Exhibition.

The supply of steam to work the numerous machines which are to be in motion, is to be furnished from a number of large double-flue boilers, 30 feet in length, of 50 nominal horse power each, to be supplied by Messrs. Hick & Sons, of Bolton, sufficiently powerful to work the whole of the machinery in motion at once, without any necessity for stopping any portion of it, or of working parts of the machinery alternately. The disadvantage of an under-supply of steam in former exhibitions was strongly felt, and it has been the aim of Her Majesty's Commissioners, in this particular, to have an ample supply of steam for every demand, without restriction. The steam from the boilers, which is to be of 70 lbs. pressure per square inch, will be conveyed through large pipes down the passage of the western annex, which is to contain all the machinery in motion; the extent of steam pipe will be unprecedented in engineering practice. The annex is nearly 1,000 feet in length from north to south, and the boiler-house will be built at a distance of at least 100 feet from the north end, near the Kensington road. There will be two lengths of pipe about 900 feet each, and a third and shorter length, which, with the junctions required, will amount to a total length of upwards of 2,500 feet, for the ramification of steam pressure throughout the annex. It is not intended by Her Majesty's Commissioners to erect steam engines specially for the services, but to make free use of the numerous and various steam engines which will be exhibited, the intending exhibitors of which generally are desirous to have them put in motion. The steam pipe will be provided with expansion-boxes at frequent intervals, to take up the unavoidable expansion and contraction of metal pipes subjected to heat and cold alternately, and they will be thickly clothed in felt, and bedded in ashes, sand, or other non-conducting substance, so as to prevent loss of heat by radiation and condensation of steam within the pipe. Such a provision, though essential and highly important, is by no means so difficult to mature as appears to have been assumed by certain writers for the press; indeed, the proportion of steam lost by condensation may be reduced to a very small fraction, by the expedient of superheating it before it leaves the boiler-house, and drain-cisterns will be provided at suitable spots for the reception and collection of the water precipitating within the pipes.

The exhaust steam, discharged from the numerous steam engines at work in the annex, will be intercepted by large return exhaust pipes, laid parallel to the steam pipes, and conducted back to the shaft or chimney attached to the boiler-house, into which it will be discharged. Thus, the whole operation of the steam, conducted to the steam engines and back again, will be conducted without noise or nuisance; and the spectacle which would otherwise be presented of numberless clouds of spent steam escaping from the various engines through the roof of the annex, according to the usual routine of worshops, will be wholly prevented. The exhaust pipe, like the steam pipe, will be fitted with expansion-joints and drain-cisterns.

The gross area of the western annex is little more than four acres, or about 180,000 square feet; of this area 16,000 square feet are to be set apart for branch refreshment rooms, about 70,000 square feet for the exhibition of foreign machinery, and about 90,000 square feet for the machinery of the United Kingdom. An additional area of 20,000 square feet will probably be reserved in the eastern annex for the exhibition of machinery.

Miscellaneous.

Railways of the World.

There are 31,800 miles of railroads in the United States, of which there are 20,688.51 in the free and but 11,111,43 in the slave States. The total cost of the entire lines has been $1,192,302,015. Last year there were only 631 miles built, against a previous annual average of 2,000 miles. But although the construction of roads decreased, the traffic on all the northern roads was greater than on any previous year. The condition of our railroads is favorable at present.

The length of railways in operation in Great Britain and Ireland is 10,750 miles 300 miles of which were built last year. Their entire cost of construction amounts to £355,000,000 (about $1,775,000,000). There are 5,801 locomotives, 15,076 passenger carriages and 180,574 freight cars used on these railways. Last year they carried 163,435,678 passengers, 60,000,000 tuns of minerals and 20,500,000 of general merchandise.

France has 6,147 miles of railway, worked by 3,000 locomotives; 3,500 miles of new lines are being constructed. Total cost of completed lines $922,200,000.

Prussia has 3,162 miles in operation; Austria 3,165 miles; the other German States have 3,239 miles; Spain has 1,450 miles; Italy, 1,350; Rome, 50; Russia, 1,289; Denmark, 262; Norway, 63; Sweden, 288; Belgium, 965; Holland, 308; Switzerland, 600; Portugal, 80; Turkey, 80; Egypt, 204.

In the British colonies, there are 1,408 in the East Indies; Canada, 1,826; New Brunswick, 175; Nova Scotia, 99; Victoria, 183; New South Wales, 125; Cape of Good Hope, 28. Making a total of 14,277 miles in operation in the British Empire; the entire cost of which has been $2,086,765,000.

In Mexico there are 29 miles of railway; Cuba, 500; New Grenada, 49½, (Panama Railway); Brazil, 111; Chili, 195; Peru, 50; Paraguay, 8.

The total length of railways in the world is 69,733 miles. Their estimate cost is about $5,877,-200,000. Nearly one half the length of lines belong to the United States; and one fourth to Great Britain and Colonies.—*London Engineer.*

Auriferous Rocks of Victoria.

The area of the quartz-bearing rocks at Victoria, in Australia, is estimated at 25,000 square miles. The total area of the extent of land at present mined upon in that colony is 561 square miles. Thus 89,920 square acres, have produced gold to the amount of £92,787,236, on an average of about £1,032 per acre, and there yet remains upwards of 15,000,000 acres almost everywhere intersected by quartz veins of greater or less thickness, which are as yet intact by the pick of the miner.

The Exhibition of 1862 and the Working Classes.

A club has been formed at Sudbury, to enable the working population of that town to visit the Great International Exhibition of 1862. The club will receive deposits at the rate of not less than 3d. per week for a single ticket, and children under 12 years of age 2d. per week; and it is expected that not only will considerable resources be thus collected, but that great advantages will also be derived in regard to railway fares and accommodation in town from the principle of organisation. The mayor (Mr. S. Higgs) has offered 1s. each to the first 200 *bona fide* working men who subscribe. A similar club has been formed at Stowmarket and one or two other points in the eastern counties.

Charcoal in Medicine and as a Disinfectant.

Charcoal powder has been for a long period a favorite remedy in America, the Indies, and in many parts of Europe, for dysentery, and it it extensively used, with success, as a remedy for nervous dyspepsia and other painful disorders of the stomach and bowels.

Dr. Beloc, Surgeon-Major in the French Army, says, in nervous affections of the stomach and bowels; in those complaints which are so prevalent, and attended with so much pain and inconvenience, but which do not confine the sufferers to their bed, such as weight and uneasiness after eating, nervousness from laborious digestion, dyspepsia, pain in the chest, waterbrash, &c.; for each of these disorders, the powder of charcoal is the most effectual in relieving pain, restoring the digestive powers, improving the appetite, and enabling the stomach to bear food. Some vegetable substances contain less than 75 per cent of carbon, the remaining 25 per cent consisting of earthy mineral and deleterious matter. Charcoal possesses the property of absorbing noxious gases. M. Lowitz, a German chemist, about the year 1789, first applied this substance for deodorization and purification. M. Theodore de Saussure, by a series of experiments, proved its power of altering the character of foul gases, by its peculiar properties. Mr. Turnbull, of Glasgow, in experimenting on the qualities of manure, covered 350 dead horses with charcoal, and no unpleasant odor was emitted from them. He also placed the body of a dog in a wooden box, for more than six months, in which he put a layer of charcoal, and covered it over with another layer, of a few inches in depth. The box was left uncovered in his laboratory, from which no offensive smell was ever discovered. The property of charcoal to restore sweetness to tainted meat was shown by Lowitz, when in St. Petersburg, in 1786.

[CIRCULARS.]

TO PATENTEES IN CANADA.

Gentlemen,

I beg to call your attention to the accompanying number of the *Journal of the Board of Arts and Manufacures* for Upper Canada, in which your patent is noticed among the list of Canadian Patents. You would confer an advantage on the general object of this journal, and facilitate the diffusion of a knowledge of your patent by forwarding to this office the specifications or a description for publication without any charge; and if suitable for the pages of the journal, any wood-cuts or stereotype plates which may serve to illustrate it.

I am, your obedient servant,

W. Edwards, *Secretary.*

TO MERCHANTS AND MANUFACTURERS.

Sir,

With a view to draw attention to Canadian Manufactures and to induce the public to give the preference to all articles of Canadian industry, I venture to call your attention to the excellent medium which the *Journal of the Board of Arts and Manufactures* now presents for making your manufactures more extensively known. Any communication relative to the subjects embraced in the following queries will be inserted in the Journal of this Board, whose pages will at all times be open to a description of the nature and extent of the manufactures in which you are engaged, and which you are respectfully invited to transmit to me for gratuitous publication, if found suitable to the pages of this journal.

I am, your obedient servant,

W. Edwards, *Secretary.*

1st.—What articles are you engaged in producing?

2nd.—What is the average number of hands in your employ; and their average wages?

3rd.—What amount of raw material do you consume; its nature and value, and where produced?

4th.—Were any of your men induced to emigrate to Canada to enter your employment? the number of their families?

5th.—How many families are dependent upon your establishment for subsistence?

6th.—What raw materials do you import; and what are produced in Canada?

7th.—Have you a Foreign or a Home Market for your Manufactures?

Mr. J. E. Pell, 14 Bonaventure Street, has consented to act as agent for this Journal in Montreal.