THE JOURNAL
OF THE
Board of Arts and Manufactures
FOR UPPER CANADA.

NOVEMBER, 1865.

OUR ANNUAL PROVINCIAL EXHIBITIONS.

In taking a retrospect of the late Exhibition of the Agricultural Association for Upper Canada, held in London a few weeks since, we notice much in connection therewith to encourage and gratify, and much also of room for improvement in the future. Our remarks must here be understood to apply almost if not wholly to the Arts and Manufactures department, with which alone we are conversant. We are not now going to refer to the number and character of the articles exhibited, as that was done in our last issue, and may be further gathered from the list of prizes in this issue, but to matters more especially of arrangement.

The first great difficulty the managers have to contend with, is the delay on the part of exhibitors to deliver their goods in proper time. The Exhibition is supposed to be ready for the judges to commence their duties at 11 a.m. on the morning of Tuesday in the Exhibition week; and yet a very large number of articles are usually delivered subsequent to that hour. Here we may remark that a greater difficulty arises in the Fine Arts class than in any other; it being absolutely necessary to success to have all specimens in and properly classified in sections and subjects, before commencing to hang them in their places—the latter being a work requiring great judgment, care and labour, so as to give the proper effect, and also to facilitate the labour of the judges.

The Exhibition proper is supposed to commence on the Tuesday morning, and close on the Friday afternoon—in all something less than four days; but the judges commence their duties on the Tuesday, and complete them as early as possible on the Wednesday, thus leaving less than three days for the inspection of the public.

What we would suggest for the future is, that all specimens in the Fine and Decorative Arts should be sent in, or delivered at the Exhibition grounds, positively not later than the evening of Wednesday of the week preceding the Show; that all other articles be delivered and placed by Saturday evening of the same week; and that the judges should commence and complete their duties on the Monday, and have the prize tickets placed at once, so that the public should have the four full days above indicated for inspection of this department: or, we would even commence and complete all arrangements one day earlier than we have just suggested, and have the judges perform their duties on the Saturday preceding the Exhibition, so as to allow five full days for the inspection of visitors.

That some arrangement of this kind is necessary, every one must concede, in view of the fearful *jam* of visitors that occurs in the main building during the short time it remains open; and especially at the Exhibition just closed, where for two days it was fearful to contemplate the crowding and crushing of the masses of people in this department.

In respect of numbers, the late Exhibition was a perfect success, so far as its effects upon the finances are considered, but in other respects a failure. In the galleries, and in other portions of the building, nothing could be seen so as to be examined and appreciated; it was simply a crowding *into* the building, and for from one to two hours being carried slowly and painfully along with the masses, until with the *outgoing* stream the open grounds were again reached. In this respect we hold that these Exhibitions are not now answering the end and purpose for which they have been organised; and until the time for inspection is extended, they never will do so.

We are aware that it would be of no use to continue the Arts and Manufactures department a day longer than the Agricultural, but it may with advantage be commenced two or three days, or even a week if need be, earlier than the other departments; so that citizens of the towns where the Exhibitions may be held, and all others who desire a quiet and careful examination of the various objects, may have the opportunity of doing so, before the crowds attending on the Agricultural and Horticultural departments arrive; thus securing also the double advantage of leaving more room for the latter during their week of attendance.

In advocating this change, we are surely not seeking our own advantage or comfort, as the ten days we usually have to attend is time quite long enough for us to be absent from our home; but if these annual interesting gatherings are to be continued, and visited as it appears by ever increasing numbers of the people, let the arrangements be such as to afford the greatest possible advantage.

We may here remark that the facilities afforded by the Railway and Steamboat authorities for reduced fares to the Exhibition, do not come into operation at a sufficiently early date to allow of those who would be disposed to deliver their goods early, to take advantage of the arrangement. This

is not to the profit of the railway companies, as it simply results in a blocking up of their roads with passengers and goods during the time embraced for the cheap fares, preventing many from attending the Exhibitions on account of the crowded state of the cars, and detaining quantities of goods so long on the way that they do not reach in time for competition, or in many cases do not reach the Exhibition at all.

One other matter before we close. The main buildings, or "crystal palaces," as they are generally termed, in each of the four cities where the exhibitions are now held, are altogether too small for the accommodation of both the Arts and Manufactures and Horticultural and Floral departments, rendering it absolutely necessary to a proper display and arrangement of goods in both sections, that a FLORAL HALL be erected in each of these places for the Horticultural and Floral products.

The galleries in the London building, at the late Exhibition, contained three times as much stuff as ought to have been displayed there; and in the lower portion the machinery, provisions, woollen goods, musical instruments, furniture and stoves, were over-crowded; the latter especially blocking up two of the entrance doors and several of the passages; and in addition to the want of sufficient room, the mixing up of Arts and Manufactures and Horticultural products, rendered any kind of uniformity of arrangement in the main building out of the question.

We make these remarks here for the purpose of eliciting the opinions of judges, exhibitors and others who may feel interested.

The next Annual Exhibition is to be held in the city of Toronto; and it is to be hoped that all causes of complaint at previous shows will be brought forward and discussed in time, so that they may be obviated on the next occasion.

Our pages are open for suggestions.

EXHIBITION FIRST AND SECOND PRIZES.

At every Exhibition held, whether Provincial or County, difficulties arise in regard to awarding *first* and *second* prizes to the same individual in the same section of the prize list. Rule No. 15 of the Provincial Association, is pretty carefully worded, so as to meet the difficulty, but in some respects it fails to do so. It reads thus:—

"No person shall be allowed to enter for exhibition "more than one specimen in any section of a class, "unless the additional article be of a distinct named "variety, or pattern, from the first. This rule not "to apply to animals, but to apply to all kinds of "grain, vegetable products, fruit, manufactured "articles, &c., in which each additional specimen "would necessarily be precisely similar to the first."

A question generally arises as to how far this rule applies. Should it properly apply to the Fine Arts? One committee of judges think it should, another committee think it should not. No artist it may be said exhibits two pictures, the second of which is precisely similar to the first, and therefore successful fine art exhibitors in some cases claim exemption from this rule. The same may be said of various specimens in the Decorative and Industrial Art—take for example the article of "Gentleman's Plain Shaftoe Saddle." The same exhibitor enters in this section two saddles; one a cut-back head and rounded cantle, the other a straight head and sharp cantle, and with other variations in design, yet both are "Plain Shaftoes."

Our opinion is that not only in all classes of Arts and Manufactures, but in those of Agriculture and Horticulture also, (live stock perhaps excepted; which, however, we do not feel quite sure of) the rule should strictly apply; so that no exhibitor should be awarded the *second* prize in addition to the first, or the *third* in addition to the first or second. We hold that the prize is not awarded to the article or thing exhibited, but to the person who by his or her skill produces it. If this view is the correct one, which we think it undoubtedly is, then to award the *first* prize to an individual as the "most skilful of the competitors," and the *second* prize to the same individual as being "second best," or "next best in skill" to himself, is a manifest absurdity, and an injustice to the "next best" competitor.

What say the parties interested?

CORRECTED PRIZE LIST.

The present number contains a correct list of the prizes awarded in the Arts and Manufactures Department, and judges' remarks thereon, at the recent Provincial Exhibition in London, C. W. We send a free copy to each of the successful competitors, not now subscribers to the journal, with an intimation that we will be glad to receive their subscriptions for the year commencing with the number for next January.

In examining the list of prizes as published in one of the daily papers, during the week of the Exhibition, we notice nearly a hundred and fifty omissions of prizes awarded, and about a hundred and twenty-five errors in words and figures; thus showing the necessity of what we have always contended for—the correction of all errors and omissions in the award books before "copy" goes

to printer; and correcting of "proof" by the Secretaries of the Association, before going to press. With so many errors—which it is almost impossible for the reporters to avoid, in the midst of so much hurry and confusion—it is simply an annoyance to a large number of competitors, and affords no reliable information to the public, to have the list thus published.

EARLY DISCOVERIES IN GAS LIGHTING.

(Communicated.)

We owe many of the comforts of civilized life to the chance idea of persons whose names are forever lost to the world. Such will be the case with the originator of the now splendid mode of illuminating our streets and buildings with carburetted hydrogen gas, unless a copy of a pamphlet hereafter alluded to, shall be found in the library of some scientific antiquary.

One of the persons (the only survivor) who fitted up the first experimental apparatus for lighting buildings, is now living near Niagara Falls, in Canada. He gives the following account of its discovery, which may be interesting to some readers:—In the year 1807, being then 15 years of age, I purchased at a book stall a pamphlet entitled "Observations on the identity of light, heat and electricity, by a lieutenant in His Majesty's Navy; being meteorological observations made during a cruise in the Mediterranean." In the preface the author said he was frequently at a loss for a light to record his observations, made chiefly during his night watch, as the captain had ordered that no candle or lamp should be allowed to burn on board after 8 o'clock. To obtain a light without disobeying orders he procured a hand grenade, in which he put a small quantity of coal, and in the fuse hole a pistol barrel; when he required a light he placed the grenade on the cook's fire, and the gas escaping from the touch hole furnished him with the light needed.

On reading the above, I immediately procured a tobacco pipe, filled the bowl half full of coals, covered the end with a button and a lump of glazier's putty, and placing it between the bars of the grate soon had a jet of flame that burnt for some minutes at the other end. This new light was the wonder and amusement of my companions; one of them, a boy about 17 years of age, the son of Dr. Parks who then kept a drug store in Mary-le-bone lane, one door from Oxford street, London, suggested the making an experiment on a larger scale; and upon our application the Doctor permitted us to try the experiment of lighting his shop, and gave us an old still head for the experiment. We then procured a brass lamp, soldered a halfpenny on the top and drilled a hole at the bottom, and five or six small pin holes round the bulb, and screwed it to the top of the shop counter; previouly soldering about six yards of Lead pipe to its bottom, carrying the pipe through the floor into an apartment in the basement, and soldering it to the still head. In the fireplace we then fixed up an iron pot in brick work, and put in it about a pint of coal, fixing the still head on with a thick layer of wet clay. On lighting the fire under the pot a dense volume of smoke and vapour filled the shop, sufficient to suffocate every body in the building; but we dare not pull down the apparatus for fear of firing the premises. We therefore drew the fire from under the pot, leaving the apparatus to cool gradually. When the smoke began to abate a light was applied to the lamp, and a jet of flame from each of the small holes burnt for some time. After a consultation with the Doctor, we agreed not to give up the experiment, but to cut the pipe and solder a tap between the parts, and another in the still head over the pot. When the fire was lit under the pot, the first distillation escaped up the chimney, and was found to be uninflammable; but in a short time it burned with a clear flame. The tap in the pipe was then opened and the one over the pot shut, and the lamp in the shop burnt with a circle of jets, to the wonder of the neighbourhood. In about a week the holes were so choked with tar that we had to take the apparatus down to clean it, but we again cut the pipe and inserted a tin cannister to catch the tar before it reached the burner. This partially succeeded, but in three weeks our burners were as badly choked as before; we then again cut the pipe, passing the ends through the top of a small barrel, three parts filled with water; the one next the burners above the surface, and the other below the surface of the water, so that the GAS had to pass the water before it could reach the burner. This last experiment was perfectly successful, and soon attracted the notice of the neighbours. Many persons visited the store to see the new light, as it was called, and complimented "the boys" on their ingenuity; among them was a chemist who kept a drug store at the corner of the Albany and Piccadilly, who after obtaining all the information "the boys" could give him, fitted up his shop with a handsome chandelier in the centre, and a device in each window, which for some time attracted the public and obstructed the thoroughfare from dark till the putting up of the shutters. This was soon followed by a Mr. Hudson, a druggist in the Haymarket, who fitted up his shop in a similiar manner. The third was a druggist in Wymore Street;

and after that several shops were fitted up in different parts of the city, and the thing ceased to be a novelty. It was frequently commented upon at the Royal Institution in Albermarle Street. At this time I was employed in removing some choice old engravings that had been pasted on the walls of Hampton Court Palace, getting them framed to decorate the Queen's residence at Buckingham House, and had frequently exhibited the tobacco-pipe new light to members of the Royal Family. Among my acquaintances was a Mr. Windsor, an enthusiast on the subject, who proposed to establish a gaslight company; and being daily in the presence of some of the Royal Family, I was requested to ask permission to run a line of gas pipe and burners along the wall that separated Carlton Palace gardens from St. James' Park. The permission was at once granted, and the Prince of Wales took great interest in the enterprize, and for some months St. James' Park was the most crowded evening promenade around London. The next step was to light one of the public streets; and Pall-mall, from Carlton House to St. James' Palace, was the first selected. A company was formed with an unlimited number of shares, of £100 each, and a great number of shares were taken up and about £15 paid on each; and in a short time the south side of Pall-mall exhibited a row of handsome iron pillars, about 60 feet apart, each crowned with three large lanterns and several beautiful jets of flame in each. The amount of light was much greater than is now seen in the best lighted thoroughfare in the world, and the new enterprize was expected to take the lead of all others, but a difficulty arose; for although the company had the best mechanics in their employ, it was found impossible to prevent the escape of gas, and the smell was declared a nuisance, and all our works were sold for old iron. In 1812 a new company was formed, who succeeded in abating the nuisance, and contracted to light up about the half of St. Martin's Parish; and the year 1813 witnessed the first successful application of gas for general illumination.

OUR PRESENT PROSPERITY.

We have recently held a day of general thanksgiving to the giver of all good, for the blessings of peace vouchsafed unto us, and for the bountiful harvest bestowed upon us, as a people: and verily we have good reason to be thankful, for we have not only an abundance of the products of the farm, the field and the garden, but we have a ready market at the most liberal prices, enabling our farmers—and as prospering in their prosperity our commercial men and mechanics—to meet their large outstanding indebtedness arising from deficient harvests in the past; and it is to be hoped also leaving sufficient to enable them to lay by something for the future.

What we have most to fear is the running into extravagance in the purchase of imported luxuries, or articles that will not be the means of again producing profit by their purchase.

Should we in our prosperity purchase extravagantly of imported articles, our surplus will soon be gone, and we will permanently be no better off than we would have been with more moderate crops and more moderate prices.

Let our farmers and mechanics beware. Let the former invest their surplus in drainage, manures, improved stock, &c.; and the latter in developing our raw native materials, and our home manufactures—thus will a permanent good result from our present prosperity, which shall benefit not only ourselves but generations to come. Let Industry, Improvement, and Economy be our motto.

C. BOECKH'S BRUSHES AT THE DUBLIN EXHIBITION.

In making selections of specimens to represent the manufactures of Upper Canada at the Dublin Exhibition, the Committee of the Board of Arts & Manufactures obtained from Mr. C. Boeckh, wholesale brush manufacturer, of this City, samples of his paint and other brushes.

Mr. Boeckh has just received from Captain Cuff, representative of the Canadian Government at the Exhibition, a letter containing an order for three and a half dozen of his brushes, for a commercial house in Britain. These are to be used as samples by the parties for whom they are manufactured, who anticipates being in a position to order largely as the brushes may become known.

We are aware that Mr. Boeckh manufactures a first class article, and are pleased to hear of the encouragement he receives, but can scarcely imagine that he will be able to compete in prices with the English manufacturers, in the British market.

Captain Cuff also expresses his belief that he will succeed in opening markets at home for other articles of Canadian product.

STEREOSCOPIC VIEWS OF DE COURTNEY'S VINERIES.

We have just been shown by Mr. J. Hollingsworth, of this city, a series of seven stereoscopic views recently taken by him of Mr. De Courtney's Vineries and Wine Cellars, at Cooksville. These

are excellent illustrative views, and give a distinct idea of the extent, mode of training, and abundance and mode of gathering the fruit, to such as may not have had an opportunity of visiting Mr. De Courtney's grounds.

The views are for sale, at 25 cts. each, by Mr. Hollingsworth, at 284 Yonge Street, who deserves encouragement for the spirited manner in which he takes so many views of interesting places and objects in and around this city, both for the stereoscope, the album, and the parlour wall.

TWENTIETH ANNUAL EXHIBITION

OF THE

AGRICULTURAL ASSOCIATION OF UPPER CANADA.

Corrected list of Prizes awarded at the city of London, September 19, 20, 21 and 22, 1865, in the ARTS AND MANUFACTURES DEPARTMENT.

Competition open to Canadian Exhibitors only.

CLASS XL.—CABINET WARE AND OTHER WOOD MANUFACTURES.

Judges.—W. Bowman, London; F.S. Clench, Cobourg; Hugh Campbell, Mitchell.

Cabinet Ware.

Best set Bed-Room Furniture, Thomas Caldwell, London, $10.

Best Centre Table, H. Coombs, London, $8.

Best Drawing-Room Sofa (exhibited before) H. Coombs, London, Diploma.

Best set Brawing-Room Chairs (exhibited before) H. Coombs, London, Diploma.

Set Dining-Room Furniture, H. Coombs, London, 2nd Prize, $6.

Side Board, Thos. Caldwell, London, 2nd Prize, $4.

Miscellaneous.

Best Cooper's Work, R. W. & A. Burrowes & Co., Eastwood, $6; 2nd do., C. Lewis, Salford, $3.

Best Corn Brooms, 1 doz., Hinman & Kellog, Grafton, Diploma and $2.

Best Handles for Tools of carpenters, blacksmiths, gunsmiths, watchmakers, &c., collection of, Thomas Bryan, jun., London, $8; 2nd do., William Craig, Toronto, $4.

Best Joiners' Work, assortment of, Alex. Campbell, London, $8.

Best Machine-Wrought Moulding and Flooring, 100 feet of each, Alex. Campbell, London, and F. B. Scofield, Woodstock, equal—each $4 50.

Best Turning in Wood, collection of specimens, William Craig, Toronto, $6; 2nd do., Wm. S. Efner, London, $3.

Best Turned Hollow Wooden Ware, assortment of, F. B. Scofield, Woodstock, $6.

Best Veneers from Canadian Woods, undressed, Wm. Clements, Newburgh, $8; 2nd do., F. F. Purdy & Co., Newburgh, $4.

Best Veneers from Canadian Woods, dressed and polished, F. B. Clench, Cobourg, $8.

Best Wash-tubs and Pails, three of each, factory made, C. Lewis, Salford, $2.

Best Willow Ware, six specimens, John Calcott, Delaware, $4.

Extra Prizes.

White Oak Plank, R. S. Frank, Westminister, $2; Sample of Canadian Woods, F. F. Purdy & Co., Newburgh, $2; Patent Washing Machine, W. W. Kitchen, Grimsby, $2; Collection of Canadian Woods, C. Lewes, Salford, $2; Bird Cage, D. Stoddart, London, $2; Bird Cage, E. Todd, London, $4; Specimens of Wave-Moulding, C. Heise, Preston, $3; Carved and Waved Mouldings, F. Guggisberg, Preston, $5; Two Card Tables, H. Coombs, London, $3: Window Blinds, Stephen Pocock, Woodstock, $3; Spinning Wheel, Wm. Glendillen, Ingersoll, $2; Window Shades, W. J. Lucas, London, $2; Clothes-Dryer, Rev. C. Vandusen, Wardsville, $2; Painted Chess Table, R. J. Webb, London, $2; Grooved and Tongued House Siding, and pair of Venetian Blinds, A. Storms, Odessa, $4; Patent Brooms, three, Henry Macstravick, Hamilton, $1; Clothes Wringer, J. Myers, Toronto, $2.

The Judges report the Bed-Boom Furniture exhibited by Thomas Caldwell, London, as "good and substantial."

CLASS XLI.—CARRIAGES AND SLEIGHS, AND PARTS THEREOF.

Judges.—M. O. Donovan, Whitby; Wm. Robinson. Galt; Thomas McCabe, Hamilton.

Best Axle, wrought iron, Byres & Matthews, Gananoque, $4.

Best Bent Shafts, half dozen, Plummer & Pacey, London, $3; 2nd do, McKinley & Saunders, St. Catharines, $2.

Best Bows for carriage tops, two sets, Plummer & Pacey, London, $3; 2nd do., McKinley & Saunders, St. Catharines, $2.

Best Buggy, double-seated, John Campbell, London, $10; 2nd do., estate of H. H. Dart, London, $6.

Best Buggy, single-seated, John Campbell, London, $8; 2nd do., estate of H. H. Dart, London, $5.

Best Buggy, trotting, W. & J. McBride, London, $6; 2nd do., J. B. Armstrong, Guelph, $4.

Best Carriage, two-horse pleasure, Thomas Todd, Galt, $12; 2nd do., John Campbell, London, $8.

Best Carriage, one-horse pleasure, estate of H. H. Dart, London, $10; 2nd do., John Campbell, London, $6.

Best Carriage, child's, W. J. Thompson, London, $4; 2nd do., W. S. Efner, London, $2.

Best Carriage Hubs, Rims and Felloes, and machine-

made spokes, assortment, Thos. Todd, Galt, $7; 2nd do., McKinley & Saunders, St. Catharines, $4.

Best Sleigh, one-horse pleasure, J. B. Armstrong, Guelph, $10.

Best Springs, one set steel carriage, James Kay, Galt, $5.

Best Wheels, one pair of carriage, unpainted, W. & J. McBride, London, $4; 2nd do., Jas. Kay, Galt, $2.

Extra Prizes.

Patent Double-tree, W. W. Kitchen, Grimsby, $2; Buggy Gearing, unpainted, W. & J. McBride, London, $4; Cutter Stuff, &c., A. Efner, London, $2; Cutter Stuff, Thomas Todd, Galt, $3; Set of Waggon Arms and Boxes, Haggart & Brothers, Brampton, $3; Buggy Seat Rails, McKinley & Saunders, St. Catharines, $2.

CLASS XLII.—CHEMICAL MANUFACTURES AND PREPARATIONS.

Judges.—Dr. Beatty, Cobourg; Dr. Howitt, Guelph; J. W. Bickle, Hamilton.

Best Colours, assortment, in oil, pulp, and powder, Toronto Linseed Oil Co., $6.

Best Medical Herbs, Roots and Plants, native growth, Wm. Saunders, London, $12; 2nd do., Hugh McKee, Norwich, $7.

Best Oils—linseed, rape, and other expressed kinds, Toronto Linseed Oil Co., $6; 2nd do., Thomas J. Cottle, Woodstock, $4.

Best Oil—coal, shale, or rock, Kintrea & White, Woodstock, $6; 2nd do., A. H. Bailey & Co., London, $4.

Best Pitch, 30 lbs., M. C. Luke, Angus, $5.

Best Resin, 30 lbs., Peter Irish, Brighton, $5.

Best Tar, one gallon, M. C. Luke, Angus, $3.

Best Turpentine, spirits of, one gallon, Peter Irish, Brighton, $5; 2nd do., M. C. Luke, Angus, $3.

Extra Prizes.

Lubricating Oil, H. T. Bell, Oil Springs; Benzine do., do., $4; Pharmaceutical Preparations, Wm. Saunders, London, Diploma; Samples of Perfumery, do., do., $3; Col. of Drugs, Spices, &c., Kerry Bros. & Crathren, Montreal, Diploma; Canadian Fire-Proof Paint, A. H. Saul, West Williams, $3; Benzine and Lubricating Oil, Kintrea & White, Woodstock, $6; Samples of Chrome Green and Yellow, A. H. Saul, West Williams, $2; Pure Chloroform, bottle of, C. Barrett, Toronto, $3.

The Judges report that between the two prize specimens of Linseed, Rape and other Oils, they "found great difficulty in determining which should have the preference"; and that in the matter of the Spirits of Turpentine, "it is not quite fair to put these articles, manufactured from different species of pine, and obtained by different processes, in competition.

CLASS XLIII.—DECORATIVE AND USEFUL ARTS, DRAWINGS AND DESIGNS.

Judges—Geo. Cormack, Whitby; F. J. Rastrick, Hamilton; H. Langley, Toronto.

Best carving in wood, S. Prebble, Montreal, C.E., $10; 2nd do., R. S. Williams, Toronto, $6; 3rd do. (special), A. J. Pell, Montreal, $4.

Best engraving on wood, with proof, C. F. Damereaux, Toronto, $6.

Best goldsmiths' work, J. W. Phelps, St. Mary's $6.

Best gold and silver leaf, C. H. Hubbard, Toronto, $4.

Best geometrical drawing of engine or mill work, coloured, P. A. Peterson, Toronto, $6.

Best lithographic drawing, plain, W. C. Chewett & Co., Toronto, $6.

Best lithographic drawing, coloured, W. C. Chewett & Co., Toronto, $6; 2nd do., Mrs. Fitzgibbon, Toronto, $4.

Best mantelpiece in marble, Wilkins & Banning, London, $10.

Best mathematical, philosophical, and surveyor's instruments, assortment, A. F. Potter, Toronto, $15.

Best modelling in plaster, J.W. Smyth, London, $6; 2nd do., Wilkins & Banning, London, $4.

Best monumental headstone, J. W. Smyth, London, $6; 2nd do., Wilkins & Banning, London, $4.

Best picture frame, ornamental, gilt, A. J. Pell, Montreal, $5; 2nd do., Robt. J. Seddon, London, $3.

Best penmanship, business hand, without flourishes, Bryant, Stratton & Co., Toronto, $4; 2nd do., J. W. Jones, London, $2.

Best penmanship, ornamental (not pen and ink pictures), Bryant, Stratton & Co., Toronto, $4; 2nd do., J. W. Jones, London, $2.

Best sign writing, Geo. Booth, Toronto, $5.

Best stained glass, collection of specimens, Joseph McCausland, Toronto, $12.

Extra Prizes.

Sleeping child in marble, Wilkins & Banning, London, $4; Arnprior marble water tank, F. Spencer, Arnprior, $5; case of dentistry, R. Campbell, Guelph, $6; Dentist's gold and tin foil, C H. Hubbard, Toronto, $4; specimens of commercial lithography, W. C. Chewett & Co., Toronto, $4; labels printed in colors, do., do., $2; pen and ink ornamental writing and sketching, Bryant Stratton & Co., Toronto, $3.

CLASS XLIV.—FINE ARTS.

Judges—G. A. Barber, Toronto; Wm. M. Wilson, Simcoe; R. P. Street, Hamilton; E. R. Martin, Guelph.

Professional List—Oil.

Best animals, grouped or single, Robert Whale, Burford, $12; 2nd do., W. N. Cresswell, Harpurhey, $7.

Best Historical Painting, W. N. Cresswell, Harpurhey, $12; 2nd do., Robt. Whale, Burford, $7.

Best Landscape, Canadian subject, Robert Whale, Burford, $12; 2nd do., Miss H. N. Harrison, Hamilton, $7.

Best Landscape or Marine Painting, not Canadian subject, Robt. Whale, Burford, $10; 2nd do., O. R. Jacobi, Montreal, $6.

Best Marine Painting, Canadian subject, W. N. Cresswell, Harpurhey, $12.

Best Portrait, from original sittings, Robt. Whale, Burford, $6; 2nd do., do. do., $6.

In Water Colours.

Best Animals, grouped or single, Jno. H. Caddy, Hamilton, $7; 2nd do., G. A. Gilbert, Toronto, $5.

Best Flowers, grouped or single, James Griffith, London, $7; 2nd do., G. A. Gilbert, Toronto, $5.

Best Landscape, Canadian subject, Jno. H. Caddy, Hamilton, $7; 2nd do., W. N. Cresswell, Harpurhey, $5.

Best Landscape or Marine Painting, not Canadian subject, Jno. H. Caddy, Hamilton, $7; 2nd do., W. N. Cresswell, Harpurhey, $5.

Best Marine View, Canadian subject, W. N. Cresswell, Harpurhey, $7; 2nd, do. Jno. H. Caddy, Hamilton, $5.

Pencil, Crayon, &c.

Best any subject, or mixed style of execution, G. A. Gilbert, Toronto, $6; 2nd do., Mrs. Walker, Bothwell, $4.

Best Crayon, coloured, G. A. Gilbert, Toronto, $6.

Best Crayon, plain, Richard Baigent, Toronto, $6; 2nd do., G. A. Gilbert, Toronto, $4.

Best Pencil Drawing, G. A. Gilbert, Toronto, $6; 2nd do., Richard Baigent, Toronto, $4.

Best Pen-and-Ink Sketch, Miss Gibbon, Sarnia, $6.

Best Sepia, Jno. H. Caddy, Hamilton, $6; 2nd do., Richard Baigent, Toronto, $4.

Amateur List—Oils.

Best Animals, grouped or single, John H. Whale, Burford, $8; 2nd do., Mrs. E. Gourlay, Hamilton, $5.

Historical Painting, 2nd prize, John H. Whale, Burford, $5.

Best Landscape, Canadian subject, John H. Whale, Burford, $8; 2nd do., A. A. Edson, Montreal, $5.

Best Landscape or Marine Painting, not Canadian subject, Mrs. Fitzgibbon, Toronto, $8; 2nd do., Mrs. E. Gourlay, Hamilton, $5.

Best Marine Painting, Canadian subject, John H. Whale, Burford, $8.

Best Portrait, from original sittings, John H. Whale, Burford, $8.

In Water Colours.

Best Animals, grouped or single, special* first class prize, D. Fowler, Amherst Island, $7.

Best Flowers, grouped or single, Mrs. Fitzgibbon, Toronto, $7; 2nd do., Mary Jane Cooke, London, $5. Special second class prize, D. Fowler, Amherst Island, $5.

Best Landscape, Canadian subject, Wm. Ambrose, Hamilton, $7; 2nd do., Mrs. E. Berry, Portsmouth, $5. Special second class prize, D. Fowler, Amhers, Island, $5.

Best Landscape or Marine Painting, not Canadian subject, Wm. Ambrose, Hamilton, $7; 2nd do., Miss Ewart, Toronto, $5. Special first class prize, D. Fowler, Amherst Island, $7.

Best Marine View, Canadian subject, Mrs. J. K. Kerr, Toronto, $7.

Best Portrait, from original sittings, Miss E. Robertson, Colborne, $6. Special first class prize, D. Fowler, Amherst Island, $6.

Pencil Crayon, &c.

Best Mixed Style of Execution, Miss Jane Dixon, Toronto, $5; 2nd do., Miss Fanny Elliot, Toronto, $3.

Best Crayon, coloured, Mrs. J. K. Kerr, Toronto, $5; 2nd do., Miss Jane Dixon, Toronto, $3.

Best Crayon, plain, Miss Jane Dixon, Toronto, $5; 2nd do., Mrs. J. K. Kerr, Toronto, $3.

Best Crayon Portrait, from original sittings, Special first class prize, D. Fowler, Amherst Island, $5.

Best Moss Picture, Mrs. K. Tully, Toronto, $5; 2nd do., do., do., $3.

Best Pencil Drawing, Miss Kew, Beamsville, $5; 2nd do., Miss E. Robertson, Colborne, $3.

Best Pen-and-Ink Sketch, Mrs. E. Gourlay, Hamilton, $5; 2nd do., Mrs. Walker, Bothwell, $3.

Best Sepia, Mrs. E. Berry, Portsmouth, $5.

Photography.

Best Ambrotypes, collection of, James Egan, London, $6.

Best Photograph Portraits, collection of, in duplicate, one set coloured, James Egan, London, $10.

Best Photograph Portraits, collection of, plain, James Egan, London, $8; 2nd do., D. C. Butchart, Toronto, $5.

Photograph Landscapes and Views, collection of, 2nd prize, James Egan, London, $5.

Best Photograph Portrait, finished in Oil, D. C. Butchart, Toronto, $8; 2nd do., John H. Griffiths, London, $5.

Best Photograph Portrait, finished in Indian Ink, D. C. Butchart, Toronto, $6; 2nd do., John H. Griffith, London, $4.

Best Photograph Portrait, finished in water colours, James Egan, London, $6.

Extra Prizes.

Illuminated M.S. on Parchment, and Title Page and Vignette of do., E. M. Chadwick, Toronto, diploma and $5; Painted and Decorated Crockery and China, Hurd and Leigh, Toronto, Diploma and $8; Flowers in Water Colours, a collection, Mrs. Fitzgibbon, Toronto, Diploma and $8; Pair of Water Colour Figures,

* It being a question of doubt, both on the part of the Judges and Revision Committee, whether Mr. Fowler could properly compete in the amateur class, it was decided to award special prizes, according to the merits of his productions, and recommend a clearer definition of the terms, "professional" and "amateur" for another year.

Mrs. Walker, Bothwell, $4; Figure in Oil Painting, O R. Jacobi, Montreal, $4.

The Judges' report commends the large collection of original drawings from nature of the wild flowers of Canada—all beautifully and correctly represented—as worthy of a Diploma and special mention, in addition to the 1st Prize awarded. Messrs. Hurd & Leigh's painted and decorated china is also "highly commended—being of Canadian production and artistically produced." The Judges also state in their report that they "are of opinion that it would improve the Exhibition if all works of art were the productions of the previous twelve months, so as to stimulate progress and originality. They also recommend that the distinction between 'professionals' and 'amateurs' should be defined, as in many cases persons who follow art as a livehood (?) have carried off prizes from competitors practising it as an amusement. They also strongly urge the necessity of having all articles to be exhibited sent in at least three days before the opening day, so as to allow the same to be properly classified, and enable the judges to perform their duty with satisfaction to the Association as well as to themselves, which has certainly not been the case on this occasion."

CLASS XLV.—Groceries and Provisions.

Judges.—John H. Arkell, Aylmer; Wm. McKechnie, Dundas; D. H. Stewart, Mitchell.

Best Barley, Pearl, 25 lbs., Robt. King, Hamilton, $3.

Best Barley, Pot, 25 lbs., Robt. King, Hamilton, $3.

Best Buckwheat Flour, 25 lbs., Robert King, Hamilton, $3.

Best Chicory, 20 lbs., prepared, George Pears, Toronto, $3.

Best Indian Corn Meal, 25 lbs., Robert King, Hamilton, $3.

Best Soap, one box, common, Charles Watts, Brantford, $4.

Best Soaps, collection of fancy, Charles Watts, Brantford, $6.

Flour Starch, 12 lbs., Sam Hunt, Westminister, second prize, $1.

Best Wheat Flour, 50 lbs., E. D. Tillson, Dereham, $7; 2nd do., Lundie & Downie, Delaware, $5.

Extra Prizes.

Preserved Meats, Mrs. James Dorman, Byron, $2; Cider Apple Sauce, Apple Butter and Pickled Mangoes, do., do., $3; Box of Candles, Chas. Watts, Brantford, $2; Assortment of Spices and Dandelion Coffee, Geo. Pears, Toronto, Diploma; Two Jars Pickles, Mrs. Batman, Byron, $1; Pickled Fruit in bottles, Mrs. James Dorman, Byron, $1; 4 doz. quarts of Porter, G. W. Creighton, Kingston, Diploma.

CLASS 46.—Ladies' Work.

Judges—Miss Hattie Stephens, Cobourg; Mrs. J. D. Humphreys, Toronto; Mrs. W. L. Lawrason, London; Mrs. Geo. Harcourt, Toronto; Mrs. Geo. Roach, Hamilton.

Best Bead Work, Miss C. F. Cary, London, $3; 2nd do., F. Chute, Port Burwell, $2; 3rd do., Miss Evans, Toronto, $1.

Best Braiding, Harriett Bidwell, Cramahe, $3; 2nd Prize, Mrs. Bates, Hamilton, $2; 3rd do., Miss Johnson, London, $1.

Best Cone Work, Miss Eliza Spencer, London, $3; 2nd do., Mrs. M. Rock, Komoka, $2; 3rd do., A. Storms, Odessa, $1.

Best Crochet Work, Miss T. A. Ramsay, Kingston, $3; 2nd do., Miss E. O'Connor, London, $2; 3rd do., Miss V. McCarthy, Stratford, $1.

Best Embroidery in Muslin, Miss E. E. Meyer, London, $3; 2nd do., Mrs. Bates, Hamilton, $2; 3rd do., Miss Kate Hayden, London, $1.

Best Embroidery in Cotton, Miss T. A. Ramsay, Kingston, $3; 2nd do., Mrs. Martha Dowson, Westminster, $2.

Best Embroidery in Silk, Miss Jane Brady, St. Thomas, $3; 2nd do., Miss V. Griffith, London, $2; 3rd do., Miss S. Bennett, Cobourg, $1.

Best Embroidery in Worsted, Mrs. R. Lewes, London, $3; 2nd do., Mrs. Henderson, London, $2.

Best Silver Wire Flowers, A. Storms, Odessa, $2; 2nd do., Mrs. E. G. Cobb, London, $1.

Best Feather Flowers, A. Storms, Odessa, $2; 2nd do., Miss Annie Davis, London, $1; 3rd do., Miss Maggie Furdon, London, 50c.

Best 3 pairs of Gloves, P. Hinman, Grafton, $2; 2nd do., James Parks, Woodstock, $1; 3rd do., W. J. Collver, Yarmouth, 50c.

Best Guipure work, Harriett Bidwell, Cramahe, $3; 2nd do., Mrs. Bates, Hamilton, $2; 3rd do., Miss A. Mackintosh, London, $1.

Best Hair Work, Sarah McMeehan, London, $3; 2nd do., Miss Annie Robertson, Colborne, $2; 3rd do., Miss C. E. Rattenbury, Brucefield, $1.

Best Knitting, Thos. Heard, jr., Lambeth, $3; 2nd do., Mary Harding, London, $2; 3rd do., Mrs. E. Pepper, Colborne, $1.

Best Lace Work, Mrs. H. Proctor, London, $3; 2nd do., Miss E. Hendra, London, $2; 3rd do., Mrs. T. Roe, London, $1.

Best Family Machine Sewing, Mrs. E. G. Cobb, London, $2.

Best Mittens, three pairs Woollen, A. McD. House, Beamsville, $2; 2nd do., P. Hinman, Grafton, $1; 3rd do., Wm. Pearce, Dunwich, 50c.

Best Moss Work, A. Storms, Odessa, $2.

Best Needle Work, Ornamental, Miss T. A. Ramsay, Kingston, $3; 2nd do., Miss E. V. Glen, London, $2; 3rd do., Miss S. Bennett, Cobourg, $1.

Best Netting, Fancy, Mary J. Welding, Brantford, $3; 2nd do., Miss K. Cotter, Port Maitland, $2; 3rd do., Miss C. Sweetman, London, $1.

Best Plait for Bonnets or Hats, of Canadian straw, Mrs. Wm. Pope, London, $3; 2nd do., Mrs. D. Smyth, Byron, $2; 3rd do., Mrs. Silverthorne, Toronto, $1.

Best Quilt, Silk, Miss Maria Scott, London, $2; 2nd do., Mrs. E. Maguire, Burford, $1; 3rd do., Mrs. J. Crann, Hamilton, 50c.

Best Quilt, Patchwork, J. Edwards, Komoka, $2; 2nd do., Geo. Westwood, 16th Regiment, London, $1; 3rd do., Geo. Gracey, London, 50c.

Best Shell Work, Mrs. E. G. Cobb, London, $2; 2nd do., Mrs. Jno. Cousins, London, $1; 3rd do., A. Routledge, Lambeth, 50c.

Best Shirt, gentleman's, Miss M. Weatherstone, London, $3; 2nd do., Miss J. Anderson, London, $2; 3rd do., M. McColl, Eagle, $1.

Best Socks, three pairs woollen, Mrs. G. Bennett, Cobourg, $2; 2nd do., Alex. Genie, Ancaster, $1; 3rd do., P. Hinman, Grafton, 50c.

Best Stockings, three pairs of woollen, A. Genie, Ancaster, $2; 2nd do., P. Hinman, Grafton, $1; 3rd do., J. Parks, Woodstock, 50c.

Best Tatting, Miss A. M. Robertson, Toronto, $3; 2nd do., Miss T. A. Ramsay, Kingston, $2; 3rd do., Mrs. J. S. Smith, Port Hope, $1.

Best Wax Flowers, Mary J. Welding, Brantford, $6; 2nd do., Mary E. Smith, London, $4.

Best Wax Fruit, Miss E. V. Glen, London, $6; 2nd do., Mary J. Welding, Brantford, $4.

Best Worsted Work, Mrs. Unwin, Toronto, $3; 2nd do., Mrs. Batman, Byron, $2: 3rd do., Miss E. V. Glen, London, $1.

Best Worsted Work, fancy, for framing, Mrs. Unwin, Toronto, $3; 2nd do., Miss Mary Morrison,, London $2; 3rd do., Miss A. J. Lougheed, London, $1.

Best Worsted Work, raised, Miss T. A. Ramsay, Kingston, $3; 2nd do., Mrs. Bates, Hamilton, $2.

Best Wreath, flower, Miss M. Bellnap, Hamilton, $2.

Best Wreath, seed, M. Porter, Bowmanville, $2; 2nd do., Miss R. L. Wilson, Enniskillen, $1.

Extra Prizes.

Rose Work, collar and cuff, Miss E. E. Meyer, London, $2; Down Muff and Victorine, do., do., $3; Hat of Canadian Straw, Mrs. James Dorman, Byron, $2; Three Rag Mats, A. Meekieson, London, $1; Three Rag Mats, Mrs. Jane Doyle, London, $1; One White Quilt, Elijah Benedict, Fingal, $1; Two Rag Rugs, Alice Crittenden, St. Mary's, $1; Hat of Canadian Straw, Mrs. Silverthorne, Toronto, $2; Fancy Chair Piece, Mrs. H. Fysh, London, $2; Fancy Worked Table Cover, Miss Jane Kearns, Birr, $1; Four Rag Mats, Mrs. John Cousins, London, $1; Case of Millinery, Miss J. Hay, London, $4; Fancy Bedcover, Miss Kate O'Sullivan, Campbellford, $1; Wax Bust of Lord Byron, and a pair of braces, Mrs. Batman, Byron, $2 50; Hat of Canadian Straw, Hepsey Moorehouse, Nilestown, $2; Sofa Pillow and pair of Hand Screens, Mary J. Cook, Westminster, $2; Knitted Quilt, Mrs. Robert Draney, London, $2; Knitted Quilt, Miss T. A. Ramsay, Kingston, $2; White Quilt, Mrs. James McDowell, London, $1 50; Marseilles Quilt, Mrs. C. Miller, Norval, $1 50; Cordon, Miss H. Bidwell, Cramahe, $1 00; Pair of Gents Socks, and Pair of Child's Socks, Miss Kersten, London, $3; 12 Hoop Skirts, Miss A. Woodbury, London, $2.

CLASS XLVII.—MACHINERY, CASTINGS, AND TOOLS.

Judges—William Turnbull, Hamilton; W. Hamilton, jr., Toronto; W. H. Gibson, Oakville.

Best Blacksmith's Bellows, J. G. Beard & Sons, Toronto, $4.

Best Cordwood Sawing Machine, Haggart & Bros. Brampton, $8: 2nd do., Elijah Leonard, London, $5.

Best Edge Tools, an assortment, H. H. Date, Galt, $15.

Best Engine, Steam, Stationary, of one to four horse power, in operation, Beckett & Co., Hamilton, $15.

Best Engine, Steam, Stationary, five horse power and upwards, in operation, Beckett & Co., $25.

Best Fire Engine, Hand-Power, Wm. Marks, Toronto, $15.

Best Machines for Planing and Drilling Metals, McKechnie & Bertram, Dundas, $8.

Best Refrigerator, T. & J. Miller, London, $6.

Best Saws, an Assortment, Joseph Flint, St. Catharines, a Diploma and $10.

Best Turning-Lathe, McKechnie & Bertram, Dundas, $7.

Extra Prizes.

Safety Cap for covering Joints of Thrashing and other Machines, W. R. Shaver, Ancaster, $4; Custom Carding Machine, Preffer and Wise, St. Thomas, Diploma and $6; Improved Spinning Wheel, Adam Dell, Strathroy, $3; Patent Mill Pick, John Gibson, St. Mary's, $3; Adjustable Self-Feeding Wood Boring Machine, John Vandyke, Grimsby (exhibited before), Diploma; Sewing Machines, R. M. Wanzer & Co., Hamilton, $5; Sewing Machines, C. Irwin & Co., Belleville, $5; Card of T and Strap Hinges, wrought iron, Byres & Matthews, Ganaoque, $2; Collection of Steam and Vacuum Guages, T. C. Collins, Toronto, $7; Flour Sifter, Richard Smith, Sherbrooke, $2; Railroad Machinery, Great Western Railway Company, Diploma and $15; Patent Tire Upsetting Machine, Norris C. Peterson, Sarnia, Diploma; Regulating Blast Tuyere Iron, do., do., $2; Weaving Loom, for Steam or Water Power, V. Wahn, Preston, $5.

The Judges' report specially commends a cordwood sawing machine by D. Bruce, of London, in addition to those to which prizes were awarded; they also unanimously recommend a Diploma for the G. W. R. Co's large and varied collection of castings and wrought metal work, both in the rough and finished state; the workmanship being very perfect and highly finished, and creditable to the mechanical skill of Canada; they also highly recommend the safety cap for joints of machinery, by W. R. Shaver, of Ancaster.

CLASS XLVIII.—METAL WORK (MISCELLANEOUS) INCLUDING STOVES.

Judges.—Geo. Wales, St. Catharines; Robert Moore, Simcoe.

Best Coppersmiths' Work, an assortment of, J. G. Beard & Sons, Toronto, $8; 2nd do., W. Dyson, London, $5.

Best Engineers' Brass Work, assortment, Hugh Young, Hamilton, $8.

Best Fire Arms, assortment, John Gurd, London, $8.

Best Iron Fencing and Gate, ornamental, E. H. Cooper, London, $8.

Best Iron Work, ornamental cast, J. G. Beard & Sons, Toronto, $7; 2nd do., Alex. Thompson, London, $4.

Best Screws and Bolts, an assortment, Saml. Sharp, Hamilton, $6.

Best Tinsmith's Work, an assortment, J. G. Beard & Sons, Toronto, $6; 2nd do., Buchanan & Gordon, Ingersoll, $4.

Best Tinsmiths' Lacquered Work, an assortment, W. Dyson, London, $6.

Best Cooking Stove, for wood, A. Copp, Hamilton, $6; 2nd do., J. G. Beard & Sons, Toronto, $4.

Best Cooking Stove, for coal, J. G. Beard & Sons, Toronto, $6.

Best Furniture for Cooking Stove, one set, J. G. Beard & Sons, Toronto, $4; 2nd do., A. Copp, Hamilton, $3.

Best Hall Stove, for wood, J. G. Beard & Sons, Toronto, $5; 2nd do., A. Copp, Hamilton, $3

Best Hall Stove, for coal, J. G. Beard & Sons, Toronto, $5: 2nd do., A. Copp, Hamilton, $3.

Best Parlour Stove, for wood, A. Copp, Hamilton, $5; 2nd do., M. & E. Anderson, London, $3.

Best Parlour Stove, for coal, A. Copp, Hamilton, $5; 2nd do., J. G. Beard & Sons, Toronto, $3.

Extra Prizes.

Assortment of Iron Ware, M. &. E. Anderson, London, $2; Drum and Heating Stove, combined, T. & J. Miller, London, $1; Leather Roller or Stretcher, Jas. Sharman, Stratford, $1; Boot Crimping Machine, and Photograph Card Press, J. Sharman, Stratford, $2; Freight Locomotive Side-rod, Wrought Iron Locomotive Axle Box, Cross Heads, Brass Dome Cover, Brass Safety-Valve Cover, New Pattern Sand Box, Finished Railway Car Springs, Finished Brass Work for a Locomotive, and a Wrought Iron Dome, Sam'l Sharp, G.W. R.R., Hamilton, Diploma and $25; Parlour Cooking Stove and Large Hotel Cooking Stove, A. Copp, Hamilton, $8; Case of Wood Screws, J. P. Billington, Dundas, $1; Specimen Coverings for Card Clothing, Eyre Theursson, Ancaster, $4.

CLASS XLIX.—Miscellaneous, Including Pottery and Indian Work.

Judges.—J. Carty, Toronto; D. McMillan, Dundas; Geo. K. Chisholm, Oakville.

Best Brushes, an assortment, A. Green, Hamilton, $6.

Best Brushes, paint and whitewash, assortment, A. Green, Hamilton, $6.

Best Filterer for water, F. P. Goold, Brantford, $3; 2nd do., do., J. H. Ahrens, Paris, $2.

Best Pottery, an assortment, W. & R. Campbell, Hamilton, $8; 2nd do., J. H. Ahrens, Paris, $5.

Best Sewerage Pipes, stoneware, assortment of sizes, W. & R. Campbell, Hamilton, $10.

Best Stoneware, an assortment, F. P. Goold, Brantford, $10.

Indian Bead Work, assortments, H. Dibon, Louisa, Mary, Johanna and Anna, of Caughnawaga, and Micher Micher, of Montreal, each $2.

Extra Prizes.

25 Stop Brick, R. Jarvis, London, $2; Pressed Brick, J. Close, Woodstock, $1; Specimens of Brick, D. Davis, London, $1; Common Brick, J. E. Griffith, London, $1; Pressed Brick, John McGregor, London, $1; Lawn Vases, W. & R. Campbell, Hamilton, $2; Model of Cottage, Miss A. McIntosh, London, $1; Set of Glass Samples, Montreal Glass Works, Diploma and $5; Model of a Land Roller, A. C. Attwood, Lobo, $2; Chess and Back-gammon Board, F. S. Clench, Cobourg, $1; Ladies' Work-Box, do., do. $1; Miniature Full Rigged Ship, James Lamont, Komoka, $4.

CLASS L.—Musical Instruments.

Judges.—Julius Fossier, Hamilton; J. D. Humphreys, Toronto; A. H. Rackett, Woodstock.

Best Harmonium, R. S. Williams, Toronto, $10; 2nd do., Andrus Bros., London, $6.

Best Melodeon, Andrus Bros., London, $6; 2nd do., R. S. Williams, Toronto, $4.

Best Piano, grand, J. F. Rainer, Whitby, $20.

Best Piano, square, C. L. Thomas, Hamilton, $15; 2nd do., Jno. Nitschke, London, $10.

Extra Prize.

A Bass Drum and a Small Drum, L. Allan, Reading, $3.

The Judges report award the first prize to R. S. Williams' Harmonium, "in consideration of *better* balance of tone and fine workmanship; and to Andrus Bros., "for the good effect of the tremol, and good quality of tone, though not so powerful" as the first prize instrument. The first prize Melodeon is recommended for its strength of tone; the square Piano of C. L. Thomas, of Hamilton, "for equality of touch and power, combined with excellence of tone. The Judges also commend an assortment of portable Melodeons by R. S. Williams, "for cheapness, and for answering the purpose to which applied."

Class LI.—Natural History.

Judges—Dr. May, Toronto; Thomas McIlwraith, Hamilton.

Birds—Collection of Stuffed Birds of Canada, classified, and common and technical names attached, W. Poole, Ingersoll, $8; 2nd do., A. Hine, London, $6.

Insects—Best Collection of Native Insects, classified, and common and technical names attached, W. Saunders, London, $8; 2nd do., John M. Denton, London, $6.

Mammalia and Reptiles of Canada, stuffed or preserved in spirits, classified, and common and technical names attached, Wm. Poole, Ingersoll, $8.

Plants—Best Collection of Native Plants, arranged in their natural families, and named, Thos. Waterhouse, London, $8.

Stuffed Birds and Animals of any country, best collection of, A. Hine, London, $8.

Extra Prizes.

Collection of English Insects, Lepidopteræ, E. B. Reed, London, $3; Specimen of Tripoli, R. Reed, London, $2; Specimens of Sea Weed, Mrs. John Cousins, London, $1; Collection of Canadian Animals, stuffed, F. Turton, London, $5.

The Judges report they "are of opinion that as regards the stuffing and setting of the specimens, Birds of Canada, No. 3 (A. Hine, London) is the best collection exhibited, but is incomplete in not having the technical and common names attached, as required."

CLASS LII.—PAPER, PRINTING, BOOKBINDING, AND TYPE.

Judges—Jas. Gillean, London; R. White, Hamilton.

Best Bookbinding (Blank Book), assortment of, R. Reid, London, $5; 2nd do., Chas. Chapman, London, $3.

Best Bookbinding (Letter Press), assortment of, Chas. Chapman, London, $5; 2nd do., H. Kordes, jr., London, $3.

Best Letter-Press Printing, plain, Hon. George Brown, Toronto, $5.

Best Letter-Press Printing, ornamental, Hon. Geo. Brown, $5.

Best Letter-Press Printing,—posters, plain and ornamental, Hon. Geo. Brown, $4.

Best Paper Hangings (Canadian paper), one dozen rolls, assorted, M. Staunton, Toronto, $6.

Best Papers—Printing, Writing, and Wrapping, one ream of each, Buntin, Gillis & Co., Hamilton, $6; 2nd do., Barber Bros., Georgetown, $4.

Best Papers—Blotting and Coloured, one ream of each, Buntin, Gillis & Co., Hamilton, $6; 2nd do., Barber Bros, Georgetown, $4.

Best Printing Type, an assortment, W. Bissell, London, $6.

Extra Prizes.

Assortment of Envelopes, Buntin, Gillis & Co., Hamilton, $2; Assortment of Bookbinding, G. Desbarats, Quebec, Diploma.

The Judges report five specimens of binding by G. Desbarats, of Quebec, "superior to any other specimens exhibited; but as they had not been entered we have been compelled to give the prizes to inferior specimens." On this recommendation of the judges, a diploma was awarded.

CLASS LIII.—SADDLE, ENGINE-HOSE, TRUNK-MAKERS' WORK, AND LEATHER.

Judges—Donald B. McKay, Brantford; Wm. Quarrie, Galt; Thos. Morrow, Cobourg.

Saddlery, &c.

Best Collars, an assortment, A. Loughrey, London, $6.

Best Engine Hose and Joints, 2¾ inches diameter, 50 feet of copper rivetted, Wm. Marks, Toronto, $8.

Best Harness, set of single carriage, John Ross, London, $7; 2nd do., M. Porter, Bowmanville, $4.

Best Hames, carriage or gig, an assortment, J. Sissons & Sons, Byron, $5.

Best Hames, team or cart, an assortment, J. Sissons & Sons, Byron, $5.

Best Saddle, ladies' full quilted, Wm. Thompson, Whitby, $8.

Best Saddle, ladies' quilted safe, do., do., $6.

Best Saddle, gentlemens' full quilted, do., do., $7.

Best Saddle, gentlemen's, plain shaftoe, do., do., $6.

Leather.

Best Brown Strap and Bridle, one side of each, S. McCulloch, Brantford, $4; 2nd do., do., Hyman & Dunnet, London, $3.

Best Deer Skins, three, dressed, G. Ritchardson, Grafton, $3.

Best Harness Leather, two sides, Hyman & Dunnet, London, $4; 2nd do., do., R. Lingwood, Fergus, $3.

Best Skirting for Saddles, two sides, S. McCulloch, Brantford, $4; 2nd do., Bowman & Zinkan, St. Jacobs, $3.

Extra Prizes.

Set of Trotting Harness, M. Porter, Bowmanville, $4.

The Judges in their report recommend a diploma to the ladies' full quilted saddle, by W. Thompson, of Whitby, "for the fine workmanship and style.

CLASS LIV.—SHOE AND BOOTMAKERS' WORK, LEATHER, &C.

Judges.—Jas. Bain, Whitby; Wm. Wilson, Woodstock, John Sterling, Toronto.

Boots, &c.

Best Boots, ladies', an assortment, A. Sutherland, Kingston, $7.

Best Boots, gentlemen's sewed, an assortment, A. Sutherland, Kingston, $7.

Best Boots, pegged, an assortment, A. Sutherland, Kingston, $5.

Best Boot and Shoemakers' Lasts and Trees, an assortment, Selway, Iredale and Ward, Toronto, $8.

Best Shoemakers' Pegs, an assortment, James Gladstones, Ayr, $4.

Leather.

Best Calfskins, R. Garner, Stamford, $3; 2nd do., Bowman & Zinkan, St. Jacobs, $2.

Best Calfskins, grained, Bowman & Zinkan, St. Jacobs, $3; 2nd do., R. Lingwood, Fergus, $2.

Best Calfskins, two, morocco, R. Lingwood, Fergus, $3; 2nd do., Bowman & Zinkan, St. Jacobs, $2.

Best Cordovan, two skins of, R. Lingwood, Fergus, $3.

Best Kip Skins, two sides, Bowman & Zinkan, $3; 2nd do., Hyman & Dunnet, London, $2.

Best Kip Skins, grained, Bowman & Zinkan, $3; 2nd do., R. Lingwood, $2.

Best Linings, six skins, Hyman & Dunnet, $3.

Best Sheep Skins, six coloured, Hewer, Hinds & Co., Guelph, $3.

Best Sole Leather, two sides, R. Garner, Stamford, $3; 2nd do., R. Lingwood, Fergus, $2.

Best Upper Leather, two sides, Hyman & Dunnet, London, $3; 2nd do., R. Garner, Stamford, $2.

Best Upper Leather, grained, two sides, R. Lingwood, Fergus, $3; 2nd do., Bowman & Zinkan, St. Jacobs, $2.

Extra Prizes.

Splits, R. Lingwood, Fergus, $2; Assortment of Seamless Boots, G. W. Morley, Newark, $4; Buffed and Pebbled Leather, Hyman & Dunnet, London, $2; Lace Boots, made of reindeer buff, James Barbeau, Quebec, $2.

The Judges in Class 54, report their "regret that so little interest is taken in the Boot and Shoe Department this year—the cities of London, Hamilton and Toronto not competing, thus allowing the city of Kingston, for three years in succession, to carry away most of the prizes with but little competition; and trust that next year the trade will bestir themselves and contribute towards this most important branch of industry." The Judges also commended the reindeer buff laced boots, by Joseph Barbeau, of Quebec; and also an assortment of boots with seamless uppers, by G. W. Morley, of Newark.

CLASS LV.—Woollen, Flax and Cotton Goods, and Furs and Wearing Apparel.

Judges—George Harcourt, Toronto; Thos. McNairn, Aylmer; A. J. G. Henderson, London.

Best Bags, from Flax or Hemp, the growth of Canada, one dozen, L. Aldrich, Thamesford, $8.

Best Bags, one dozen, cotton, J. Wright & Son, Dundas, $4.

Best Blankets, Woollen, one pair, J. Waterhouse & Co., Port Stanley, $6; 2nd do., Jno. Broadbent, Buxton, $4.

Best Calico, unbleached, one piece, J. Wright & Son, Dundas, $5; 2nd do., Gordon & Mackay, Thorold, $3.

Best Caps, Cloth, an assortment, E. Beltz, London, $5.

Best Carpet, Woollen, one piece, Miss S. Misener, Yarmouth, $8; 2nd do., W. J. Collver, Yarmouth, $5.

Best Carpet, Woollen, stair, one piece, Daniel Shaw, Westminster, $7.

Best Carpet, Rag, one piece, D. Graham, Lobo, $5; 2nd do., W. J. Collver, Yarmouth, $3.

Best Cassimere Cloth, from merino wool, one piece, P. Hinman, Grafton, $7.

Best Cloth, fulled, one piece, Arch. McD. House, Beamsville, $7; 2nd do., Mr. Ellson, Delaware, $4.

Best Counterpanes, two, Jos. Grant, Aberfoyle, $5; 2nd do., Mrs. C. Ellson, Delaware, $3.

Best Drawers, factory made, woollen, one pair, Armstrong, Anderson & Co., Guelph, $5.

Best Flannel, factory made, one piece, J. Waterhouse & Co., Port Stanley, $5; 2nd do., Stephens, Dufton & Co., London, $3.

Best Flannel, not factory made, one piece, P. Hinman, Grafton, $5; 2nd do., W. Armstrong, Lambeth, $3.

Best Flannel, scarlet, one piece, Stephens, Dufton & Co., London, $5; 2nd do., Wm. Pearce, Dunwich, $3.

Best Fur Cap and Gloves, E. Beltz, London, $5.

Best Fur Sleigh Robes, Buffalo, Wolf and Raccoon, an assortment, E. Beltz, London, $10.

Best Gloves and Mits of any leather, an assortment, G. Ritchardson, Grafton, $5.

Best Horse Blankets, two pairs, J. Pearce, Tyrconnell, $5; 2nd do., D. Clark, Morriston, $3.

Best Linen Goods, one piece, John Pearce, Tyrconnell, $5; 2nd do., Wm. Pearce, Dunwich, $3.

Best Overcoat of Canadian cloth, Thomas Peel, London, $5.

Best Shawls, home made, P. Hinman, Grafton, $4; 2nd do., Jno. Pearce, Tyrconnell, $2.

Best Sheepskin Mats, dressed and coloured, an assortment, Jno. Broadbent, Buxton, $6.

Best Shirts, factory made, three of each, woollen and Angola, Armstrong, Anderson & Co., Guelph, $5.

Best Silk and Felt Hats, E. Beltz, London, $5.

Best Stockings and Socks, factory made, woollen, three pairs of each, Armstrong, Anderson & Co., Guelph, $4.

Best Suit of Clothes of Canadian cloth, Thos. Peel, London, $8; 2nd do., Alex. Williamson, Stratford, $5.

Best Tweed, Winter, one piece, J. J. Clutton & Co., Aylmer, $6; 2nd do., Stephens, Dufton & Co., London, $4.

Best Tweed, Summer, one piece, J. J. Clutton & Co., Aylmer, $6; 2nd do., Stephens, Dufton & Co., London, $4.

Best Checked Winsey, one piece, Daniel Shaw, Westminster, $5.

Best Assortment of Woollen Cloths, Tweeds, &c., J. J. Clutton & Co., Aylmer, $10.

Best Assortment of Woollen Shawls, Stockings, Drawers, Shirts and Mits, D. Clark, Morriston, $10.

Best Yarn, white and dyed, 1 lb. of each, Stephens, Dufton & Co., London, $3; 2nd do., do., Samuel Hunt, Westminster, $2.

Best Fleecy Woollen Yarn, for knitting, 1 lb., J. Waterhouse & Co., Port Stanley, $3; 2nd do., do., W. J. Collver, Yarmouth, $2.

Best Cotton Yarn, 2 lbs., Jos. Wright & Son, Dundas, $3.

Best Linen Yarn, 2 lbs., Jno. Pearce, Tyrconnell, $3; 2nd do., do., do., Wm. Pearce, Dunwich, $2.

Linen Goods, 6 varieties, manufactured in Canada from Canadian grown flax (special), $20.

Extra Prizes.

Dyeing, a case of specimens, John Mortimer, London, $2; Lamb-Skin Overcoat, A. C. Attwood, Lobo, $2; Union Flannel, Shirting, and all wool dress piece, W. B. Langrick, Brockville, $3; Plain Winsey, and Jean, J. J. Clutton & Co., Aylmer, $3; Rag Stair Carpet, Chas. Tuckey, London Tp., $3; Black Squirrel Sleigh Robe, Jno T. Wood, Lobo, $3; Persian Lamb Coat, E. Beltz, London, $2; Black Squirrel Sleigh Mat, Jno. T. Wood, Lobo, $3; Flannel for Ladies' Wear, 1 piece, Stephens, Dufton & Co, London, $2; Patchwork Quilt of Soldiers' Cloth, Wm. Fowler, 16th Regiment, Hamilton, $2; Rag Carpet, imitation of Turkey, Miss E. A. Johnston, London, $5; Table Linen, Jno. Pearce, Tyrconnell, $3.

The Judges report the linen bags, by L. Aldrich, and the cotton bags, by J. Wright and Son, Dundas, as very good; they also report the six varieties of linen goods as complying with the requirements of the prize list in quantity, but in quality very poor, and not deserving the high prize offered, but still deserving encouragement.

CLASS 56.—FOREIGN MANUFACTURES.

Judges—E. A. McNaughton, Cobourg; Wm. Edwards, Toronto.

Church Organ, small size, Jno. Nitschke, of London, agent for Cartart & Needham, New York. Diploma.

Ring-Chuck for turning and fitting packing rings for Locomotives, &c., T. Thurber, Auburn. Diploma.

New Improvement for turning and making Springs for Railway and other Carriages. T. Thurber, Auburn. Diploma.

Case of Gold and Silver Chronometers, Watches, &c., A. W. Russell & Co., Liverpool. Diploma.

Family Sewing Machines, Wheeler & Wilson's, D. T. Ware, Agent, London. Diploma.

Chromo-Lithographic Picture, "Battle of the Boyne," Sparkes, Bourne & Co., N. Y. Diploma.

Northern Cotton, or Fibre of the Epilobeum (Great Willow-herb), with specimens spun and knitted, Rutger B. Miller, Utica, N. Y., Diploma.

Board of Arts and Manufactures

FOR UPPER CANADA.

MEETING OF SUB-COMMITTEE.

Board Room, Toronto,
October 26, 1865.

The regular meeting of the sub-committee was held at 2 o'clock, p.m. Present: The President (Dr. Beatty); the Vice-President (Prof. Hincks); J. Shier, B. Walton, W. H. Sheppard and E. A. McNaughton.

The minutes of previous meeting were read and confirmed.

The Sec.-Treasurer submitted his quarterly *rough* balance sheet, showing total receipts to date $3,087.65; expenditure, $1,457.99; balance in hand, $1,629.66; also estimated receipts and expenditure to 31st of December next, showing an anticipated balance at that date of $1,216.16; also estimated receipts and expenditure (new books excepted) to the end of the year for which the Legislative grant is made, June 30th, 1866, showing anticipated balance at that period of $363.16. This latter balance, however, may be in great part absorbed in the purchase of new books for the free Library of Reference, or other unforeseen expenditure. Report was received.

Correspondence with the Assistant Minister of Agriculture, J. C. Tache, Esq., was read, relative to an anticipated removal of British Patent Office publications from the charge of this Board to the seat of Government at Ottawa.

Moved by Mr. McNaughton, seconded by Mr. Shier, and

Resolved,—That the Book and Journal Committee (Professor Buckland, W. H. Sheppard, and H. Langley) be requested to report to the next meeting of this committee a draft of memorial to the Government, and such other steps as they may recommend to be taken, as may seem best adapted to secure a full set, and continuation volumes, of the valuable British Patent Office publications to the free Library of Reference in connection with this Board.

Some accounts were submitted and ordered for payment.

The Committee on Examinations verbally reported the result of the recent FINAL EXAMINATIONS, as already published in the July and August numbers of the Journal, and that the usual lithograph diplomas had been presented to the 1st and 2nd class candidates, and the parchment copper-plate certificates for pocket use also to the 1st, 2nd, and 3rd class candidates.

Moved by Mr. Sheppard, seconded by Mr. Shier, and

Resolved,—That the Committee on Examinations, Messrs Professors Hincks and Buckland, and H. Langley, be requested to communicate with the Directors of Mechanics' Institutes, with a view to the Institutes awarding their CLASS prizes to pupils *based* upon the reports of the examiners appointed by this Board for the Final Examinations, instead of holding special examinations, as heretofore.

Moved by Mr. Sheppard, seconded by Professor Hincks, and

Resolved,—That the President and Mr. E. A. McNaughton be appointed a special committee to report to the next meeting of this committee, upon the general character and results of the late Agricultural Association's exhibition in London, so far as relates to the Arts and Manufactures department; and to report such changes or improvement in the management of future exhibitions of the Association, as to them may seem desirable.

The character, management and style of the Journal was discussed, and generally approved of.

The meeting then adjourned.

W. EDWARDS,
Secretary.

Correspondence.

PEALE'S WAGES CALCULATOR.

To the Editor of the Board of Arts Journal.

Sir,—I observe in the *Journal* for this month, at page 279, a notice of "Peale's Wages Calculator."

I have no doubt this will be a very useful little machine. Of course, I have little to say against it, as Mr Peale *may* have also invented it. I merely wish to claim the priority of the principle of the invention, an account of which is published in your journal of June 1862, page 172. I took a a patent for *Canada* and deposited a model in the Patent Office, which was recorded 12th April, 1862.

If any one should wish to manufacture the machine, which is applicable to a great variety of calculations, such as measurement of timber, &c., I shall be happy to sell the patent for *Canada* on very reasonable terms.

I remain, Sir, your obt. servant,
J. W. DUNBAR MOODIE.

Belleville, Oct., 1865.

EPILOBIUM, OR NORTHERN COTTON.

The samples referred to in the following communication were received at London too late for exhibition, we therefore take this means of drawing attention to the subject, and invite any who may feel sufficiently interested to call at the Office of this Board, and examine the samples for themselves.

From the lightness and softness of the fibre, we should judge that it is admirably adapted for the finer descriptions of wadding, or batting, and also as a material for the finer qualities of paper; but we do not think it is of sufficient strength for the purpose of cloth, twine, or cordage, unless mixed with a fair proportion of wool or flax, as shown in a portion of the articles sent for exhibition—these consist of socks, mits, lampwicks, cord, yarns, twines, a wadded hood, carded and uncarded fibre, and Epilobium seed.

To the Secretary of the Agricultural Association of Upper Canada, at London.

Sir,—Permit me to address you upon a subject which, in my humble opinion, deeply concerns the northern portion of the American Continent, whose inhabitants are suffering from the high price of cotton, particularly in the most necessary articles of which it has hitherto been the component element, viz., batting, wadding, wicking, cord, twine, &c. The fact, that in the county of Oneida, N.Y,, children's feet were frozen in bed during the last winter, is sufficient to shew the magnitude of the evil to which I allude, and the importance of the remedy which I beg leave respectfully to submit to the consideration of "whom it may concern."

At the recent Fair of the State of New York, held at Utica, on the 12th of September, I exhibited specimens of the above *enumerated articles*, made of the fibres of the "Epilobium angustifolium," vulgarly known hereabouts, as Willow-weed, Deer-weed, Queen of the meadow, Indian wickopee, Fire-weed, &c. A Diploma and Favorable notice was awarded, but the unanimous approval of "the million," and particularly of the women from the rural districts, gave me more satisfaction than the reports of the two committees who examined the articles. A mattress, pillow, and comforter, all made of this material, were especially the objects of mothers with young families; then came the mittens, socks, hoods, &c., all of which were pronounced equally as warm as cotton, and preferable from their lightness and softness, which were greater than that of cotton, as you will observe by the samples I send you, by express of to-day.

I am informed, that the crop of Epilobium is abundant in Canada, and now just ripe for the harvest. If this be true, I need hardly urge upon Canadians the importance of immediate attention to the subject. I have gathered several bales, for the purpose of experiment, but it is too late to do anything more in this latitude until next year. I understand that on our northern boundary in the lumber districts, there are hundreds, even thousands of acres of this herb growing spontaneously, which may be secured by the women and children who will soon be shivering for the want of it.

The expense of gathering and cleaning the pods

is much less than that of cotton, and that it is in every respect cheaper, is evident from the facts, first, that it grows upon lands which are comparatively worthless, second, that it is perennial and requires planting but once, or rather *not at all* for it is *spontaneous*, third, that it may be mown or cradled, whereas the cotton must be picked, *pod by pod*. This year, it is true, we must pick, but as soon as the logs, &c., are removed, the cradle or mowing machine may be used.

My "*modus operandi*" has been to employ women and children to pick the stems upon which the pods grow, and when they have brought them to their houses, to strip the pods from the stems, spreading them in the sun or in a dry chamber, in order to cure them—the pods will open, and should be picked before they open, or the fibre blows away. When thoroughly dry, and if exposed to the wind, even while drying, they should be put in a sack or sheet, to prevent loss of fibre. Then take them to the machine for cleaning, which is a very simple operation, and the fibres may be immediately stuffed into bedding of the very warmest and lightest kind.

Wadding for hoods, &c., can be made by the same machine, (see samples thus made) carded on fine cotton cards, and spun on a common wheel by hand, threads are made, and from the threads, lampwick, candlewick, socks, mits, twine, &c., &c., as you see by samples. Mixed with wool or pure and simple, it answers the purpose of keeping warm and light, by our own household labour, at less cost than cotton. We are now paying from 6cts. to 7cts. for lampwicks *at retail!* Mattresses are from 50cts. to $1! Batting, 60cts. to 70cts. per pound! Cotton, 45cts. to 50cts.!

It is not yet too late to remedy this crying want; but not a day should be lost.

Yours, respectfully,

RUTGER B. MILLER.

Utica, Sept. 20, 1865.

Selected Articles.

ON THE RELATIVE ADVANTAGES OF THE INCH AND METRE AS THE STANDARD UNIT OF DECIMAL MEASURE.

BY MR. JOHN FERNIE OF LEEDS.

The subject of a Decimal System of Measure resolves itself into two distinct questions, the *desirability* of a decimal system, and the *standard of measure* to be adopted as the unit of the decimal system.

The principle of a decimal system of measurement is now considered to be so advantageous and desirable by the practical and scientific men who have entered into the subject, that sooner or later the irregular and inconvenient system hitherto used in this country must be expected to give place to one more suited to the present times. The permissive bill of 1864, which legalised by Act of Parliament the use in this country of the present standards of measure decimalised, and also of the French standard the metre, is the first public step in that direction; and consequently the question as to which standard is to be finally and exclusively adopted for use in this country has now become an important and urgent practical question. The adoption of the METRE system in its entirety, both for measures and weights, has been strongly advocated by a very influential committee, who are actively endeavouring to effect that purpose; and the object of the present paper is to compare the standards for measure of length, and to show the practicability of adopting a decimal system founded on the INCH at present used in this country, and the advantages that the inch possesses over the metre as the standard unit of measure.

The first question of the *desirability* of a decimal system of measure may now be considered settled, and the principle definitely adopted in this country: but the second question of the *standard of measure* is still open, and is a very important one for consideration on account of the number of circumstances affecting it.

The adoption of the Metre has been strongly recommended, and special efforts were made to get it fixed upon as the compulsory standard of measure for this country; but in the decimal bill now passed it is determined only to legalise the use of the metre in addition to the former standards in this country. The grounds on which the adoption of the metre has been urged are, the existence already of a complete decimal system of measure and of weights based on the metre, and its adoption already as the standard of measure by the large and important population of the French empire and several other countries: the object being to obtain if possible a universal standard of measure for the whole civilised world, on account of the great advantages that would attend the universal use of the same system of measures in the rapidly extending international communications.

The consideration of the *standard of measure* involves two distinct classes of requirements that have to be met as far as practicable, which need a separate examination, namely:—those involving *scientific questions* for preliminary investigation; and those that are *practical conditions* necessary to be fulfilled before the object can be realiy carried out.

The scientific questions involved may be stated as follows:—

1st. The standard to be the one that can be replaced best in case of being accidentally lost.

2nd. The standard to be the one most universal in the character of its basis of reference.

The practical conditions involved may be stated as follows:—

3rd. The standard to be the one best suited for use in decimal subdivision.

4th. The standard to be the one most extensively and influentially in use already, and consequently involving the least alteration of existing measures.

1st. In considering the question of the standard that can be *replaced best* in case of being totally lost by an accident, there appears on examination to be no real choice between the metre and the inch in this respect. The length of the Metre was originally determined by measuring a portion of a quadrant of the earth's polar circumference; but its length was also referred to the length of a seconds pendulum, on account of the much greater facility for the accurately repeating the measurement of a pendulum than the extremely difficult and complicated operation of measuring an arc of the earth's circumference. The length of the metre was consequently defined in 1798 by Borda, one of the commissioners for determining the French national standard, by giving 0·99385 metre as the length of a seconds pendulum at Paris making 86,400 oscillations in twenty-four hours and vibrating in vacuo at the sea level and at the temperature of freezing water.

The length of the Inch was defined in 1824 by the declaration by Act of Parliament that 39·13-929 inches is the length of a seconds pendulum in the latitude of London vibrating in vacuo at the sea level and at the temperature of 62° Fahrenheit. Consequently both the metre and the inch can be verified by the same means, the measurement of a pendulum; and indeed the relation between them having been once established, it follows that whatever means is used for verifying the one, whether by the length of the pendulum or any measurement of the earth's surface, is equally available for verifying the other; so that in this respect there is not any choice between the metre and the inch.

2nd. In regard to the second point—the standard that is *most universal in the character of its basis* of reference—the metre was formerly supposed to have a marked superiority over the inch, as it was originally intended to be exactly the 1·10 millionth part of a quadrant of the earth's polar circuumference,* the basis of measurement to which it was referred; whilst on the other hand the inch was an uneven fraction of the length of the pendulum. The result however of subsequent and more accurate measurement has been to show an error of 1-6404th part deficiency in the original measurement of the metre, which was effected in 1794 by the measurement of an arc of about 630 miles length, extending through France from the coast at Dunkirk to Formentera on the coast of Spain, the measurement of which was carried out under unusual difficulties in time of war. In consequence of this error in the original measurement for the standard, the length of the metre has now to be defined by an uneven fraction, as is the case in defining the length of the inch. The further result however of recent investigation has been to show that a quadrant of the earth's polar circumference is not, as was previously supposed, a uniform quantity, and it is therefore not a suitable basis for determining a standard unit of measure; for it has been found that the form of the earth at the equator differs from a true circle, its longest equatorial diameter exceeding its shortest by 1-3941th part, and there is consequently a variation in the lengths of different quadrants of the circumference measured from the pole to the equator. As regards the universality of its basis therefore, there is no choice between the metre and the inch.

It has to be noticed that the present legal standard of measure in this country is really an individual standard metallic yard measure, which was legalised by Act of Parliament in 1855; this had been prepared with all possible care by comparison of all existing standards of authority, the former legal standard, a metallic yard measure made by Bird in 1760, having been destroyed by fire in the burning of the Houses of Parliament in 1834. In consequence however of some sources of error having been discovered by subsequent investigations in the former process of measuring the seconds pendulum, all reference is omitted in this Act of 1855 to the means of verifying the standard by the length of the pendulum, and the only provision made against a loss of the standard is by legalising certain duplicates that were made from it with the greatest care as secondary standards. The present standard of measure is therefore really an individual metallic yard measure, forming the legal standard independent of any reference to another source: and the metre may indeed be considered to be in a similar position, since it is a continuation or copy of the original metre, which is now known to differ from the measure of the earth's circumference that it was intended to represent, while the amount of error at present ascertained may probably undergo still further correction by future still more accurate observations.

The circumstances however of depending upon accuracy of copying for the preservation of a standard, though theoretically objectionable, is not practically a disadvantage as regards accuracy. For with the extreme degree of perfection now attained in copying measures of length by Mr. Whitworth's process of contact measurement, the accuracy of measurement can be carried as far as one millionth of an inch, which is a considerably higher approximation than can be attained in any present process of determining the length of a pendulum or an arc of the earth's circumference. The writer is informed by Mr. Whitworth that the standard cylindrical gauges supplied by him to engineering and other establishments do not vary 1-10,000th inch in diameter for any size up to 2 inches, and the larger sizes up to 6 inches diameter do not vary 1-5000th inch.

In consequence of the variation in the lengths of the several quadrants of the earth's circumference, a suggestion has been made by Sir John Herschel to adopt the earth's polar axis as the standard of reference, that being the only single or unique dimension of the earth's mass. As this dimension is very nearly 500,500,000 inches or 1-1000th part more than 500 million inches, it has been proposed by him to increase the inch by 1-1000th part and make it then the standard unit of length as the 1-500 millionth part of the earth's polar axis. It has to be observed however in reference to this proposal, that 1-1000th part of an inch is now an appreciable quantity in mechanical work, such as boring rifles, &c.; and the alteration

* NOTE—Or more correctly the 1-100,000th part of a decimal degree of latitude of which 100 degrees made the quadrant, this degree being taken in France and consequent differing in length from a similar degree in other latitudes on account of the polar diameter of the earth being 1-299th part less than its mean equatorial diameter, owing to its spheroidal form.

if carried out would involve a loss of one mile in every 1000 miles. Moreover, independently of these practical objections, any such step would really involve a similar mistake to that made in originally fixing the metre, since the results of future more correct measurements of the earth's axis would be likely to require a correction in the fraction expressing the inch, in addition to the present known error of 1-170,000 part, arising from the actual length of the axis being rather less than 500,500,000 inches, as ascertained by the present measurement.

All these various considerations therefore appear to lead to the conclusion that the best practical course is to refer to an individual standard which will admit of being copied with a very high degree of accuracy, as in the case of the present legal standard in this country.

3rd. The next question, as to the standard *best suited for use in decimal subdivision*, is one to be determined by the relative practical convenience or inconvenience of the principal subdivisions and multiples of the different standards of length.

The old legal standard of measure in this country, the yard, is near the size of the metre, the former being 36 inches and the latter 39·3708 inches. If the yard were subdivided decimally into tenths, hundredths, and thousandths, it would make a scale as inconvenient and difficult of application in this country as the metre scale: but the standard is defined as a yard of 36 inches, and the inch as a unit of measure has important advantages as regards facility of application, and has a special qualification for the purpose as a convenient unit for expressing the smaller dimensions required in mechanical engineering work, since the subdivisions and multiples of the inch predominate in the dimensions of the parts of machinery, &c. For example, a measuring machine extending from 0 to 10 inches gives an ample range to make the requisite templates and gauges with an accuracy up to 1-1000th inch for all the boring and turning work required for locomotives and for stationary engines up to 100 horse power, and for the tools and machines of corresponding size. The larger dimensions above 10 inches are but few in number as compared with those below 10 inches, and are not required to be more accurate than to 1-100th inch; their dimensions can therefore be obtained from a steel rule of 100 inches length divided into inches, tenths, and half-tenths, while the half-tenth of an inch being easily divisible by the eye into five parts gives hundredths of an inch. The writer has found such a range up to 100 inches amply sufficient for the requirements of one of the largest locomotive establishments, and also for all the purposes of a large ironworks; and with such a system great accuracy of work is obtained, mistakes and misfits are avoided, and a duplicate system of the most perfect kind is established.

For small dimensions the metre is divided into 1000 parts called millimetres, each being equal to ·03937 inch or about 1-26th inch: but in the classes of work in which the finer dimensions of thousandths of an inch is required, the inch has an advantage over the metre in convenience of application as the unit of measure; for dimensions in thousandths of an inch are readily and conveniently expressed and spoken of, but with the metre as a unit such dimensions require the use of millimetres and fractions of millimetres carried to two places of decimals in order to express them. For example, the standard bore of the government rifles, in which a difference of 1-1000th inch in the diameter of bore has to be recognised and expressed, is

·577 inch or 577 thousandths;

but the expression of such a dimension on the metre system would be in the inconvenient form of

14·67 millimetres.

This is a practical advantage of importance in favour of the inch as the unit of measure; for dimensions to 1-1000th inch are now required in regular use for various descriptions of work. For example, in the case of fixing a wheel or a lever upon its axle, the amount of difference in diameter required between boring and turning, in order to ensure the correct amount of tension, is not a thing to be guessed at, but is a definite quantity ranging from 1-1000th to 5-1000ths inch or ·001 to ·005 inch. If in addition to forcing on by hydraulic pressure, as in the case of putting wheels upon their axles, the further step is taken of expanding the external portion by heat and then shrinking it upon its seating, as in fixing levers upon shafts, a very high degree of accuracy in the respective diameters is required, in order to ensure a definite amount of tension: this is especially the case in the manufacture of wrought iron ordnance, where one series of hoops has to be shrunk upon another, each layer being compressed in proportion to the work it is intended to sustain. These dimensions of 1000th inch are now readily appreciated and worked to in regular work by means of the system of contact gauges introduced by Mr. Whitworth; they can be measured by any good workman with a pair of callipers, and great advantage in accuracy and facility of work is derived from the system of working to these definite decimal dimensions.

It may also be observed that the inch divided into 1000ths serves very conveniently to express the series of thicknesses known as the wire and metal gauges, as shown in Mr. Whitworth's decimal wire gauge, a specimen of which is on the table, extending from No. 300 or 300 thousandths of an inch to No. 18 or 18 thousandths of an inch.

A decimal scale founded on the inch as the unit would have then for its subdivisions the 100ths and 1000ths inch at present in use; and the first ascending step in the scale would be the substitution of a 10-inch foot for the present 12-inch foot, being a reduction of 1-6th in the present measure. The succeeding measures would be as shown in the following table, taking merely for the sake of comparison a similar nomenclature to that of the metre scale:—

	Inches.		
Milli inch =	·001	or thousandths of an inch.	
Centi inch =	·01	„ hundredth „	
Deci inch =	·1	„ tenth „	
Inch =	1	the Standard Unit.	
Deca inch =	10	5·6 foot	of 12 in.
Hecto inch =	100	about 1¼ fathom	„ 72 „
Kilo inch =	1,000	„ 1¼ chain	„ 792 „
Myria inch =	10,000	„ 1¼ furlong	„ 7920 „
	100,000	„ 1½ mile	„ 63360 „

A corresponding decimal scale applied to superficial measure would be as follows:—

Square Inches.

Square Inch =	1				
Square Deca inch =	100	about	⅔ foot of	144	sq. ins.
Square Hecto inch =	10,000	„	¼ pole „	39,204	„ „
Square Kilo inch =	1,000,000	„	⅙ acre „	6,272,640	„ „

In carrying out this change of the measures at present in use, it has to be observed that in consequence of taking for the unit the lowest of the present denominations—the inch—the important advantage is obtained that any dimension on the present system can be exactly expressed in the decimal system without any fractional remainder, and the only calculation required for the change is to bring the dimension into inches, which immediately gives its corresponding value in the decimal system. But if any other of the present measures, such as the foot or the yard, were taken as the unit, a troublesome calculation would be required for this purpose, just as in the case of adopting the metre for the unit; and the result would be an inconvenient fractional quantity, with its accuracy depending in many cases on the length to which the decimal was carried.

4th. The last consideration is the standard that is the *most extensively and influentially in use* already, and consequently involves the least alteration of existing measures in its adoption.

The *metre* was established in France in 1840, and is now the measure in universal use throughout the French empire, and also in Belgium, Holland, and Northern Italy. It has also been subsequently adopted and has partly come into use in Spain, Portugal, Italy, and Greece, and also in Brazil, Peru, Chili, Mexico, and other countries in America. The population of the above countries is about as follows, taking the data from the *Almanach de Gotha*:—

		Population.	
Metre in universal use	France, Belgium, Holland, and Northern Italy,	50,000,000	
Metre adopted and partly in use	European Countries	37,000,000	
	Ditto Colonies	35,000,000	
	American Countries	26,000,000	
			98,000,000
			148,000,000

The *inch* is in universal use throughout the British empire (excepting India) and throughout the North American States. In British India the native standard measure, the "hath," is legalised as 18 inches; and a multiple of the inch is also the standard measure of the Russian empire, the imperial "sagene" being legalised as 7 feet English. The population of the above countries is about as follows, taken from the same source:—

		Population.	
Inch in universal use	British empire (excepting India)	36,000,000	
	North American States	31,000,000	
			67,000,000
Multiple of Inch in use	British India	138,000,000	
	Russian empire	74,000,000	
			212,000,000
			279,000,000

In addition to this excess in the actual numbers of the people now using the inch over those now using the metre, the fact should be considered that the former include the great machinery producers, whose work is already existing in such large quantities in all parts of the world in the form of engines, machinery, railway plant, tools, &c.; such as the tools and machines of Manchester and Leeds, so largely exported to other countries, their cotton and flax machinery, the sugar mills of the West Indies, the steam engines, agricultural engines, and machinery sent to all parts of the world, steamboats, railway plant and machinery, railway bridges and roofs, &c.; the amount of steam engines and machinery alone that has been exported from this country during the last twenty years having reached the value of £49,000,000, and averaging during the last five years about £4,000,000 annually. The large excess in the machinery already made under the inch over that made under the metre system of measure is an important practical consideration, as it must be remembered that the machines sent out to other countries form types of other machines, and that they require repairing and renewing with the same measures with which they were made. In this country the inch is involved intimately in all mechanical engineering work, and is the basis on which the various machines and engines have been built, as the mechanical engineer may be said to think in inches, calculate in inches, and work in inches; mechanical drawings are made to the inch or its multiples, patterns are in inches, the pitches of the teeth of wheels, the sizes of taps and dies, the standard gauges for boring and turning, and the finer dimensions of every part of every tool, machine, and engine, are all made in inches; and the sizes of all bars of iron and planks of timber are in inches. The inch is also the basis of the data for calculations of strength of materials, sectional areas of girders and framing, pressure of steam, &c., power, velocity, capacity, and weight. The difficulty of effecting any change in the unit now forming the basis of these measures and calculations would therefore be exceedingly great; but in the case of the metre this difficulty is greatly increased by the relation between the metre and the inch requiring a long fraction to represent it with sufficient accuracy for such purposes, thus:—

1 metre is equal to 39·3708 inches and
1 inch is equal to 25·3995 millimetres.

In the following Table are shown, for the purpose of comparison, the corresponding values in millimetres of some of the ordinary fractions of the inch, and the corresponding values of square and cubic inches in square centimetres and cubic millimetres from which will be seen the extreme difficulty and inconvenience that would arise in attempting to change the inch to the metre system.

1	inch	= 25·3995	millimetres.
½	„	= 12·6998	„
¼	„	= 6·3499	„
⅛	„	= 3·1749	„
1/16	„	= 1·5875	„
1/32	„	= 0·7937	„
1/64	„	= 0·3968	„
1/100	„	= 0·2540	„
1	square inch	= 6·451	square centimetres.
10	„ „	= 64·521	„ „
1	cubic inch	= 17·386	cubic millimetres.
10	„ „	=163·862	„ „

Considering the preponderance of the population now using the inch and not the metre, and the extent to which the inch is now spread over the whole world, the difficulties in the way of a change to the metre appear to the writer so insuperable as to amount practically to a prohibition of a decimal system of measure if it is to be based on the metre.

The decimalising the present very irregular and inconvenient system of *Weights and Measures of Capacity* in this country is one of great importence; and great advantages would arise from their reduction to a uniform decimal system. It has been supposed that the metre system has an advantage in basing the system of weights directly upon the measures of length, the kilogramme of 2·2048 lbs. English being intended to be exactly the weight of a cubic decimetre of pure water at its maximum density; but it now appears from subsequent more accurate measurement that this requires some correction, so that the relation between the kilogramme and the metre is not an even one as intended, but an uneven fractional one. There is strictly no choice therefore in that respect between the kilogramme and the pound; and in fact, in the same way as with the definition of the metre or the inch, any weight, such as the English pound, may be defined with equal accuracy for the standard unit.

It may be remarked that if the pound (pound avoirdupois=7000 grains troy) were taken as the standard unit for decimal weights, the important weights of the cwt. and the ton, which now vary in practice, the cwt. between 112 and 120 lbs. and the ton between 20 and 21 cwts. or 2240 and 2520 lbs., might be decimalised as 100 and 2000 lbs. without any very serious difficulty and with important advantage in removing another of the old irregularities in the system of weights and measures; just as in 1841 the imperial and decimal gallon consisting of 10 lbs. of distilled water at 62° Fahr. was substituted by Act of Parliament for the old ale and wine gallons having 102 and 83 per cent. respectively of the same value.

The following are the general conclusions submitted in the present paper in reference to the standard for decimal measure:—

I. That the inch and the metre are equally eligible for the purpose, as regards the basis of reference on which they are founded; and either of them could be as accurately and readily replaced as the other in case of being lost: since both of them are practically dependent upon the copying of an individual standard, which can be effected by the present improved means of measurement, with a higher degree of accuracy than could be attained in a repetition of the original process of constructing the standard by reference to a natural standard such as a pendulum or an arc of the earth's circumference.

II. That the metre is not suitable for adoption in this country, on account of its entire difference from the existing measures, and the inconvenience that would arise in expressing the smaller dimensions extensively used in mechanical work, &c.; and that the inch is the most suitable measure for the purpose, on account of its being intimately involved in the present data for calculations and dimensions of mechanical work, &c., and from its convenience for expressing the smaller dimensions extensively used. That for larger dimensions the easiest and most convenient decimal change would be the adoption of a 10 inch measure, which would be a reduction of an even fraction of 1-6th from the present foot; and the longer measures being already multiples of the inch, the change would then be at least easier for their decimal adaptation to the inch than for their entire alteration to the metre standard,

III. That it is very desirable that an alteration should be made in the present system of weights and measures of capacity, for reducing them both to decimal systems; and that these can be based as definitely and conveniently upon the inch as the standard of measure as upon the metre; and that it will be preferable to adopt for the standard a weight that is already in most common use in this country, such as the pound, without attempting to construct any new standard bearing a more simple relation to the decimal standard of length, but differing from all the existing weights.

Mr. Fernie said he had endeavoured to enter upon the subject of the paper without any bias for either the inch or the metre; and after a good deal of consideration of the question he had come to the conclusions given in the paper, in favour of the inch as the standard unit of decimal measure. In the estimates of the population using the inch or the metre he had found some difficulty in obtaining reliable information respecting this for the different countries; and was partly indebted to a paper read by Professor Rankine at last year's meeting of the British Association at Bath, and partly also to a paper by Sir John Herschel on the yard, pendulum, and metre; it was probable, therefore, that a different view of the relative populations on either side of the question might be entertained by the advocates of the metre system. With regard also to the value of the exportations from England of machinery constructed on the inch system, which had been referred to in the paper, a small deduction had to be made for machinery constructed on the metre system, as a few of the locomotive establishments in this country had had to send out engines made on the metre system to France and Italy; but generally speaking the engines and machinery made in England had been all constructed upon the inch as the standard of measurement. The only instance that he knew of in which the metre had been entirely adopted in this country as the basis for working upon was the manufacture of Giffard's injector for steam boilers, made at the Atlas Works, Manchester. The injector was however altogether a French invention, and the drawings required for its manufacture were all sent over from France in the first instance with the dimensions marked in millimetres; and as the proportions of the parts were so very delicate, it was feared they might be disturbed by turning the measurements into inches, and the metre had therefore been adhered to as the basis of measurement in that particular branch of work. It would certainly be most difficult to induce the French to adopt the inch; but on the other hand he did not think it was practicable to introduce the metre system universally in English engineering workshops, as the expense of the change would be so great, and he did not see that

there would be any advantage in it at all. He therefore considered the inch preferable as the standard unit of decimal measure in this country.

The President said that a deputation had been sent to the present meeting from the International Decimal Association, and he hoped they would give their views upon the subject of the paper that had been read.

Mr. James Yates, as a Vice-President of the International Decimal Association, said he had been particularly gratified to find that the views expressed in the paper coincided so fully with those of the Decimal Association, with regard to the value and practicability of the decimal system of measurement; there was indeed little difference of opinion excepting in the ultimate conclusion drawn as to the standard unit for decimal measure, for which the metre was considered by the Association the most eligible. There was no question that the mode of measurement hitherto used in this country was so irregular and inconvenient that it ought to be abandoned, and a uniform decimal system substituted for it; and the introduction of such a uniform system universally throughout the world would be attended with most important advantages, from the rapidly extending international communications. The two practical conditions affecting the choice of a universal standard unit of measure were, that it should be the one best suited for use in decimal subdivision; and that it should be the one causing the least possible alteration in the existing measures. The question was thus brought into a very narrow compass: namely, whether the preference should be given to the inch or to the metre as the unit of measure; the latter being defined by the platinum metre preserved since 1799 in the *Hotel des Archives* in Paris, and the former by the gunmetal yard measure or bar deposited in 1855 in the office of the Exchequer at Westminster.

The course adopted by the International Decimal Association, in order to obtain a solution of this question as to the best unit of length, had been to send a series of eleven questions to all the persons who were supposed to be best qualified to judge upon the subject; and the answers having been received, four meetings were held in London, to which all such persons were invited; and on that occasion Mr. Whitworth's system of accurate measurement was exhibited and explained. The result of the discussion of the question at the meetings was, that a report was drawn up and circulated, in which it was recommended as eminently desirable that the unit of measurement should be of such a length as might be adapted to measure the greatest variety of objects, and in the most numerous cases likely to occur in daily life; and that it should be visible at a glance of the eye, and easily carried about and manipulated: and it appeared that for these purposes the inch or the foot would be too short, and the fathom too long; and that a measure of about the same length as the ell, the yard, the metre, or the second's pendulum was to be preferred, of which there were important reasons for selecting the metre as the universal unit. The inch indeed seemed at the outset very unsuitable to become the basis of a universal system; and although for English mechanical engineers it might be a very convenient measure, yet even for their purposes he was not satisfied that it would be better than the metre, by the use of which he thought all measurements in mechanical work might be made with equal nicety and accuracy. In the ordinary transactions of daily life the commonest and most universal measurements might be taken as those associated with textile manufactures; and the metre being a measure suitable for cases of this kind would be the most convenient for common use and most eligible as the standard unit of lineal measurement. For example, an order for 13 metres of silk, or 64 square metres of carpet, was simple in expression, and would convey a clear conception of the quantity, if the metre system were adopted, and the unit would be very near the yard now used for the purpose; whereas with the inch as the unit, the equivalent expressions of 510 inches length, or 99,000 square inches respectively, were very inconvenient and not very easily conceived. Such illustrations showed clearly the inconvenience of using a small unit; and led to the conclusion that, in fixing a standard unit of measurement, it was necessary not to have regard to any special purpose exclusively. In aiming solely at the small measurements that predominated in mechanical engineering work, the inch might be the best; but when a standard was required for all sorts of measurement, the inch was, in his own opinion, unsuitable for general use.

For the purpose of minute subdivision every advantage was presented by the metre which was attainable by the inch; since the accuracy of minute measurements depended not on the scale, but on the instrument, which could of course be made equally applicable to any scale. The most recent instrument for minute measurements in connection with the metre system, was that of M. Perreaux of Paris, which was shown in the Great Exhibition of 1862, and afforded the means of measuring to 1-3000th of a millimetre (about 13 millionths of an inch); and for all practical purposes that was probably as minute and exact a measurement as was required. It should be remarked that Mr. Whitworth himself, who had recommended the inch to be adhered to for mechanical engineering work, objected to the prototype yard from which the inch was supposed to be taken, because it could not be seen or used; and had shown that it was hardly to be called a measure at all, and was inapplicable and of no value whatever in mechanical operations. The Astronomer Royal too had admitted that the chief value of this standard yard was its convenience for geodetic operations. For these purposes, however, the metre was at least equally eligible; and the difficulty that was anticipated from converting the present measure of this country to the metre system, on account of the number of decimal places required, would be met by the use of ready-reckoners, especially adapted to all the purposes of commerce; these would be requisite until the metre was fully established in general use, after which the need of any such aids would cease.

With regard to the relative population in favour of the inch and the metre respectively, he believed the numbers given in the *Almanach de Gotha*, as the population at the present time of all the countries in the world, were generally accepted as the best authority on the subject; and from these data

he had come to the conclusion that the population in favour of the metre should be taken as about three times that using the inch, instead of the majority being in favour of the inch as argued in the paper. Russia, with a population of 74 millions, appeared to have been put down as favourable to the inch, because it used the "sagene" of 7 feet English, or 84 inches. This measure, which was the Russian fathom, had been fixed at a time when the length of that fathom was very uncertain, by Peter the Great, who decided that it should be exactly equal to 7 feet English. It had been stated however by Mr. Kupffer, the imperial superintendent of weights and measures in Russia, that, although the inch was known in Russia as the 1-84th part of their standard unit, it was not used by any means in the same manner or to the same extent as the inch was used in England: on the other hand he instanced many points in which the present weights and measures in Russia approached very nearly to the metre system; and he expressed his opinion that it would be far easier for Russia to adopt the metre system than for England to do so, and he decidedly considered the metre system was preferable for Russia to the inch system. A report had also been presented to the Minister of Finance, by the Imperial Academy of Sciences in St. Petersburg, in which the adoption of the metre was recommended for Russia; and there was therefore some ground for saying that Russia was decidedly tending to the adoption of the metre. The different states forming the Germanic Confederation had formerly been exceedingly confused in their weights and measures, and had recently appointed commissioners to devise a uniform system, who recommended the adoption of the metre system throughout all Germany. A meeting of the several representatives was then held at Frankfort-on-the-Maine, when all the states except Prussia agreed to adopt the recommendation of the commissioners; and at length in 1863, when the statistical congress was held in Berlin, Prussia also gave in its adherence to the metre system; thus all Germany might now be fairly reckoned on the side of the metre. Moreover Germany had for a long time past made a partial use of the metre system, the half kilogramme having been employed as the standard unit of weight in the custom house, the post-office, the railways, and other public departments. In India also there was a movement going on which was favourable to the metre system, and recent extracts from the *Madras Times* showed that that district of India was considering the subject and inclining to the metre. On the whole therefore he thought that Germany and Russia should be added on the side of the countries favorable to the metre, and India should at least be omitted from the number for the inch; and the population favorable to the metre would then be more than 200 millions, in comparison with about 70 millions actually using the inch at the present time.

An important movement was now going on in this country for introducing the metre system in education, since it was clear that the system could not be brought into universal use unless it was first taught universally in schools. He had found a widely prevalent desire on the part of schoolmasters and others interested in education to have the metre system taught in schools to all classes of the community, and it was astonishing to see the amount of facility with which the system was learnt. He exhibited a digram of the measures and weights of the metre system (Dowling's synoptic table), by means of which he was confident any child might be made to understand the principles of the system thoroughly in a few hours; and if the system were taught for three months in any of the elementary schools, the children would become quite familiar with it. But on the other hand it was well known that the present confused tables of weights and measures were a continual torment to the learners, who had no sooner got them by heart than they began to forget them. The metre system, however, was not intended to be rendered compulsory in this country at present, but to be publicly taught, and by that means gradually introduced, and not made compulsory until the nation was fully prepared for it.

He was happy to acknowledge the favourable opportunity that had been afforded by the paper just read for a practical discussion of the subject in one of its many important bearings; and such a course could not fail to contribute to the satisfactory settlement of this important international question.

Several other members of the International Decimal Association took part in the discussion, going over similar grounds to Mr. Yates, and strongly urging the adoption of the metre as the unit of measure.

RECENT APPLICATIONS OF MAGNESIUM.

(By W. White.)

A Paper read before the British Association, Birmingham, September, 1865.

Last year magnesium was introduced to commerce; and since its introduction several attempts have been made to convert it from an article of curiosity and amusement into one of utility.

At Bath, last autumn, we brought it in wire, and blinded ourselves and dazzled our friends with its brilliant light. Shortly after, it was discovered that combustion was improved by flattening the wire into ribbon; and ribbon has almost superseded wire in the shops.

Magnesium so far has almost exclusively been regarded as a source of light, and the problem has been, how to burn it to the best advantage.

Assuming that wire or ribbon was the best form, the question narrowed itself to the contrivance of some apparatus, which would pay it out at the precise rate of combustion.

Invention moves by easy steps. The first attempts were made by Mr. William Mather, of Salford, and Mr. F. W. Hart, of Kingsland, who each produced a lamp in which the wire was delivered by hand from a reel, and guided through rollers and a tube to the flame of a spirit-lamp, in order to avert the risk of distinction. To this lamp Mr. Alonzo Grant, an American, affixed clockwork; and with this addition it has met with considerable success.

The risk of sudden extinction was a chief difficulty in the early use of the magnesium light, probably arising from some flaw in the wire—the presence of some foreign matter in its substance.

As the manufacture has improved, and the wire assumed a degree of ductility unknown in samples a year ago, this difficulty has become greatly reduced, and especially in the case of the ribbon, which I have seen burn steadily for half-an-hour without sign of intermission. Perfect certainty of combustion (dispensing with the spirit-lamp) has been ensured by the use of a double strand of wire or ribbon—it being exceedingly improbable that the flame of both should go out at the same instant, and in the event of one being extinguished, it would be re-lit by the other. One of Grant's lamps paying out a double strand has burned for two hours without cessation; and it is only necessary that the reels of magnesium and the clockwork be enlarged to secure a continuous light for any requisite time.

Captain Bamber, R.N., of Clarence House, Jersey, has been making a variety of experiments in order to adapt magnesium to common use in mines, tunnels, and railways. His instrument consists of a mahogany box, about eighteen inches long, containing a series of small wheels (much resembling those of a musical box), and a drum, round which the wire is wound, and from which the burner is supplied at a rate proportionate to the revolution of the drum, whose action is governed by a regulator. The burner is enclosed by a powerful lens, or "bull's eye." Captain Bamber exhibited this instrument one night lately at the Paddington Railway Station, and though the thinnest ribbon manufactured was used, the time was easily read off a watch at the distance of 250 yards.

There is manifestly much more to be accomplished in the matter of lamps. We require apparatus whereby a hall or picture-gallery can be illuminated for the evening. This, one would say, should be effected by burning the magnesium overhead from the centre of the ceiling; but the disposal of the smoke and ash, consisting of pure magnesia, is the difficulty—a difficulty, however, which has only to be stated to be met and overcome. Already some ingenious mechanics are tackling it hopefully.

It is a question whether magnesium in filings has met with due attention. It would not be difficult to deliver a stream of metal as sand from an hour-glass into a jet of gas or other flame, and thus maintain a light with a certainty equal to that obtained by wire and clockwork.

* * * * * *

A peculiarity of the magnesium light is, that it leaves colours unaffected—that is, it displays them as in sunshine. This may be verified with agreeable effect by burning a piece of wire at night in a garden or conservatory, when it will be found that greens and blues, yellows and whites, reds, violets, and purples, appear with perfect distinctness. This fortunate quality has led to the employment of the light by dyers and silk mercers as a ready means of settling questions as to shades of colour either at night or in foggy weather.

* * * * * *

To the utilization of magnesium no one has brought such experience and such resources as Captain Bolton. As is well known, he devised the oxy-hydrogen signal-apparatus introduced to H. M.'s service some three years ago. The credit attached to this success would have tempted many a man into the position of an obstructive; but Captain Bolton having arrived at the conviction, based upon actual experiment, that the magnesium light possessed all the necessary attributes for a perfect naval and military signal light, equally with the electric and lime light, and with decided superiority over them in the grand requisite of handiness, he at once avowed his conviction, and set to work to apply its powers to the best advantage.

In the first place, in conjunction with Captain Colomb, he has succeeded in introducing magnesium powder into signal-lights for use in the mercantile marine. These lights are intended to burn on the port or starboard sides of vessels entering port during thick or foggy weather. They last 3, 5, or 8 minutes, and longer lights from 12 to 15, and are distinctly visible at a distance of eight miles. The cost is trifling.

The Mercantile Marine Association of Liverpool have lately recommended that a powerful red light be made as the signal for danger at night. This recommendation Captain Bolton and Captain Colomb have met, again by the use of magnesium in powder. They have prepared a red light to burn about 15 minutes at a cost of 1*s.* 6*d.* It is visible in clear weather at a distance of ten miles. The signal is now under consideration by the Association.

A greater interest, however, belongs to Captain Bolton's efforts to supersede the oxy-hydrogen light by the combustion of magnesium in simplicity, in wire or ribbon. His apparatus for this purpose is not yet complete, and until it is, it would be unfair to him to prejudice it by description. Suffice it to say, that he has succeeded in consuming or suppressing the smoke, and with a few more adjustments will accomplish clipping off the ash which gathers on the point of the burning strand of magnesium, and sadly dims its glory.

With all imperfections, Captain Bolton has found it easy to signal with magnesium from Shoeburyness to the "Great Eastern," eight miles off; and from Portsmouth to St. Catherine's Downs, Isle of Wight, a distance of sixteen miles.

Supposing Captain Bolton should fully attain what he proposes, it will lead to the employment of magnesium in all the ships and light-houses of Europe. Rid magnesium of its smoke and ash, and there is no light to compare with it in other respects.

The manufacture of magnesium has been commenced in Boston, and from the men of Massachusetts, who are said as babies to lie awake and scheme improvements and patents in the construction of cradles, we are likely to hear of some novel applications of the metal. If the contest in which they were engaged had not so happily ended, we should have heard ere this a great deal about the utility of magnesium in war. We were startled in reading last February, in 'The Times' and other papers, that blockade-running was about to receive an unexpected check, for it had been found possible to remove the veil of night by the blaze of magnesium fire. In a rough way it may be said, that to us in England novelty is a prejudice to be overcome, but to Americans novelty is a recommendation.

All our talk has been of magnesium as a source of light, but surely it will be found capable of other applications. It is, perhaps, the most abundant metal in nature. It rolls in the sea, and forms vast tracts of land. If, as some say, everything in creation bears reference to man and was designed for his use, what a future there is for magnesium! Sir Humphry Davy was the first to give the hint of its existence, nearly sixty years ago: it is time that Birmingham converted that hint to practical purpose.

Transactions of Societies.

AGRICULTURAL ASSOCIATION OF UPPFR CANADA.

The Annual Meeting.

In accordance with the By-Laws of the Association, the Annual Meeting was held on the morning of Friday, September 22nd, in the large committee-room on the Exhibition grounds, at London.

The officers of the Association, J. C. Rykert, President (in the chair); W. J. McGillivray, 1st Vice-President; J. P. Wheler, 2nd Vice-President; R. L. Denison, Treasurer; Hugh C. Thomson, (Secretary of the Board of Agriculture) and W. Edwards (Secretary of the Board of Arts and Manufactures), joint Secretaries.

In addition to the delegates from the various Agricultural and Horticultural Societies, and Board of Arts and Manufactures for U. C., there were also present the following members of the Council of the Association:

Board of Agriculture.—Hon. D. Christie, President; W. Ferguson, M.P.P., Vice-President; R. L. Denison, Treasurer; Hon. G. Alexander, Professor Buckland, Dr. Richmond, Hon. A. A. Burnham and F. W. Stone.

Board of Arts and Manufactures.—Dr. Beatty, President.

The minutes of last Annual Meeting were read and confirmed.

It was then moved by Dr. Barker, seconded by Mr. A. K. Scholfield, That N. J. McGillivray, Esq., of Glengary, 1st Vice-President, be President of the Association for the ensuing year.—Carried.

Moved by Mr. John Shier, seconded by Mr. Arch. Barker, That John P. Wheler, Esq., of East York, 2nd Vice-President, be 1st Vice-President for the ensuing year.—Carried.

Moved by Mr. A. Barker, seconded by Mr. John Shier, That Hon. John Carling, of London, be 2nd Vice-President.

Hon. Mr. Carling, being present, begged leave to decline the nomination, as his business engagements would render it impossible for him to discharge the duties of the office. The motion was accordingly withdrawn.

Moved by Mr. Geo. Murton, seconded by Mr. James Scarff, That Thomas Stock, Esq., of North Wentworth, be 2nd Vice-President.—Carried.

Moved by Mr. A. Barker, seconded by Mr. Wm. Grey, That Mr. R. L. Denison be re-elected Treasurer for the ensuing year.—Carried.

Moved by the Hon. Mr. Carling, seconded by Mr. James Johnson, That the next Exhibition of this Association be held at the City of Toronto.

Mr. Denison begged leave to enquire what propositions the representatives of the City of Toronto were prepared to submit to the meeting in regard to the preparations for the exhibition.

Mr. Metcalf, Mayor of the City of Toronto, and other delegates from that corporation, being present, were invited to give information on this subject to the meeting. The Mayor then submitted a document guaranteeing "to provide all the necessary accommodation that may be required to enable the Provincial Agricultural Association to hold its exhibition."

The motion was then put from the chair and carried.

Moved by Mr. R. Gibbons, seconded by Mr. A. R. Scholfield, That the old system of selecting Judges by the Board of Agriculture be continued in future.

Moved in amendment by Mr. Guy, seconded by Mr. R. W. Sawtell, That the different County Agricultural Societies be requested to name three persons from each Society, and to send those persons names and the classes in which they are competent to act as Judges, to the Secretary of the Board of Agriculture, to enable the Board to make such selection as they may think fit from the number.

The amendment was put from the chair, and lost and the original motion carried.

Moved by Mr. A. Barker, seconded by Mr. John Shier, That the delegates present at the Annual Meeting of the Association held this day in London, give it as their deliberate opinion and conviction, that in any amendment to the Agricultural Bill the delegates should have the right to give an open vote for the election of retiring members of the Board of Agriculture.

Moved in amendment by Mr. Thomas Stock, seconded by Mr. John Renton, That this meeting would recommend the passage of the Agricultural Bill, introduced by Mr. Cowan in the Session of Parliament for 1864.

Amendment put and lost, and main motion carried.

Moved by Mr. Barker, seconded by Mr. Wheler, That a copy of this resolution be sent to the Minister of Agriculture, and that he be requested to use the influence of the Government in carrying it out. —Carried.

Moved by Professor Buckland, seconded by Hon. Mr. Burnham, that the Board of Agriculture urge upon the Government the propriety of taking measures to prevent the importation into this Province of cattle from countries where the cattle plague is known to exist.—Carried.

Moved by Mr. Burnham, seconded by Mr. Stock, That the thanks of the Association be given to the Great Western and the Grand Trunk Railway Companies, for the liberal terms, and the large amount of accommodation afforded by them in the conveyance of passengers, stock, and articles to and from the exhibition.—Carried.

Moved by Mr. Grey, seconded by Mr. Ferguson, That the thanks of this Association are due, and are hereby tendered to the importers of thoroughbred stock.—Carried.

Moved by Mr. A. K. Scholfield, seconded by Mr. Dennis Nixon, That the thanks of this Association be tendered to Mr. J. C. Rykert, for the very efficient manner in which he has discharged the duties of President of the Association during the past year.—Carried.

Moved by Mr. Barker, seconded by Mr. Shier, That the thanks of the Association be, and are hereby tendered to the Treasurer and Secretaries for their valuable services during the past year.—Carried.

The meeting then adjourned.

TORONTO MECHANICS' INSTITUTE.

The several evening classes for the winter season are now fully organized, and promise to have a prosperous session, both as to numbers and efficiency. The Book-keeping class now embraces 61 pupils, the English class 12, Arithmetic 13, Architectural and Mechanical Drawing, 14; Ornamental Drawing 12, French 12; and Mr. Lewis' Phonography and Elocution classes 32—in all 156 pupils. For details of the working of these classes see Journal for September and October.

The liberal spirit in which the Directors of the Northern Railway promote these classes, in an annual appropriation towards prizes awarded at the close of each term; and the active interest taken therein by the Managing Director, F. W. Cumberland, Esq., cannot be too highly commended; and at the close of the present session the Directors of the Company will also award, by competition, to pupils of the classes two apprenticeships; one of them will be to learn general railroad business, the other to learn the business of a machinist in the workshops of the Company. These are real prizes, when it is considered that the apprentice begins with a salary of fifty cents a day.

We trust that not only will the youths who attend these classes be largely benefited by the liberality of this Company and the Directors of the Institute, but that the one may thereby secure good, honest, and intelligent employees, and the other build up for itself a useful and intelligent membership, and for society honorable citizens.

The Directors of the Institute have engaged with Mr. Vandenhoff to deliver a series of readings in Toronto and the principal cities and towns of Upper Canada. This course has been taken we believe at the suggestion of Mr. Vandenhoff himself, as the only plan by which he could give readings in any but the two or three largest cities of the Province. The Toronto *Globe* says—

"The enterprise is one of great interest and importance, and we hope it will meet with the hearty co-operation of the places which are to be favoured with his visits. Public readings are exceedingly popular in England, and attract, even when given by non-professional readers. They have a charm in themselves—in the thoughts of genius, the melodies of poetry, and the creations of fiction. Mr. Vandenhoff is not only an elocutionist of the highest order—he is an artist, who himself creates in the very pictures he delineates and represents; and while his readings are the finest and truest interpretation of his author, instructing his hearers and exalting their taste —they have all the attractiveness which makes theatrical performances so fascinating, with none of their moral objections. In Toronto he always commands large audiences—amongst them the most intelligent and respectable members of the community. This enterprise of the Mechanics' Institute is a public benefit, and will, we trust, meet with that support which it so well deserves. The Board of Directors are an educational body, and desire to give impulse to similar institutions throughout the country. In this engagement with Mr. Vandenhoff they consider they are aiding the important work of popular amusement and improvement, and while they enter on the undertaking with hopes of success, they contemplate that it shall be only the beginning of greater efforts for the same important moral and intellectual object. Mr. Vandenhoff will visit the following places:—Hamilton, Dundas, Woodstock, Brantford, Ingersoll, London, Stratford, Galt, Guelph, Whitby, Oshawa, Port Hope, Cobourg, Belleville, Kingston, Brockville and Oshawa. The enterprise is a novel and noble one, and we would urge upon these several places to countenance it by giving Mr. Vandenhoff a good reception."

The Toronto Mechanics' Institute has now fairly taken its stand as one of the leading educational institutions of the country, and especially in relation to the industrial classes of the community—a position it has not attained but by the continuous persevering efforts of its managers for a number of years. A more recent number of the *Globe* says:

"If there is a busy hive in Toronto, it is at the Mechanics' Institute. We instance the proceedings of last evening. The music hall was occupied by the great violinist, Prume; the lecture room by Mr. Carter and his hundred vocalists practicing for "The Messiah;" the Ontario Literary Society were in their usual room; the book-keeping class room was crowded with sixty pupils; the architectural and mechanical drawing-class room was also full, and the library crowded with numbers exchanging books, and pupils joining the various classes, and the reading-room as crowded as either of the others. In addition to all this, the free library of reference, belonging to the Board of Arts and Manufactures, was open to the public—as it is every Tuesday and Friday evening, (and during each week day from 10 to 12, noon, and 1 to 4 o'clock, p. m.) Truly the directors of the Mechanics' Institute are doing a thriving business, and may feel proud of the extending influence of their useful society."

Machinery and Manufactures.

CANADIAN MANUFACTURES.

Substantial Progress.

Whatever depressions or discouragements may hitherto have affected the material interests of Canada, nothing has thus far retarded the progress of manufactures. They, as a rule, have been continually advancing, as well in extent and variety as in quality of articles produced. Considering the limited extent of the Canadian market, the small amount of capital seeking investment in this direction, and especially the absence of experienced and skilled labour, we may well regard as remarkable the advance which has been made in Canada in this particular branch of industry during the last five years. The country has become rich in the knowledge of those requisites necessary for the manufacture of fabrics best adapted to its people and its climate. Our woollen manufactures cannot be surpassed by anything that is imported, either in suitableness, cheapness, or durability—the three great requisites. From the finest piece of tweed to the coarsest and heaviest homespun, there is the greatest variety of textures; and it is ouly necessary to go through the stocks of our largest dealers to be thoroughly convinced of the success which has attended the manufacturer of cloth in Canada. Cotton cloths, cotton yarn, and cotton batting, although not large in extent, are of very good quality; and it has been demonstrated that the wants of the Canadian trade can be fully met by a further extension of the business. The mills at Dundas, Thorold and Hastings in Canada West, Montreal, in Canada East, and St. Johns, New Brunswick, produce goods which meet with a continuous demand; and notwithstanding the difficulty of procuring the best qualities of raw cotton, the manufactured article has been extensively sought after. In flax, too, the evidences of progress are most apparent. At Preston, Messrs. Hunt, Elliott and Stephen have a most extensive establishment, from which they are turning out such articles as bagging, towelling and coarse linen, besides ordinary descriptions of cordage. The Messrs. Perine Bros., to whom we have before referred, have a number of mills in operation; and the immense establishment of Messrs. Gooderham and Worts, at Streetsville, is rapidly going forward to completion. The linseed oil mills of Toronto and Montreal have been exceedingly successful, and there will be no difficulty whatever in making a good profit on all the flax seed that can be spared in Canada. The manufacture of hosiery has been undertaken with remarkable success at Hespeler, Canada West, and articles manufactured there, such as shirts, drawers, and stockings, have been eagerly sought after by the trade. Indeed no small amount of ill feelling has been created in the anxiety to secure goods, and the large demand for this class of articles, and the success of the factory just mentioned, will no doubt lead to the establishment of other manufactories. From the Hespeler manufactory we have seen an article of nubias or ladies' clouds, which is exceedingly creditable, and we understand that immense quantities have been manufactured and absorbed by the Canadian trade for the winter's consumption.

It is hardly necessary to remark upon the great success that has attended the manufacture of leather and boots and shoes within the last eight or ten years. We do not now import a tithe of what we once went abroad to secure; and the number of people employed in Montreal, Kingston, Toronto, Hamilton, and London, is far larger than is generally apprehended. In the manufacture of rubber also, the Montreal factory has succeeded in producing a class of article which has met with very general acceptance, and this establishment, if under proper management, could be made to yield a very large return. The machine shops of the country, such as those of Brush, Bartley and Gilbert, of Montreal, Doran and Davidson, and the Canadian Engine and Machinery Company of Kingston, McGee and Hamilton of Toronto, Gartshore of Dundas, and Goldie and McCulloch of Galt, have given most conclusive evidence of abilty to supply the country with every description of motive machinery, and it is now entirely unnecessary to go outside of Canada for any article in this line of manufacture. The furniture trade, too, can boast of considerable progress. The most complete and finished articles are got up at very reasonable prices. We are glad to hear that a company, with a large capital, has been formed in England, consisting of some leading Manchester men, who will on 1st December assume control of the well known establishment of E. Mial & Co., of Oshawa, the intention being to supply the English market with first class furniture of Canadian manufacture. The manufacture of bacon from pork during the last few years has had a

marked growth. In Hamilton, the establishment of Mr. Davis of Liverpool, and in Toronto of Wm. Davies,& Co. are continually in operation, and few outside the trade have any idea of the quantity of bacon and cured meats that are constantly being shipped from these houses to Europe, there to go into immediate consumption. This trade is, however, in its infancy; otherwise there is hardly a limit to the quantity of first class bacon that could be produced in Canada. The Canada Glass Works have been for some time in successful operation, and the quality of the article produced, and the profit which thus far they have shown, fully demonstrates the success of this class of manufacture. Agricultural implements have shown vast improvement, and the Canadian farmer can now find in Canada the highest quality of farm machinery. In stoves, the Toronto and Montreal foundries can compete with the world, and we believe large shipments have been made to the Western States from manufactories in Brockville, Kingston, and other points. Locks have been most successfully manufactured in Kingston penitentiary. Nails, spikes, sprigs, tacks, and all varieties of that class of articles, are got up in the best style in Montreal, and sold at prices so low that sometimes the profit is difficult to be seen. At Gananoque and at Galt, waggon springs, edge tools, hand presses, and a variety of other manufactures from iron are turned out, which would do credit to a Sheffield manufactory. The Sugar Refinery at Montreal, the Starch Works at Edwardsburg, the Soap and Candle factories all over the country, the Paper Mills of first class character to be found in both Western and Eastern Canada, the Tobacco manufactories, and the Brush and Woodenware establishments, with a variety of others which we find it almost impossible to enumerate, are all in vigorous and successful operation, and fully attest the wonderful and continuous progress which the country is making. The truth is, few people imagine the extent and value of the manufactures of Canada. It is only when one sits down to enumerate their number and variety, and the numbers of people employed daily in working them, that a fair idea of their importance can be attained. As a rule, all departments of manufacture have prospered here. We have had but few alterations in the tariff in the last three or four years, and notwithstanding the very heavy importations, there has been a coutinuous increase in the demand for almost everything that we can produce.

The good crop which has just been harvested, and the prosperous condition of business generally, still further stimulates our progress; and we look forward with hopefulness to a yet greater development of Canadian manufacturing industry. Its influence upon the welfare of the country cannot be over-estimated. The creation of a home market for our agricultural products, the employment of a large number of persons unfit for severer labour, and the advancement in wealth and prosperity which are certain to follow, add other cheering indications to the prospect of our future. At some future time we shall endeavour to enumerate different other articles which we consider could be successfully manufactured in this country, and on this point we shall be glad to have suggestions from any of our readers. Now that there is a prospect of our being shut out from our best agricultural markets, it behooves those who have an interest in the Province to consider everything which can contribute to the internal progress of the country, and the creation of a market within ourselves. We have, especially in Lower Canada, a population which for manufacturing purposes is unsurpassed in the world. We have boundless water power, and many classes of raw material which could be utilized, and, under the magic touch of the manufacturer, come into every-day use. We have on our borders a nation whose taxation is enormous, whose currency is deranged, and whose commercial system has experienced a shock which it will require long years to rectify. The present is therefore Canada's opportunity, and we should not lose sight of anything that will tend to promote its manufacturing interests; that by improving our advantages in this respect, we may contribute to the solid progress and independent prosperity of our country.—*Trade Review.*

Looking Glass Plate Manufacture in Montreal.

We have been shewn by Messrs. J. & W. Hilton, of this city, a sample of looking-glass plates silvered by them. The backs are coated with a hard red enamel, by a process of their own, This enamel hardens, and protects the silvering, so that the plates can be handled and subjected to pretty rough usage without danger of damage. Hitherto the article (commonly known by the name of red back silvering glass plates) has been only made in Germany, and very large quantities have been brought from thence into Canada and the United States. Messrs. Hilton are now prepared to furnish as good an article as the imported one, and at a less price. A better proof of their facilities for furnishing these goods cannot be found, than in the fact that they are now supplying orders for them from the United States. These plates have been on exhibition during last week at the Crystal Palace, and have attracted considerable attention. We are glad to notice this new branch of Canadian industry, and the trade should encourage it by giving it the preference of their orders.—*Ib.*

Bessemer Cast Steel.

The Birmingham meeting of the British Association for the Advancement of Science will be rendered important if only by Mr. Bessemer's paper "On the Manufacture of Cast Steel.", perhaps the most important—certainly the most useful—paper read at the holiday *fête* of the philosophers. It will be remembered that in 1856, at the Cheltenham meeting of the same association, Mr. Bessemer read what now may be called an account of the *theories* on which he had recently taken out certain patents. His paper made an immense sensation; within three weeks after the reading, licences to manufacture malleable iron, under the Bessemer patent, were purchased by ironmasters to the amount of £25,000. But although the theory was correct, there were defects in the process fatal to profitable working. The vulgar proverb of "going up like a rocket to come down like a stick" was realized in this case. The new method was thoroughly discredited, not a little to the satisfac-

tion of the steady-going manufacturers, who stood by, did not take out licences, and exclaimed, "I told you so." Mr. Bessemer was not discouraged by temporary failure, for he saw a large reward before him if he did succeed. He set to work, and spent three years and £10,000 in amending the defects of his process. But by the time he had to a great extent succeeded, the faith of the trade had been so completely destroyed that no one would work his patents. This led the Bessemer Company to erect steel-works in Sheffield. They were able to use Mr. Mushet's large batch of manganese patents, because confidence in the improvement of the manufacture of iron had sunk so low, that it was not thought worth while to pay the £50 stamp due on them at the end of three years. The Bessemer Steel-Works "have become a school where dozens of practical steel-makers have received their lessons in the new art." The Bessemer cast-steel plates made for ships plates is of a very tough and ductile quality, and double the strength of the iron plates usually employed in ship-building. One Liverpool firm has constructed 31,510 tons of shipping, wholly or partially built of steel. Of these 38 vessels are propelled by steam. Beside these, the principal masts and spars of 18 sailing vessels have been made wholly of steel. A steel vessel of 1000 tons would weigh 250 tons less than one of the same tonnage of iron, and have that advantage in more tonnage, or less immersion. Two steel paddle-wheel steamers, launched at Liverpool by James Quigley and Co., on the 13th of August, for the Liverpool and Dublin service, will draw from three to four feet less water than the iron steamers of the same line, and thus be able to leave the ports at all states of the tide, and not require a tidal train in connexion with them. Reference was also made to the importance of this new material when applied to iron-plated ships of war. A plain steel axle was exhibited, that scarcely showed any wear, after having run 112,500 miles. Steel rails were tried against iron at the Chalk Farm Bridge of the Camden station, at which point there is a narrow throat from which converges the whole system of rails employed at the London termini of that station. At this spot two steel rails and two iron rails were fixed on the 2nd of May, 1862, precisely opposite each other. The result, up to July, 1865, has proved that steel will wear out at least twenty iron rails; and there is no doubt that all companies that can afford the cost will renew their roads with steel rails.

The following figures show the progress of steel manufacture consequent on the Bessemer patents. In 1851, the entire production of steel of all kinds in Sheffield was 35,000 tons annually, of which 18,000 were cast steel—equal to about 346 tons per week. A monster ingot weighing 24 cwt., exhibited at the Exhibition of 1861, was supposed to be the largest mass of steel ever manufactured in England. The Bessemer apparatus at the works of John Brown and Co., Sheffield, is capable of producing every four hours a mass of cast steel weighing 24 tons! There are now seventeen extensive Bessemer Steel-Works in Great Britian. One, the "Barrow," can turn out 1200 tons of finished steel per week; and when their new converting-house is finished will be capable of producing 2400 tons of cast steel per week. The average price of cast steel has been reduced at least £20 per ton below the average price at which it was sold in 1851. "With the present means of production, therefore, a saving of upwards of six millions per annum may be effected in Great Britain alone, *and this is the infant state of the Bessemer steel manufacture.*" In answer to a question from Mr. Bramwell, Mr Bessemer stated that he had been able to produce his steel with one class of iron only found in this country—the *hematite*. The bulk of the iron was too much impregnated with phosphorus and sulphur. Hematite is obtained almost entirely from Cumberland, from the Forest of Dean, and Exmoor, where extensive veins still remain unworked.—*British Journal of Gas Lighting, &c.*

Concentration of Sirup by Freezing.

ARTIFICIAL refrigeration is evidently destined to receive most important industrial applications. Already, in the paraffine-oil manufacture, and in the ingenious process by which M. Balard and M. Merie obtain chloride of potassium from sea water it renders most valuable service, and now M. Alvaro Reynoso, of Havana, is applying it to the concentration of sirups. In face of the well-known fact that water in freezing becomes completely separated from whatever it may have previously held in solution, and of the successful working of the process by which Carré and others produce any desired degree of cold, by mechanical means, at a scarcely appreciable cost, one wonders that no one should have thought before of applying artificial cold to the extraction of sugar from sirups, especially when it is remembered how injurious the action of heat is apt to be. However, M. Reynoso has conceived the idea at last, and is devoting himself energetically to its realization. He is in England just now, testing the respective merits of the various cold-producing appliances in use here. He has found that a sirup marking only 6 deg. of Beaumé's saccharometer becomes converted by congelation into ice, and a sirup of 30 deg. Should it be found that the cold does not injure the sirup, we may look to see great changes in the processes of the sugar manufacture.—*Mechanics' Magazine.*

Water Power in Warehouses.

We have on several occasions alluded to the application of turbines to hoisting purposes in Manchester and other Lancashire towns, which have the advantage of a high-pressure water service; and Mr. Pearce, of Bradford, has now adopted another very ingenious arrangement in the shape of a water-engine, which was put down by Messrs. Ramsbottom & Co., of Blackburn. The engine is supplied with water from the corporation mains on a pressure of 60 or 70 lbs. to the square inch. The water enters a pair of water engines, each of which possesses a pair of cylinders and pistons. The cylinders oscillate upon trunnions, and the effect of this oscillation is to reverse the valvular arrangement, thereby causing a continuous rotatory motion which puts the hoist in action. The engine has been applied with success to printing machines, to a mortar grinding machine, and other apparatus requiring a motive power on a small scale. The experiments made on this occasion were quite satis-

factory. The hoisting of three sheets of wool or opa, each weighing about 6 cwts., did not occupy more than seven minutes, and the quantity of water consumed in the process was about 120 gallons. A series of experiments followed, and, including the sheets raised in the first experiment, no fewer than fifteen sheets of wool, weighing in the aggregate 3 tuns 15 cwt., were raised from the ground floor to the highest story in the warehouse in the short space of forty-five minutes. The entire quantity of water consumed was only 570 gallons, the cost of which was about 6½d.—*Scientific American.*

Miscellaneous.

Nitro-glycerine.

In the *Mechanics' Magazine* for August 11 an account was given of some Swedish experiments with that highly explosive compound, nitro-glycerine, which Mr. Nobel, a Swedish engineer, is endeavoring to bring into use, instead of gunpowder, for blasting purposes. The "blasting oil," as Mr. Nobel calls it, has since been experimented with in Cornwall, with very satisfactory results. It is an oily fluid, of a light yellow color, and of 1·6 specfic gravity. It consists of three atoms of nitric acid, or $3\ NO_5$, combined with one atom of glycerine or $C_6\ H_5\ O^3$, so that its ultimate composition may be represented by $C_6\ H_5\ O_{18}\ N$. It bears the temperature of boiling water without explosion or injury, but explodes at about 360° Fahrenheit. The changes which occur during explosion convert each volume of it into 469 volumes of carbonic acid, 554 volumes of steam, 39 volumes of oxygen, and 236 volumes of nitrogen, being a total of 1,298 volumes of gas for each volume of the liquid oil. The gases produced by the explosion of gunpowder measure, when cold only 250 times the bulk of the gunpowder exploded, so that, supposing the gases evolved to be in each case at the same temperature, nitro-glycerine would thus be five times more effective than its bulk of gunpowder. A great deal more heat, however, is generated by the explosion of nitro-glycerine than by the explosion of gunpowder, and the gases produced by the explosion of the former are therefore in so much higher a state of tension than those produced during the explosion of the latter that the new agent is really thirteen times more effective, bulk for bulk, and eight times more effective, weight for weight, than the old. The use of nitro-glycerine in blasting, therefore, enables thirteen times more disruptive force to be applied, by means of a hole of a given size, than can be brought to bear by means of a bore of the same dimensions when gunpowder is used, and one result of its substitution for gunpowder, for blasting purposes is thus a very great economy of labor. When there are rents in the rock in which the bore is made, the advantage of nitro-glycerine over gunpowder is greater than thirteen to one, amounting, indeed, to between twenty and thirty to one, by reason of the explosion of nitro-glycerine being so much more rapid than that of gunpowder that the force of its explosion is not appreciably diminished by fissures in the bore, which would diminish the effective force of an explosion of gunpowder by fifty per cent. For the same reason, "tamping is never required, a shaft of loose sand being sufficient in all cases. Hence, accidents in charging are impossible, besides the saving in time." Other advantages of nitro-glycerine are that, "being insoluble, discharges under water or in water-carrying rocks may be effected by it without cartridges; and, as the blasting oil can only be exploded under certain conditions, and by means of igniters manufactured specially for the purpose, its storing and transport involve no danger." Curiously enough, contact with fire is not sufficient to ignite it at ordinary temperatures, neither is contact with phosphorus, or even with potassium. The chief danger in its use is from its intensely poisonous qualities, but these can be effectually guarded against without much trouble. At present nitro-glycerine is more costly than gunpowder, in about the proportion in which it is more effective, so that, for charges of equal force, nitro-glycerine and gunpowder cost about the same. The saving of labor and time which results from the use of the former, however, renders it by far the more economical agent of the two.—*Mechanics' Magazine.*

Condensed Ale.

Condensed ale is among the latest discoveries. It is the invention of a citizen of Rochester, N. Y., and he claims by this method the ordinary extract of malt and hops is reduced seven-eighths in quantity, and to the consistency of sugar-house sirups, without throwing off any of the volatile matter, or aroma which brewers seek to retain, if possible, not always with success. The heat applied in cooking the extract is steam, and burning of the liquor is entirely avoided, so that, by the peculiar method of brewerage and condensation, the ale is allowed to retain all the finer qualities that impart to it the rare spirit that "cheers but not inebriates." The condensed product is put up in ale-casks, and may be shipped to any part of the world unspoiled by heat or climate. This is the greatest advantage which is claimed for it.—*American Artizan.*

Magnesium in the Ocean.

It has been estimated that the ocean contains 160,000 cubic miles of magnesium—a quantity which would cover the entire surface of the globe, both sea and land, to a thickness of more than eight feet. In obtaining salt irom sea water, the residuum is largely magnesium. It constitutes 13 per cent. of magnesium limestone, a rock found in all parts of the world in enormous quantities. Three years ago all the chemists who had obtained it probably did not possess an ounce among them. One year ago its price was 112 guineas (about $600 in gold) per pound! Now owing to improvements recently introduced magnesium wire is sold at *threepence per foot.* It has been suggested that when it shall be cheap enough, vessels of war should be built of it, for whilst but little heavier than "heart of oak," is is as strong and tenacious as steel.—*American Gas-light Journal.*

Old age has deformities enough of its own; do not add to it the deformity of vice.

Parties at a dead lock should extricate themselves with a skeleton key.