THE JOURNAL

OF THE

Board of Arts and Manufactures

FOR ONTARIO.

SEPTEMBER, 1867.

OUR SOCIAL CUSTOMS.

Time was, when it was considered anything but a violation of the rules of good society, for both the entertainer and the entertained to linger at the convivial board until utterly oblivious of all terrestrial things. Happily, these *good old times* have passed away, and society has, to some extent, more regard than it had for the proprieties of life. For a season the hopes of the philanthropist, even, led him to believe that a better and brighter era had dawned upon our poor fallen humanity, and that sobriety had taken the place of drunkenness; moderation—if not total abstinence from intoxicating drinks—the place of excess. To a certain extent his hopes have been realized, but how far short these realizations have fallen of what he did, and had a right to, expect.

We do not propose to occupy the pages of this journal with a *temperance* essay, as such; but simply to direct the attention of the industrial classes to this great social and moral evil of intemperance, as it affects themselves and their families, and society generally. How much, we would ask, of the weekly earnings of the working man, is spent for that which benefits him not, individually, but rather keeps him poor in health and circumstances, and drags him *down, down*, in the social scale? Nightly we pass the saloons or drinking places in this city, and notice that, even during the excessively warm evenings of July and August, they are filled, or partially so, with working men, who are thus spending their time and their money in worse than frivolity; and, in too many cases, robbing their families of the common necessaries, not to mention any of the luxurious comforts, of life.

We can scarcely take up one of the city daily papers, but we read of murders, accidental deaths and injuries, fires, fightings, police court cases, prisons and penitentiaries as resulting from or connected with the use of intoxicating drinks. Misery, wretchedness and want, lunacy and madness, the bloated countenance, the haggard features, the palsied hand, and the broken-down constitution; the idiotic sot, the silly driveller, and the shameless reprobates of both sexes, daily meet us and cross our path—the victims of *strong drinks;* and who, or how few, put forth a hand or make an effort to stay the curse? We thank GOD there are a noble few that do; but Oh! in view of the coming political elections and strife, the cupidity and moral corruption of too many of the candidates and their agents, and the evil influence that arch-enemy *Alcohol* is known to exercise over the votes of the *free and independent*, who will be able to stay the tide of drunkenness and its attendant demoralisation? Who? echo answers—*Who?*

When writing the heading of this article, we did not intend our pen to take so wide a range as it has done. We had in view, especially, some facts bearing upon the fearful extent of this social evil, as manifested in connection with almost all such occasions as general public holidays, dinners and suppers, balls, pic-nics, excursions; the inaugurating or opening of railways or other public works, municipal and other entertainments. So far as our experience goes, during the past few years, these have been occasions of stumbling to many, and of sadness on the part of a few at having their enjoyments marred, and in witnessing the moral degredation of a large portion of those in whose company they have been induced to associate.

We have, on several such occasions, seen the bottle deified by the majority present. We have, both on the railroad and steamboat, seen the brandy bottle and glass continuously passed round from man to man, so long as they were able to drink it or there remained any for them to drink. We have, on a recent occasion, when the lives and safety of some 200 excursionists were involved, not only seen a large portion of those intoxicated, but the locomotive engineer of the train which they were on *have* in his possession a bottle of raw brandy, stolen by him from their supplies; and the fireman of the steamboat on which they continued their journey homewards, on a dark night, so drunk that he could not put the necessary wood into the fire, and would fall in front of his furnace door in his attempts to do so; while a drunken deck-hand was fighting on the deck of the steamer with an equally drunken excursionist; and a drunken Municipal Magistrate with *attempted* dignity paraded his official authority to secure the peace. We have on a similar occasion, seen two Representatives of different Municipalities, who were, until maddened by strong drink, the best of friends, only kept from personal conflict on the deck of a steamer, by the interposition of the more sober of their associates

All these things, and a great many more such have we seen in this the enlightened 19th century.

and this amongst a civilized and professedly christian people; and the evil still continues, with all its attendant idolatry, blasphemy, wretchedness and woe! During the past year, as recently stated by the Police Magistrate of this city, some 4,000 cases of drunkenness came before him judicially; and who can tell the amount of wretchedness connected with these cases, either in the persons of the drunkards themselves or their families—who can tell? Or how many cases in the city during the same period that were not judicially brought forward, or that were never brought to light?

Working men! mechanics! think seriously of these things—"We speak as unto wise men, judge ye what we say." These evils of which we have been speaking do not pertain more, or so much, to you, as to some other classes of the community; but the evil does exist amongst you. On your sobriety, industry and skill, depends to so large an extent the welfare and prosperity of our new Dominion. Let it be seen that you appreciate the importance of a life of sobriety, and intelligent industry, both to yourselves and others. Connect yourselves with Mechanics' Institutes, or similar associations, during the winter months; and to those amongst you—whose age and circumstances will not preclude your doing so—join the Evening Classes in these Institutions, during the ensuing session; that you may thus become *more* intelligent workmen and worthier citizens, and thus be able to use the social and political privileges you enjoy, to the advancement of your own happiness and that of others. *So mote it be.*

PROVINCIAL EXHIBITION.

The attention of intending exhibitors at the ensuing Provincial Exhibition, is directed to the fact that it is to be held in the City of Kingston, commencing on Monday, the 23rd of September, inst.; that the time for making entries of Agricultural products and Implements, Machinery and Manufactures, was supposed to have closed on Saturday, the 31st ult.—No doubt, however, that entries will still be taken in these departments, if sent in promptly; that entries in Horticultural products, Ladies' Work, and the Fine Arts, should be sent in by the 14th September, inst.

In all classes but those of Live Stock, the entries must be made in the names of the producers; not more than one specimen of the same variety can be entered in any one section of the prize list; all Agricultural and Horticultural products to be the growth of the present year; and all manufactured articles, or works of art, awarded prizes at any previous Provincial Exhibition, can not again be entered in competition; but they may be awarded diplomas, if superior to everything else of their class upon the grounds.

All specimens of the Fine Arts must be delivered on the ground by Friday the 20th of September; all other than live stock by Monday the 23rd, Live Stock must be on the ground not later than Tuesday, the 24th, at noon. All articles must be delivered at and removed from the grounds at the expense of the exhibitors.

The usual arrangements will be made with the railroads and steamboats, for the conveyance of goods and visitors at reduced rates. These rates will be published in time.

Each member of the association, having paid $1 subscription as an entry fee, will receive four *single* admission tickets; if more are required, they will have to be purchased. Life-members, Delegates from societies, members of the press, and the judges and visitors only, will be admitted by badges. Tickets of admission 25 cents each, will be issued on Tuesday, Wednesday, Thursday and Friday. Carriages and horsemen will not be admitted to the grounds.

The annual meeting of the Directors will be held on the grounds, on Friday, the 27th September, at 10 o'clock, A.M. The members of the Board of Agriculture and of the Board of Arts and Manufactures; the Presidents and Vice-Presidents of County Agricultural Societies and of all Horticultural Societies, constitute the *ex-officio* Directors of the Association.

The Treasurer of the Association will commence paying the premiums on the morning of Saturday, the 28th September, at 9 o'clock.

We know of nothing more that it is absolutely necessary for exhibitors to know, at present, unless it is the *duty* devolving upon every good citizen of the Province of Ontario, to render all the assistance in their power to this their own Association, the exhibitions of which have done so much for the advancement in Agriculture, Arts and Manufactures, for the past twenty-two years.

AMERICAN v. ENGLISH GUNS.

In the No. of this Journal for December 1866, under the above heading, we quoted the London *Engineer*, and other authorities, to show that the much vaunted American 15 and 20 inch "Rodman guns" were not weapons of such destructive powers as need cause any serious alarm on the part of Great Britain; and that in a number of experiments in the United States, and during their civil conflict, it had not proved equal as a weapon of offence to the British 12-ton broadside or the new 9-inch calibre gun of the British Navy.

The British Admiralty, so as to thoroughly test the power of the Rodman Gun, has recently purchased one from the United States, with a supply of powder, shot, &c.; and, on the 24th of July, the experimental trials were made with it at Shoeburyness, before a large body of officers and others.

The *Engineer* commenting on the results of the experiments, concludes thus:—"It may also be deduced from the Shoeburyness experiments, that the 15-inch American gun is in no sense a more formidable gun than it has been supposed to be. The experiments, imperfect as they are, have gone far enough to show that it is inferior to our own 12-ton gun. * * * It is satisfactory to learn even this much, and we have no doubt that when the gun comes to be tried at a target in competition with the English gun, the superiority of the latter will be fully demonstrated. It is to be borne in mind, too, that while the American gun weighs nearly 20 tons, the English gun weighs little over 12 tons; if, therefore, we regard the ease with which the two guns can be carried and worked on board ship, the English gun has an enormous advantage."

What says the New York *Tribune*, of the 10th of August, after having received full particulars of the experiments? Hear the editor:—"The Rodman gun has proved a signal failure," and after describing the construction of the target, and showing that it had "been repeatedly penetrated by English rifle projectiles;" the Rodman gun, at "only 70 yards," and with a charge of "60 pounds of American powder, that is to say, 10 pounds more than the ordinary charge of the Rodman gun," failed to penetrate it. "It struck the target in a weak place, the junction of two plates, leaving only an indentation of four inches, but buckling the plates considerably. * * * "These experiments leave little doubt that the Rodman 15-inch, weighing 19¼ tons, is far inferior to the English 9-inch, which weighs only 12 tons, and it is not only in its penetrating power that we are disappointed, but its racking "effect, which is claimed as its special merit, appears to have been greatly overrated, and not comparable to that of the English gun."

"It is pretty clear now that with iron shot, and at 70 yards range, it could not hurt the best of the British iron-clads, and that even with steel shot (which are not part of its equipment) there are some vessels which would successfully resist it. * * * The experiments at Shoeburyness have only taught us that if—which heaven avert—the British and American iron-clads should ever go into action against each other, we should be blown out of the water before we had knocked a single hole in our enemy's hulls."

This will do until the Americans get up another sensational gun.

CANADIAN PATENTS.

(*Continued from page* 67.)

BUREAU OF AGRICULTURE AND STATISTICS,

PATENT OFFICE,

Ottawa, 19th July, 1867,

His Excellency the Governor General has been pleased to grant Letters Patent of Inventions for a period of Fourteen years, from the date thereof, to the persons whose names are included in the following list.

Published by command,

A. J. CAMBIE,

Acting Deputy to the Minister of Agriculture.

John Johnson, of the city of Toronto, in the county of York, Gentleman, "A new and useful process or method for rendering unexplosive Benzole and other hydro-carbon liquids, and for generating and illuminating gas, therefrom the compound so produced to be called the "Patent Gas Oil."—(Dated Ottawa, 11th December, 1866.)

Charles Reid of the town of St. Catharines, in the county of Lincoln, Tinsmith, "A new and useful Stove pipe Shelf."—(Dated Ottawa, 14th December, 1866.)

John Mather, of Gatineau Mills, in the county of Ottawa, Saw Mill Manager, a new and useful Slab Cutter."—(Dated Ottawa, 20th December, 1866.)

Caspar Brinzer, of the Village of Yorkville, in the county of York, Cabinet-maker, "A new and useful Chair and Step Ladder, called the Brinzer chair and Step Ladder combined,"—(Dated Ottawa, 9th January, 1867.)

Charles Taylor, of the County of Bonaventure, in the district of Gaspé, Practical Engineer, "A new and useful Stone and Quartz Breaker,"—(Dated Ottawa, 11th December, 1866.)

John Lazier, of the Town of Belleville, in the county of Hastings, Merchant "A new and useful Improved Domestic Spinner,"—(Dated Ottawa, 17th December, 1866.)

John Yemen, of the Village of Mitchell, in the county of Perth, Dentist, "A Heel Plate called Yemen's Reversible Heel Plate,"—(Dated Ottawa, 11th December, 1866.)

Henry Wood, of the City of Montreal, Mechanical Engineer, "An improvement in the Manufacture of Paper Stock, from Straw, flag, grass and other fibrous vegetable matter,"—(Dated Ottawa, 11th December, 1866.)

Henry Wood, of the City of Montreal, Mechanical Engineer, "An Improvement in the Manufacture of Fibre from Indian Corn or Maize plant, fibrous Grasses, Canes, Bamboos, Seeds and other fibrous vegetable matter."—(Dated Ottawa, 11th December, 1866.)

Moses A. Payne, of the Township of Yarmouth, in the County of Elgin, yeoman, "A new and useful machine called 'Moses A Payne's Force Sand Pump.'" —(Dated Ottawa, 31st December, 1866.)

John Cummings, of the Township of East Zorra, in the County of Oxford, yeoman, and Hiram Harrington, of the said township, yeoman, "An Improved Threshing Machine."—(Dated Ottawa, 31st December, 1866.)

Matthew Cummings, of the Village of Bridgewater, in the County of Hastings, labourer, "A new and useful dog-power Washing Machine."—(Dated Ottawa, 5th January, 1867.)

Jacob Barnes, of the Town of Oakville, in the County of Halton, Machinist, "A new, useful and Improved Box Stove or Furnace with tubulated smoke, and improved heat conducters, with open draft regulator and atmospherical pressure pump "—(Dated Ottawa, 7th January, 1867.)

Thomas Alexander, of the City of Hamilton, in the County of Wentworth, Plumber and Gas Fitter, "A new and useful apparatus for generating Hydro-Carbon Vapors."—(Dated Ottawa, 7th December, 1867.)

Richard Burn, of the City of Ottawa, in the County of Carleton, Coach-maker, "A new and useful projectile which he terms a 'Sword Shot.' "—(Dated Ottawa, 7th January, 1867.)

William Fordyce Beecher, of the Town of Brockville, in the County of Leeds, Foundry man, "A new and useful improved Radiator."—(Dated Ottawa, 12th December, 1866.)

Otto Rotton, in the City of Kingston, in the County of Frontenac, Doctor of Medicine, "A new, useful and improved still or evaporator called 'the non-destructive vapor-Still.' "—(Dated Ottawa, 13th December, 1866.)

Edward Perry, of the City of Montreal, Trunk manufacturer, "A new and useful Pivot Hinge."—(Dated Ottawa, 17th December, 1866.)

Louis Pierre Gauvreau, of the City of Quebec, Civil Engineer, "A new and usefnl Cement to be called "Gauvreau's Orleans Hydraulic Cement."—(Dated Ottawa, 18th December, 1866.)

Elias W. Borden, of Belford, in the County of Missisquoi, Mechanic, "A new and useful double action Churn."—(Dated Ottawa, 20th December, 1866.)

Joseph Clinton Henderson, of the Town of Brockville, in the County of Leeds, Iron-founder, "A new and useful Radiator or Dumb Stove which he has called, 'Henderson's Improved Radiator.' "—(Dated Ottawa, 22nd December, 1866.)

John Marritt, of the Village of Aurora, in the County of York, Yeoman, "Marritt's Aurora Flax Puller."—(Dated Ottawa, 22nd December, 1866.)

James Henry Clapham, of the City of Quebec, "A new and useful Drilling and Pumping Machine."—(Dated Ottawa, 18th December, 1866.)

Charles Joseph Smith, of the Town of Brantford, in the County of Brant, Gentleman, "A new and useful Improvement in Fire Grate Bars for Furnaces."—(Dated Ottawa, 30th January, 1867.)

Richard Lawlor, of the Village of Hawkesbury, in the County of Prescott, Mill-wright, "A new and useful Churn and Butter Worker."—(Dated Ottawa, 7th January, 1867.)

Thomas L. Wilson, of the City of Montreal, Mechanical Engineer, "A new and useful Improved Steam Jet Cupola, for smelting metals."—(Dated Ottawa, 21st January, 1867.)

Henry Wood, of the City of Montreal, Mechanical Engineer, "New and useful Improvements, in the manufacture of fibre and paper stock from fibrous vegetable matter, as canes, bamboos, Indian corn or maize plant, reeds, grasses, rice plant, straw, flax, hemp, and other such vegetable materials, for the purpose of obtaining fibre for the manufacture of textile materials, &c., and paper stock by treatment with chemicals and steam, and for bleaching the same, both operations being performed under pressure or in vacuo."—(Dated Ottawa, 21st January 1867.)

George Watt, of Beauharnois in the District of Beauharnois, Carpenter, "An improved double Action Hinge."—(Dated Ottawa, 21st January, 1867.)

Henry Wood, of the City of Montreal, Mechanical Engineer, "A new and useful improved Retainer Boiler and moveable Furnace for treating or disintegrating vegetable matter, bleaching, &c., and for desulphurising and amalgamating all kinds of ores, minerals, &c., all under pressure or in vacuo."—(Dated Ottawa, 21st January, 1867.

Mortimer Birdsill Mills, of the Village of Sparta, in the County of Elgin, Artist, "A new and useful Triangle Churn."—(Dated Ottawa, 21st December 1866.)

John Taylor Stoakes, of the Parish of St. Bernard de Lacolle, in the County of St. Johns, in the District of Iberville, Machinest, "a A new and useful lateral acting self coupling Buffer for Railroad Cars."—(Dated Ottawa, 21st Jonuary, 1867.

Elias Wallis, of the Township of Elgin, in the county of Huntingdon, Farmer, "A new and useful Farmer's labour saving Machine combined."—(Dated Ottawa, 23rd January, 1867.)

William Morse, of Township of Trafalgar, in the County of Halton, Carpenter, "A Gate."—(Dated Ottawa, 24th January. 1867.)

Jonas Henry Rowe, of the Township of King, in the County of York, Gentleman, "A new and useful spinning wheel called "The Improved Self returning Spindle, or Champion spinning-wheel. "—(Dated Ottawa, 24th January, 1867.)

James Hodges, of the Township of Bulstrode, in the District of Arthabaska, Civil Engineer, "New and useful Improvements, in the Manufacture of Iron, Copper and other metals by incorporating their ores, when in a pulverized state, with or without a flux with pulped peat as a fuel for smelting or reduction." —(Dated Ottawa, 31st December, 1866.)

Ashley Hibbard, of the City of Montreal, Manufacturer and Trader, "Cirée Belting."—(Dated Ottawa, 31st December. 1866.)

Erastus Slater, of the City of Toronto, in the County of York, Carpenter, "A new and useful Extension Ladder."—(Dated Ottawa, 24th January, 1867.)

Otton Rotton, of the City of Kingston, in the County of Frontenac, Doctor of Medicine, "A new and useful Still called 'The Spray Still.' "—(Dated Ottawa, 24th January, 1867.)

William Bowman, of the City of London, in the County of Middlesex, Engineer, "A Crude Petroleum Burner."—(Dated Ottawa, 24th January, 1867.)

John Crane, of the Town of Woodstock, in the County of Oxford, Surgical Instrument maker, "A new and useful Truss, to be known as 'Crane's Self Adjusting Truss."—(Dated Ottawa, 24th January, 1867.)

P. Swan and D. E. Powers, Assignees of B. H. Rose, "A new and useful Improvement in the Cross Cut Saw, and the Buck Saw respectively."—(Dated Ottawa, 25th January, 1867.)

George Zachariah Rykert, of the Township of Grantham, in the County of Lincoln, Provincial Land Surveyor, "A new and useful Gate called 'The Grantham Gate.' "—(Dated Ottawa, 26th January, 1867.)

Charles Duffy, of the Village of Collingwood, in the County of Simcoe, Gentleman, "A new and useful

Spring Bed Bottom."—(Dated Ottawa, 28th January, 1867.)

Robert Charles Lyons, of the Town of Simcoe, in the County of Norfolk, Gentleman, "An Improved Rail Pile."—(Dated Ottawa, 28th January, 1867.)

William Notman, of the City of Montreal, Photographer, "A new and useful Art of taking photographic pictures representing winter scenes, by artificial means, with or without figures."—(Dated Ottawa, 28th January, 1867.)

Bartholomew Clifford Galvin, of the City of Ottawa, in the County of Carleton, Solicitor, "A Portable Switch and Railway Engine and Car combined, to be used in connection with railway tracks, whereby the railway cars may be effected without the aid of permanent switches, and with or without the aid of locomotive engines, and whereby also such engines or railway cars may be put on or off the track when desired."—(Dated Ottawa, 31st January, 1867.)

Harvey Smith Pendleton, of the Township of Durham, in the County of Oxford, Yeoman, "A new and useful Cement or Composition of matter for covering Roofs, forming Pavements, and for other purposes."—(Dated Ottawa, 31st January, 1867.)

Harvey Smith Pendleton, of the Township of Dere ham, in the County of Oxford, Yeoman, "A new and useful art of making butter from the liquids separated from the solids during the process of manufacturing Cheese."—(Dated Ottawa, 31st January, 1867.)

Michael Stevenson, of the Town of St. Mary's, in the County of Perth, Gentleman, "A new and useful Drilling Machine, called 'A double hand Drilling Machine for railroad iron.'"—(Dated Ottawa, 2nd February, 1867.)

Samuel Howe Manning, of the City of London, in the County of Middlesex, Carpenter, "A new and useful Land Roller, called 'Manning's Improved Land Roller.'"—(Dated Ottawa, 16th February, 1867.)

William Philip Marston, of the City of Toronto, in the County of York, Gun-maker, "Certain new and useful improvements in Breech loading Rifles, specially adapted to the altering of Muzzle loading Enfield, and other Rifles, to Breech Loaders."—(Dated Ottawa, 31st January, 1867.)

Bernard Sproul Doud, of the Township of Pakenham, in the County of Lanark, Currier, "A new and improved Composition Cement."—(Dated Ottawa, 4th February, 1867.)

Ernest Kreighoff, of the City of Toronto, in the County of York, Upholsterer, "Certain new and useful improvements in Spring Mattrasses, Sofas and Chairs, applicable to any other article which is now or might be provided with elastic stuffing."—(Dated Ottawa, 4th February, 1867.)

Samuel Hulbert, of the Town of Prescott in the County of Grenville, Founder, "Certain improvements in the Agricultural Plough."—(Dated Ottawa, 4th February, 1867.)

Robert Leckie, of Actonvale, in the County of Bagot, "A new and useful improvement in the manufacture of Sulphuric Acid, Sulphate of Metals, Copper, Nickel and Oxide of Cobalt."—(Dated Ottawa, 4th February, 1867,)

Robert Leckie and Thomas Macfarlane, of Actonvale, in the County of Bagot, "A new and useful improvement of Sulphuric Acid, Hydrochloric Acid, Sulphate of Soda, Gold, Silver, Copper, Oxide of Copper, of Nickel, and of Cobalt."—(Dated Ottawa, 5th February, 1867.

Alfred Willson, of Bell Ewart, in the Township, of Innisfil, in the County of Simcoe, Gentleman, "A new and ufeful self acting Car Coupler, and uncoupler (in case of accidents) and hand uncoupler."—(Dated Ottawa, 6th February, 1867.)

Bernard Sproul Doud, of the Township of Pakenham, in the County of Lanark, Currier, "A new and improved Sleigh Break."—(Dated Ottawa, 8th February, 1867.)

John Dewe, of the City of Toronto, in the County of York, Esquire, "A new and useful Stamp Improver."—(Dated Ottawa, 8th February, 1866.)

Matthew Lyman Roberts, of the Village of Smithville, in the County of Lincoln, Pot Ash boiler-maker, "A new and useful improved Plough."—(Dated Ottawa, 12th February, 1867.

Ashley Hibbard, of the City of Montreal, Manufacturer, "A new and useful improvement in the manufacture of Cirée Belting."—(Dated Ottawa, 13th February, 1867.)

Thomas Lawrie, of the City of Hamilton in the County of Wentworth, Mill-wright, "A new and useful Compound adjustable Revolving Grain Drying Machine."—(Dated Ottawa, 14th February, 1867.)

Robert Erratta Stephens, of the Town of Owen Sound, in the County of Grey, Gentleman, "A new and useful Breech Loading Fire-arm called 'The Stephens Gun."—(Dated Ottawa, 14th February, 1867.)

Benjamin Birdwood Toye, of the City of Toronto, in the County of York, Telegrapher, "A new and useful Automatic Repeater, for use in Telegraph lines."—(Dated Ottawa, 14th February, 1867.

William Vickers, of the Township of Blanchard, in the County of Perth, Yeoman, "A Swivel Gate."—(Dated Ottawa. 14th February, 1867.)

James Adams Green, of the City of Hamilton, in the County of Wentworth, Machinist, "A new and useful improved method of Casting Iron Arms for Waggon Axle-trees and the Nuts in connection therewith."—(Dated Ottawa, 19th February, 1867.)

Hon. Philip H. Moore, "A new method of manufacturing Peat into Coal, by process of steam," under special Act, Cap, 161, 29 & 30 Vic.—(Dated Ottawa, 26th February, 1867.)

Bernard Sproul Doud, of the Township of Pakenham, in the County of Lanark, Currier, "A new and useful Hand Grain Rake."—(Dated Ottawa, 6th February, 1867.)

Eusebe Anctil, of the Parish of St. Anne de la Pocatiere, in the Province of Canada, Machinist, and Francois Xavier Anctil, of the same place, Printer, "A new and improved Printing Press, to be called 'Presse Anctil.,'"—(Dated Ottawa, 20th February, 1867.)

Robert Charles Lyons, of the Town of Simcoe, in the County of Norfolk, Gentleman, "A new and useful Improvement in Rolls for the rolling of steel headed Railway Rails."—(Dated Ottawa, 23rd February, 1867.)

Daniel Mackenzie, of the Town of Bellville, in the County of Hastings, Gas Engineer, "A new and useful Gas Generator and Carburetter."—(Dated Ottawa, 23rd February, 1867,)

William Wiard, of the Village of Ancaster, in the County of Wentworth, Mechanical Engineer, "Certain improvements in the means of preventing, indicating and correcting an undue degree of the super-heating of steam in steam boilers, and for promoting an equality of temperature in the parts for the more economical

working thereof, and for the prevention of explosions." —(Dated Ottawa, 23rd February, 1867.)

George Montayn Thomson, of the City of Ottawa, in the County of Carleton, Produce merchant, "A certain new and useful improvement in Machines for Crushing Cutting and Pressing Hay, and other similar substances, called 'The Roller Hay Press.'"—(Dated Ottawa. 15th February, 1867.)

Harmon Stevens Scholfield, of the Town of Brockville, in the County of Leeds, Gentleman, "A new and useful Blotter and Eraser combined."—(Dated Ottawa, 26th February, 1867.)

Charles Walker Barry, of the City of Montreal, Gentleman, "A new and useful apparatus for generating heat and light by the decomposition of Coal or other Oils."—(Dated Ottawa, 27th February, 1867.

Jonathan Beaumont Phrayne, of the City of Montreal, Mechanic, "An improved Self Adjusting Carriage Step."—(Dated Ottawa, 4th March, 1867.)

Charles F. Anderson, of the Township of Stanstead, in the County of Stanstead, Photographic Artist, "A new and useful Washing Machine and Ironing Table combined."—(Dated Ottawa, 4th March, 1867.)

Hugh Fraser, of the Village of Clarksburgh, in the County of Grey, Carpenter, and Abram Perrin, of the same place, Carpenter, "A new and useful oscillating Planking Screw."—(Dated Ottawa, 7th March, 1867.)

Philip Pearson Harris for the introduction of a Patent under chap. 167, 29 & 30 Vic., "A Machine for refining and deodorizing Crude Petroleum Oil."—(Dated Ottawa, 7th March, 1867.)

Samuel Seddon Walbank, of the Town of Ingersoll, in the County of Oxford, Physician, "A new and useful Coal Oil and Petroleum Deodorizer."—(Dated Ottawa, 9th March, 1867.)

Arthur Gates Wilson, of the Township of Kingsey, in the County of Drummond, "A new and useful improvement in the manufacture of Carriage and Harness Trimmings."—(Dated Ottawa, 9th March, 1867.)

Charles F. Anderson, of the Township of Stanstead, in the County of Stanstead, Photographic Artist, "A new and useful Lamp Chimney Cleaner and Household Conveniencer."—(Dated Ottawa, 4th March, 1867.)

James Edward Thomson, of the City of Toronto, in the County of York, Hydraulic and Gas Engineer, "An improved Seal Lock."—(Dated Ottawa, 7th March, 1867.

Israel Kinney, of the Town of Woodstock, in the County of Oxford, Wheelwright, "A new and useful Washboard, to be known as 'The Paragon Washboard.'"—(Dated Ottawa, 4th March.)

Harvey Smith Pendleton, of the Township of Dereham, in the County of Oxford, Yeoman, "A new and useful apparatus called 'The Canadian Dish Washer.'" —(Dated Ottawa, 4th March, 1867.)

George McCarty, of the Town of Barrie, in the County of Simcoe, Yeoman, "A Foot Warmer and Lantern combined."—(Dated Ottawa, 7th March, 1867.)

Thomas Nichol, of the Town of Chatham, in the County of Kent, Gunsmith, "A Breech Loading Rifle." —(Dated Ottawa, 7th March, 1867.)

Toussaint Crevier, and Edouard Poitras, of the City of Montreal, Tinsmiths and Merchants, "A new and useful improved Hot Air Furnace."—(Dated Ottawa, 11th March, 1867.)

James Wark, of the City of Montreal, Machinist, "An improved apparatus for producing steam in boilers, by the use of Coal Oil or Crude Petroleum as fuel."—(Dated Ottawa, 11th March, 1867.)

Donald Codd, of the City of Ottawa, in the County of Carleton, Gentleman, "An improved Corn Sheller." —(Dated Ottawa, 12th March, 1867.)

Horace Merrill, of the City of Ottawa, in the County of Carleton, Civil Engineer, "A new and useful Slab Cutter."—(Dated Ottawa, 12th March, 1867.)

Joseph James Inglis, of the Town of Brantford, in the County of Brant, Gentleman, "A new and useful composition matter for Roofing, Side walks, and other purposes, known as 'Inglis' Fire-proof Cement for Roofing and Side walks."—(Dated Ottawa, 14th March, 1867.)

Cyrus Moore, of the Town of Brantford, in the County of Lambton, Gentleman, "A new and useful Lubricating Grease."—(Dated Ottawa, 14th March, 1867.)

Owen Theophilus Bevan, of the Village of Petrolia, in the County of Lambton, Cooper, "A new and useful forced and Crude Petroleum Steam Generator."—(Dated Ottawa, 13th March, 1867.)

William Summers, of the Village of Woodbridge, in the County of York, Machinist, "Certain new improvements in grain crushing or chopping Mills, and in the methods of making the fluted Iron Rollers for the same."—(Dated Ottawa, 14th March, 1867.)

William Campbell Van Buskirk, of the Town of St. Thomas, in the County of Elgin, Physician, "A new and useful Draining Plough."—(Dated Ottawa, 14th March, 1867.)

Cyrus Moore, of the Town of Brantford, in the County of Brant, Gentleman, "A new and useful Lubricating Oil."—(Dated Ottawa, 14th March, 1867.)

John Marritt, of the Village of Aurora, in the County of York, Yeoman, "A new and useful Machine to be called 'Marritt's Economic Knife Cleaner.'"—(Dated Ottawa, 15th March, 1867.)

Charles Walker Barry, of the City of Montreal, Gentleman, "A new and useful Improved combined Gas Stove and Furnace."—(Dated Ottawa, 18th March, 1867.)

Antoine Auguste Milleur, of the City of Montreal, Trader and Manufacturer, "An Improved Refrigerator."—(Dated Ottawa, 18th March, 1867.)

Toussaint Crevier and Edouard Poitras, of the City of Montreal, Tinsmiths, "A new and useful Improvement in Refrigerators."—(Dated Ottawa, 18th March, 1867.)

Aaron Magoon, of the Township of Stanstead, in the County of Stanstead, Farmer, "A new and useful Lime Kiln."—(Dated Ottawa, 18th March, 1867.)

Robert Lockhart, of the Town of Walkerton, in the County of Bruce, Wheelwright. "A new and useful Hub and Felloe Boring Machine for the use of wheelwrights."—(Dated Ottawa, 20th March, 1867.)

Robert Lockhart, of the Town of Walkerton, in the County of Bruce, Wheelwright, "A new and useful self centering Face Sett for the use of wheelwrights."—(Dated Ottawa, 20th March, 1867.)

Thomas Henry Ince, of the City of Toronto, in the County of York, Gentleman, "For the introduction of a new and useful composition of matter called "The Agricultural Fertilizer."—(Dated Ottawa, 23rd March, 1867.)

John Robert Miller, of the Town of Stratford, in the County of Perth, Carriage Builder, "A new and useful and Improved Plough Mould board."—(Dated Ottawa, 23rd March, 1867.)

Benjamin Crandell, of the Village of Borelia, in the County of Ontario, Yeoman, "A self Acting Brake on the front wheels of a waggon, that may be applied to all vehicles drawn by animals."—(Dated Ottawa, 23rd March, 1867.)

Thomas Hunter, of the City of Toronto, in the County of York, Saddler, "A new and improved Creasing and Sleeking Machine for Leather Work."—(Dated Ottawa, 23rd March, 1867.)

William Justus Dunning, of the Village of Demorestville, in the County of Prince Edward, Gentleman, "A new and useful Suction and Force Pump."—(Dated Ottawa, 28rd March, 1867.)

Lorenzo Dow Reynolds, of the Town of St. Catharines, in the County of Lincoln, Mechanic, "A new and useful invention called 'Reynolds Renovating Fluid.'"—(Dated Ottawa, 27th March, 1867.)

Frederick Membery, of the Township of Earnestown, in the County of Lennox and Addington, Yeoman, "A new and useful Axle Oiler, called 'The Expert Axle Oiler.'"—(Dated Ottawa, 27th March, 1867.)

Urson Adolphus Harvey, Assignee of Luthur Dunn, of the Village of St. Davids, in the County of Lincoln, Esquire, "A new and useful machine for the stretching of Leather to be used for Belting, and in Saddlery and Harness Making."—(Dated Ottawa, 23rd March, 1867.)

Urson Adolphus Harvey, Assignee of Luther Dunn, of the Village of St. Davids in the County of Lincoln, Esquire, "A new and useful machine for the Edging, Cutting and Marking of Leather Belting and other material."—(Dated Ottawa, 23rd March, 1867.)

Edward Spenser Piper, of the City of Toronto, in the County of York, Merchant, "A new and useful Ventilator and Smoke Conductor, called 'The improved Archimedean Ventilator and Smoke Conductor.'"—(Dated Ottawa, 1st April, 1867.)

Frederick Cook, of the Village of Oil Springs, in the County of Lambton, Petroleum Refiner, "A new and useful apparatus for burning, as a fuel, Petroleum, or Fluids made from it."—(Dated Ottawa, 1st April, 1867.)

Moses Pratt, of the Town of Windsor, in the County of Essex, Carpenter and Joiner, "A Grain Seperator."—(Dated Ottawa, 1st April, 1867.)

Richard Yielding, of the Town of Windsor, in the County of Essex, Gentleman, "A new and useful invention, called 'Richard Yielding's Apparatus for burning, as Fuel, Petroleum and other kindred Fluids."—(Dated Ottawa, 3rd April, 1867.)

Peter Paterson, of the City of Toronto, in the County of York, Merchant, "A new and useful Concave Tire and Tire Coupling."—(Dated Ottawa, 5th April 1867.)

Israel Kenny, of the Town of Woodstock, in the County of Oxford, Waggon Maker, "A new and useful seat for Buggies, and other Vehicles."—(Dated Ottawa, 5th April, 1867.)

Melvin Wood, of the Township of Yarmouth, in the County of Elgin, Millwright, "A new and useful Churn, called 'The Quakeress Churn.'"—(Dated Ottawa, 10th April, 1867.)

Joseph Copeland, of the Township of Yarmouth, in the County Elgin, Yeoman, "A new and useful Farm Gate, known as 'The Copeland Gate."—(Dated Ottawa, 10th April, 1867.)

George Cliff, of the Town of Sarnia, in the County of Lambton, Weaver, "A new, useful and improved Self Acting Hand Loom."—(Dated Ottawa, 10th April, 1867.)

Henry Wood Dimon, of the Township of Charlotteville, in the County of Norfolk, Gentleman, "A self acting Waggon and wheeled Vehicle Brake, called 'Dimon's Self Acting Waggon Brake."—(Dated Ottawa, 10th April, 1867.)

John Smith Robinson, of the City of London, in the County of Middlesex, Oil Refiner, "A new and useful Composition of matter which is an improved method of deodorizing Petroleum or Rock Oil."—(Dated Ottawa, 10th April, 1867.)

Robert Land Lucas, of the Township of Trafalgar, in the County of Halton, Yeoman, "A new and useful Farm and Railway Elevating Gate."—(Dated Ottawa, 13th April, 1867.)

John Duncan, of the Town of Port Dover, in the County of Norfolk, Yeoman, "A new and useful and improved Hay Elevator."—(Dated Ottawa, 13th April, 1867.)

Francis Baker, of the Village of Kilbride, in the Township of Nelson, in the County of Halton, Yeoman, "A new and useful Rotory and Non-exhaust Steam Engine."—(Dated Ottawa, 16th April 1867.)

James McGarry, of the Village of Drummondville, in the County of Lincoln, Physician, "Certain new and useful Improvements for Carburetting Air."—(Dated Ottawa, 17th April, 1867.)

George Samuel Wilkes, of the Town of Brantford, in the County of Brant, Esquire, "A certain new and useful improvement in Mowing and Reaping Machines."—(Dated Ottawa, 10th April, 1867.)

Greenleaf W. Batchedler, of the City of Montreal, Gentleman, "A new and useful Improved Hay Press."—(Dated Ottawa, 2nd April, 1867.)

Samuel Russel Warren, of the City of Montreal, Organ-builder, "An improved Organ Wind Chest Slide."—(Dated Ottawa, 11th April, 1867.)

Charles Rolland Merriam, of the Town of Sherbrooke, Tinsmith, "A new and useful Tin Sap Spout."—(Dated Ottawa, 11th April, 1867.)

John Houston, of the Township of Barnston, in the County of Stanstead, Mechanic, "A new and useful Rocking Churn."—(Dated Ottawa, 16th April, 1867.)

George Augustus Brown, of the Town of Belleville, in the County of Hastings, Carriage-builder, "A new and useful Spring Reach Carriage."—(Dated Ottawa, 16th April, 1867.)

Aimè Nicholas Napoleon Aubin, of Belœil, in the County of Verchères, Engineer, "An Apparatus for lighting Villages or Towns, by means of Air and Hydrocarburetted Steam."—(Dated Ottawa, 16th April, 1867.)

Homer Taylor, of the City of Montreal, Gentleman, "A new and improved Apparatus for generating heat by the Combustion of Crude Petroleum, Coal Oil, &c. &c."—(Dated Ottawa, 16th April, 1867.)

George Henry Pierce, of the Village of Richmond, in the County of Richmond, Civil Engineer, "An improved Fire proof Mastic Cement for Roofing, and for other purposes."—(Dated Ottawa, 18th April, 1867.

John M. Vernon, of the City of Montreal, Merchant, "A new and useful improved composition for coating Wood, Cloth, Metals, Stone, Brick, making lining for Journal Boxes, Roofing, Pavements, Sidewalk, &c., &c."—(Dated Ottawa, 26th April, 1867.)

Charles Hughes, of the City of Montreal, Esquire, "A Portable Self Connecting Fence."—(Dated Ottawa, 29th April, 1867.)

Maurice Howell Utley, of the City of Montreal, Doctor of Medicine, "A new and improved Vacuo Vacua Electro Apparatus for the treatment and cure of diseases."—(Dated, Ottawa, 29th April, 1867.)

James Ray Buchanan, of the Township of Colchester, in the County of Essex, Merchant, "A new and useful Well Sinker and Tubular Well, known as 'Buchanan's Well Sinker and Tubular Well."—(Dated Ottawa, 18th April, 1867.)

Robert Thompson, of the Township of Oro, in the County of Simcoe, Yeoman, "A new and useful Log Elevator, ."—(Dated Ottawa, 23rd April, 1867.)

Jonathan B. Raymond, of the Township of Yarmouth, in the County of Elgin, Millwright, "A new useful Metalic Belting, called 'Raymond's Metalic Belting.'"—(Dated Ottawa, 25th April, 1867.)

William Youngman Brunton, of the City of London, in the County of Middlesex, Auctioneer, "A new and useful Founders Facing or Dust."—(Dated Ottawa, 25th April, 1867.)

Samuel Stevens, of the Town of Belleville, in the County of Hastings, Gentleman, "Certain new and useful improvements in Cheese Vats."—(Dated Ottawa, 7th May, 1867.)

Robert Smith, the younger, of the City of Toronto, in the County of York, Machinist, "Certain new and useful improvements in the construction of Amalgamating Tables for separating Gold from pulverized ore and in the apparatus connected therewith."—(Dated Ottawa, 7th May, 1867.)

Thomas Forfar, of the Township of East Flamboro, in the County of Wentworth, Carpenter, "A new and useful Churn, to be called 'The Dairy Churn.'"—(Dated Ottawa, 7th May, 1867.)

Robert Barclay, of the Town of Paris, in the County of Brant, Watchmaker, "A certain new and useful improvement in the construction of Sewing Machines."—(Dated Ottawa, 7th May, 1867.)

William Glendillen, of the Township of North Oxford, in the County of Oxford, "A new and useful Spinning Wheel."—(Dated Ottawa, 7th May, 1867.)

Richard Dover Chatterton, of the Town of Cobourg, in the County of Northumberland, Esquire, "A new mode of Propelling Vessels by means of a Machine or apparatus, which he has named 'Chatterton's Hydro Momentum Propeller.'"—)Dated Ottawa, 7th May, 1867.)

William Harden Bradley, of the Township of Haldimand, in the County of Northumberland, Yeoman, "A new and useful Improved Cultivator."—(Dated Ottawa, 16th May,1367.)

John Johnson, of the City of Toronto, in the County of York, Gentleman, "A lamp to be called 'The Cotton Packed Safety Lamp."—(Dated Ottawa, 7th May, 1867.)

George S. Brush, of the City of Montreal, Manufacturer, "A Double Acting Steam Pump."—Dated Ottawa, 9th May, 1867.)

John Girty Munger, of the Township of Colchester, in the County of Essex, "An Improved Adjustable Friction Roller Farm Gate."—(Dated Ottawa, 13th May, 1867.

Reginald Henwood, of the Town of Brantford, in the County of Brant, Doctor of Medicine, "A new and improved Sewer Guard, called, "The Airtight Sewer Guard."—(Dated Ottawa, 13th May, 1767.)

Charles E. Kennedy, of the Township of Hatley, in the District of St. Francis, Tinsmith, "A new and useful Sap Heater."—(Dated Ottawa, 9th May, 1867.)

Jean Baptiste Bertrand, of the City of Quebec, Carpenter, "A Lever Apparatus for changing the position of the rabbet of doorways or other openings." (Dated Ottawa, 9th May, 1867.)

Frederick Cook of the Village of Oil Springs, in the Village of Oil Springs, in the County of Lambton, Oil Refiner, "A new and useful Improvement in Apparatus for Burning Petroleum, and fluids made from it." (Dated Ottawa, 13th May, 1867.)

George Harding, of the City of Toronto, in the County of York, Plumber, "Certain new and useful Improvements in Traps for Water Closets, or Slop Closets, especially adapted for use in Jails, Hospitals, Asylums and other Public Institutions."—(Dated Ottawa, 13th May, 1867.)

John McIntyre, of the Town of Windsor, in the County of Essex, Merchant Tailor, "Lateral Saw' called, "McIntyre's Patent Lateral Saw.'"—(Dated Ottawa, 13th May, 1867)

James B. Paton, of the Township of Waterloo, in the County of Waterloo, Machinist, "A new and useful Knife and Scissor's Sharpener."—(Dated Ottawa, 14th May 1868.)

William Stuart, of the Township of Osnabruck, in the County of Stormont, Blacksmith, "A new and useful Self-cleaning Plough Coulter, called, 'Stuart's Self-cleaning Plough Coulter.'"—(Dated Ottawa, 14th May, 1867.)

Robert Findlay, of the Town of Windsor, in the County of Essex, Gentlemen, "A new and useful Improved double Acting Pump."—(Dated Ottawa, 17th May, 1867.)

Louis Labouglie, of Buckingham, in the County of Ottawa, "An Improvment in the Art of purifying Ores."—(Dated Ottawa,17th May, 1867.)

Joseph Marks, of the City of Montreal, Mechanical Engineer, "A new and useful Improved Compound Self-packing Balance Globe Valve."—(Dated Ottawa, 17th May, 1867)

Henry Wood, of the City of Montreal, Mechanical Engineer, "A new and useful Improvement in the manufacture of White Lead from Metallic Lead, Litharge and Ores of Lead."—(Dated Ottawa, 27th May, 1867.)

Henry Woodward, of the City of Montreal, Gas Engineer, "A new and useful Improved apparatus for Carburetting Coal Gas."—(Dated Ottawa, 4th June, 1867.)

Richard Lewis, of Melbourne, in the County of Richmond, Ship Carpenter, "A new and useful Economical Gate Hanging."—(Dated Ottawa, 8th June, 1867.)

John Reece, of the Township of Stanstead, Mechanic, "An Improved Pegging Machine."—(Dated Ottawa, 14th June, 1867.)

Joseph Henry Daly, of the City of Montreal, Gentleman, "For the introduction of Improvements in Railway Wheels and Tyres, and in casting the same. and other articles requiring a hard surface, combined with strength and toughness."—(Dated Ottawa, 14th June, 1867.)

William Muir, of the City of Toronto, in the County of York, Gentleman, "For the introduction of Compounding or Combining Mineral Coal with Mineral Oils, Petroleum and other Hydro Carbon substances, or the residue thereof after distillation for producing an illuminating Gas by the process of Heat."—(Dated Ottawa, 23rd May, 1867.)

Alexander H Wagner, of the Town of Windsor, in the County of Essex, Gentleman, "Wagner's statutable outward opening door for Churches and Public Buildings."—(Dated Ottawa, 6th June, 1867.)

Casimir Stanislaus Gzowski and the Honorable David Lewis Macpherson, (by Special Act, Cap 162, 29th and 30th Vic.,) "Certain Improvements in treating certain Ores and Alloys, and in obtaining Metals and other products therefrom" — (Dated Ottawa, 23rd June, 1867.)

James Chase, of the Village of Brooklin, in the County of Ontario, "A new, useful and improved Barrel Head Turner."—(Dated Ottawa, 6th June, 1867.)

Silas Bigelow, of the Town of Lindsay, in the County of Victoria, Merchant, "A useful Water or Boat Wheel called 'The Extension Pulley Water Wheel.'"—(Dated Ottawa, 17th May, 1867.)

William Thomas Clay, of the Village of Thornhill, in the County of York, Millwright, "A new and useful machine, styled 'Clay's Canadian Bolt Feed for Grist and Merchant Mills."—(Dated Ottawa, 6th June, 1867.)

James Chase, of the Village of Brooklin, in the County of Ontario, Machinist, "A new, useful and Improved Shingle and Heading Sawing Machine."—(Dated Ottawa, 6th June, 1867.)

John Midlen Wilson, of the City of Ottawa, in the County of Carleton, Carpenter, "A new and useful repeating Suction and Force Pump."—(Dated Ottawa, 6th June, 1867.)

William Hartley, of the Village of Mount Forest, in the County of Wellington, Pattern Maker, "Certain new and useful Improvements in the Sawing Machine." (Dated Ottawa, 13th May, 1867.)

John S. Robinson, of the City of London, in the County of Middlesex, Oil Refiner, "A new and useful Improvement in the Improved Method of Deodorizing Petroleum or Rock Oils."—(Dated Ottawa, 6th June, 1867.)

Alexander McLennan, of the Township of Lancaster, in the County of Glengarry, Yeoman, a new and useful Hay Fork, called 'The Javelin Hay Fork."—Dated Ottawa, 6th June, 1867.)

Thomas Daniel Hodgens, of the City of London, in the County of Middlesex, Waggon Maker, "A new and useful Hodgen's Improved fastening for thimble Skeins for Waggons."— (Dated Ottawa, 6th June, 1867.)

Bernard Sproule Dowd, of the Village of Packenham, in the County of Lanark, Currier, "A new and useful Patent Loading Waggon for facilitating loading hay, grain and articles in Bulk."—(Dated Ottawa, 6th June, 1867.)

James Milne, of Innisfil, in the County of Simcoe, Millwright, "A new and Improved Coupling for Railway Cars."—(Dated Ottawa, 6th June, 1867.)

Levi Walker, of the Village of Kincardine, in the County of Bruce, Pump Maker, "A new and useful Water Power which he calls, "Walker's Economic Water Power.'"—(Dated Ottawa, 14th June, 1867.)

Ezra Benson Cryderman, of the Township of Darlington, in the County of Durham, Gentleman, "A new and useful invention for the purpose of Extracting Honey from the Comb, to be called 'The Canadian Honey Extractor.'"—(Dated Ottawa, 14th June, 1867.)

Donald Bethune, of the Town of Port Hope, in the County of Durham, Esquire, "A certain new and useful Machine or Apparatus by which Railway Brakes are made self-acting, called 'Bethune's Self-acting Railway Brake.'"—Dated Ottawa, 14th June, 1867.)

Michael Horner, of the Township of Markham, in the County of York, Millwright, "A new and Improved Self-Shutting Gate."—Dated Ottawa, 14th June, 1867)

Samuel Stevens of the Town of Belleville, in the County of Hastings, Gentleman, "A new and useful Improvement in distilling Petroleum."—(Dated Ottawa, 14th June, 1866.)

Henry Wynn, of the City of London in the County of Middlesex, Carpenter, "A new and useful Wynn's Fountain Pen."—(Dated Ottawa, 14th June, 1867.)

Francis Daniel Taylor, of the City of Montreal, Mining Engineer, "New and useful Improvements in machinery for crushing and pulverizing quartz and other ore-bearing substances."—(Dated Ottawa, 27th June, 1867.)

Walter Dutton, of the Town of Ingersoll, in the County of Oxford, Cordwainer, "A new and useful method of Cutting and Crimping Boots and Shoes for Men, Women and Children, called the 'Dutton Boot." (Dated Ottawa, 24th June, 1867.)

Thomas Barnes Bishop, of the City of Montreal, Veterinary Surgeon, "A vulcanized rubber heel cap for boots and shoes."—(Dated Ottawa, June 27th 1867.)

Horatio Horskin, of Stanbridge, in the district of Bedford, Hotel Keeper, "A new and useful Coupling for attaching Shafts to Vehicles."—(Dated Ottawa, 27th June, 1867.)

Orange Jull, of the Village of Orangeville, in the County of Wellington, Miller, "A Grain Cleaner."—(Dated Ottawa, 6th June, 1867.)

Andrew B. Taft, of the City of Montreal, Architect, "A new and useful Improvement in the Nicholson Pavement."—(Dated Ottawa, 15th June, 1867.)

Thomas Barnes Bishop, of the City of Montreal, Veterinary Surgeon, "A new and useful India Rubber Cushion or Elastic Horse Shoe."—(Dated Ottawa, 15th June, 1867.)

Gilbert Marcus Hoskings, of the City of London, in the County of Middlesex, Carpenter and Joiner, "A new and useful foot morticing Machine."—(Dated Ottawa, 26th June, 2867.)

Francis Stevens Huntley, of the City of Toronto, in the County of York, Gentleman, "A new and useful Farm and Stock Gate."—(Dated Ottawa, 26th June, 1867.)

Christopher Lockman, of the City of Hamilton, in the County of Wentworth, Machinist, "A new and useful Sewing Machine."—(Dated Ottawa, 27th June, 1867.)

Abimelech Hillman, of the Town of Stratford, in the County of Perth, Cabinet Maker, "A Self-acting Car Coupler."—(Dated Ottawa, 27th June.)

Thomas Hector, of the City of Ottawa, in the County of Carleton, Esquire, "A new and useful improved Hoe."—(Dated Ottawa, 28th June, 1867.)

Charles Powell, of the Village of Newton Brook, in the County of York, "Certain new and useful Improvements to Pumps and Hose attachments to Pumds."—(Dated Ottawa, 28th June, 1867.)

Henry Nobles Hibbard, of Point Albino, in the County of Welland, School Teacher, "A new and useful tube-well called 'Hibbard's improved Tube-Well.'"—(Dated Ottawa, 28th June, 1867.)

Joel Sylvester Warner, of the Town of Prescott, in the County Grenville, Jeweller, "A new and useful composition by which House-Ashes and Pot-Ash may be converted into Pearl-Ash."—(Dated Ottawa, 28th June, 1867.)

Board of Arts and Manufactures FOR ONTARIO.

TRADE MARKS.

Trade Marks registered in the office of the Board of Registration and Statistics, Ottawa, and open for inspection at the Library of this Board.

(*Continued from page* 204.)

C. Jacob. Sherbrooke, Quebec. Trade Mark:—"Jacob's Rheumatic Liquid." Recorded in Vol. A, folio—, (No. 587). July 26th, 1867.

Morris Zacharias, Montreal, Trade Mark:—"M Z." and the words, "Dominion" above and "Cigars" underneath. Recorded in Vol. A, folio 186, (No. 591). July 27th, 1867.

C. Powell, Toronto, Ontario. Trade Mark:—"New Dominion Force Pump." Recorded in Vol. A, folio 187, (No. 616). August 6th, 1867.

NEW BOOKS ADDED TO THE FREE LIBRARY OF REFERENCE.

C. 31.—Tile Pavements.—Specimens of Tile Pavements, drawn from existing authorities. By Henry Shaw, F.S.A., 1858.

E. 34, 35.—Architecture.—Quarterly papers of Architecture, with 41 engravings, many coloured, Vols. I and II. By John Weale.

F. 59.—Geology.—Geological Survey of Canada; report of progress from 1863 to 1865. Director, Sir W. E. Logan.

F. 60.—Coins.—Folke's Coins, a volume of plates only.

G. 85.—Surgery.—A Manual on the Principles of Surgery, based on Pathology for students. By W. Canniff, M.D., F.R.C.S., &c. &c., 1866.

G. 86.—Painting.—A Treatise on Painting in Fresco, Secco, Oil, and Distemper; with the art of Gilding and Illuminating manuscripts, &c. By Cennini: with introduction and notes by Tambroni. 1437 to 1821.

H 73.—Chemical Manipulation.—Being instructions to students in chemistry, &c., &c. By Michael Farrady, D.C.L., 1842.

I. 37.—Exhibition, Paris.—Catalogue of the British section of the Paris Universal Exposition, of 1867, containing a list of the exhibitors of the United Kingdom and its Colonies, and the objects which they exhibit, in English, French, German, and Italian; with statistical introduction, &c. Official, 1867.

L. 44.—Conveyancer.—The Canadian Conveyancer, and Hand-book of Legal Forms; being a selection of concise precedents in Conveyancing, adapted to the new Registry Act. By J. Rordans, 1867.

P. P.—Confederation Debates.—Parliamentary Debates on the subject of the Confederation of the North American Provinces: 3rd sess., 8th Parliament of Canada. Printed by order of the Legislature.

Parliamentary Blue Books, Sessional Papers, Statutes, etc., are regularly received; also a good selection of the choicest of the British, United States, and Canadian Mechanical and Scientific Journals.

Correspondence.

TECHNICAL EDUCATION.

To the Editor of the Arts Journal.

Dear Sir,—You have done well in bringing before the public, at the present time, the subject of "Technical Education."

We have arrived at a juncture in the progress of our country, when an opportunity is presented to —or I may rather say, when a duty is enjoined upon—our public men to examine whether in any of our important institutions any part may be incomplete; and as it is our desire to obtain a standing with the older nations of the earth in science, arts, manufactures and general progress, the subject you have introduced has a special claim upon our attention.

In our educational system there appears to be one link wanting; and that at a point of importance as regards our material welfare. We are justly proud of our common schools. In them most liberal and efficient provision is made for every youth in the land to acquire the rudiments of education; but when our youths enter upon the period of life subsequent to school-boy days, they experience a pressing necessity for special education in the various avocations in which they are engaged. If a youth is designed for any of the so called learned professions the way is easy and plain for him; he finds already provided for him, at great public cost, superior grammar schools, colleges and universities, at almost nominal fees for admission and instruction; and in many cases he actually receives the bonus of a free scholarship and emoluments attached. If he intends to follow a mercantile pursuit, those useful institutions, commercial colleges—which, owing to the trading spirit of the age can be made self sustaining—will instruct him in every principle and intricacy of business; but if he goes at once to the workshop, there are few facilities for his acquiring that special mental culture which ought to go side by side with his manual labor, if he desires to excel in any art whatever. It is true that he may go through his apprenticeship and come out of it able to do a good day's work, without any special theoretical knowledge; but if

he has a theoretical knowledge of those branches of science, or art, which bear upon his peculiar craft, along with his practical skill, he will have the power to follow more direct and correct methods in doing his work, and will derive a great amount of mental pleasure in its performance: for there are involved in the most ordinary pursuits of the Artificer principles in Mathematics, physics and art, which truly elevate the mind; and which, if understood, appreciated and acted upon, bring him into intellectual and executive—although very humble—relation to the great Artificer of the Universe.

What then do we desire in order that facilities may be afforded to our artizans for technical theoretical knowledge? I think your correspondent S. R. mistakes your idea if he supposes—as he apparantly does from the first part of his letter—that you and the working classes whom you represent, desire the establishment of model workshops as a part of technical education. These may perhaps be desirable for those whose professions include the supervision of mechanical arts, such as architects, civil engineers, &c., but the artificer will learn *to do* more effectually in the ordinary workshop, where, in the race of competition, will be required all the economy and excellence which we desire to obtain by the education of our workmen. What we require is this, the establishment of schools or classes where the workman and apprentice may, at suitable hours, acquire a knowledge of those principles of science and art which will enable him to comprehend, analyze, and more fully utilize those forces and phenomena with which he is always in contact—the principles of mechanics and other branches of Natural Philosophy; Chemistry and its kindred sciences; Geometry, Drawing, Designing and the higher branches of artistic knowledge

It may be asked, if such instruction is so very desirable for artizans, why do they not themselves originate and sustain the means by which they may be so much benefitted? Why should the Government and the wealthier classes be called upon to force, as it were, advantages upon them which they appear to be quite indifferent to? In answer to this I may say, that no one can appreciate an object which he is ignorant of. It is a lamentable fact, that of late the attention of our rising generation of artizans has been attracted in every direction but that of solid intellectual culture. How long is it since a public lecture was delivered upon any scientific or artistic subject in our city? Does not the Lecture Committee of our Mechanics' Institute appear to consider its principal duty to be the provision of light entertainments? The only facility for mental improvement offered has been the few evening classes for rudimentary instruction. The taste of most of our young people has therefore been diverted to Balls, Concerts, Promenades, &c.; and I hold that under these circumstances it is the duty and interest of the Government, which is supposed to be to some extent paternal, and of the wealthier classes, who are supposed to be of somewhat superior intelligence, to raise so valuable a part of the community from any degradation to which they may have fallen, to a higher position of usefulness and happiness. It is to the interest of our country that our artizans should excel; and that we should retain amongst us those individuals of genius and taste, who, from time to time rise up, and are thirsting for opportunities for intellectual advancement in technical pursuits; and who to attain that advancement have to emigrate to foreign cities, where a more liberal policy in that direction prevails. It has to be acknowledged that, in the bulk of our mechanics, the taste for such knowledge has to be induced; and it will be up-hill work to bring them to a right appreciation of it. We must not suppose that if a school of Arts, of most efficient character and liberal terms, were opened, that we should find an enthusiastic crowd ready to rush into it. We should find but few at first willing to bring their minds to bear upon such subjects; but as one and another, according to their several tendencies, became introduced to the fascinating principles of science and art, their tastes for them would grow—they would make them subjects of conversation in the workshops; and, as in nature the greater always controls the less, so those minds which are first moved will attract the lighter to them, and we shall eventually obtain the enthusiasm we desire. At present there exists a state of stagnation: the few who are interested are pursuing their studies quietly, as well as they are able, by books, or they leave us for more favorable localities; but let there be an interest excited, and a *centre* established around which the votaries of technical science can cluster, and we may see our country rise to a position in arts and manufactures as high as the older nationalities.

In order to obtain a greater power of progress in arts and manufactures in our Dominion, there is one *desideratum* collateral with the scientific and artistic training of our artizans, namely—a similar training of the wealthier classes. The progress of a nation is materially retarded, when, those who ought to patronise whatever is brought forth of a superior character are unable through ignorance, to judge whether the production offered to them is really worthy. Afraid to commit themselves by approval, they treat with neglect many things that are really good, and which therefore either sink into oblivion or are appropriated by more intelli-

gent communities. The want of self reliance in matters of taste and judgment, from defective education amongst the patronising classes, leads them to ignore many good things at home, and to make their purchases in foreign markets: the only criticism upon which they can rely, is, whether or not the article *takes* in New York, Paris or London, and the only estimate they can make of an object, is, that it costs so many dollars.

I hope the consideration of these things will not be neglected by our Legislators, and that we shall begin our new career by establishing a sound foundation for material progress. Such an institution as the school of Arts, proposed by your Board, would surely not be too much for a Province such as Ontario; or if it were, we certainly ought to afford some assistance to the Mechanics' Institutes which are endeavouring to establish classes for practical scientific instruction.

Yours truly,

Toronto, Aug. 19, 1867. ARTIFICER.

Selected Articles.

THE IRISH FLAX INDUSTRY.

BY FRANZ GENGER.

The Cultivation of Flax.—The cultivation of flax has greatly increased in Ireland during the past few years. In 1847 there were 88,000 acres planted with flax; in 1862, 225,105; in 1863, 321,138; and in 1864, 452,913. We see that it was especially increasing from 1862 to 1864, which was principally owing to the cotton crisis. It seems to me necessary to state that the want of flax, created by the want of cotton, could not have been so easily supplied by increased cultivation had the agricultural population not been in some manner prepared for it in advance. The reasons for this were partly the intelligence and speculative character of the Irish farmers, who were already aware of the facility of flax cultivation; further, the Irish climate being so well adapted for cultivating the plant, and the particular instructions about cultivation and proceeds of flax which have been and still are continually given by the North-eastern Agricultural Society and the Belfast Linen Trade Committee. Finally, we have to attribute a certain influence to the flax factories, founded since 1847, as they furnished a ready market to the farmers for the raw material, and relieved them of the trouble of dressing. The Irish flax crop of 1864 was valued at 4,500,000 pounds sterling, giving an average receipt of $70 net per acre. Seed from Riga is mostly used for sowing, and it seems that the farmers have not yet any fixed idea about the use of domestic seed. The dressing of the ground and the sowing and handling of the plant on the field is done according to the methods which are followed in Belgium, and which become—by the instructions of the above-named societies—more and more known in Ireland.

Flax-retting, dressing, breaking, and swingling.—As to the further preparation of flax, we have to distinguish:—1. The method used by small farmers who dress the cultivated flax, or at least ret it, themselves; and 2. Method in use in the large flax factories. The first one is mostly used. The flax is pulled before the seed is quite ripe, immediately thereafter rippled, and then retted. Retting is done in pits of 16 feet breadth, 4 feet depth, and different lengths. They are generally so made that the water has a slow influx and reflux. They are either in the immediate neighborhood of rivers or are fed by springs. As the latter generally have hard water, the retting pools are filled a few weeks before retting begins, so as to cause a separation of the hardening substances by the water standing in the atmosphere. Water containing iron is never used. Retting occupies from eight to fourteen days, according to the temperature. After it is over the flax is spread for drying, and turned from time to time; it is then piled up during the middle of the day in the open air or in barns. Drying by artificial heat is deemed disadvantageous and wholly avoided. The large flax factories, of which the first was founded in 1847, and of which the number from the commencement rapidly increased till, in 1851, nineteen were in active operation, have not lately been increased. At present a joint-stock undertaking is started in Palmerstown, near Dublin, which, besides other branches, will also pursue that of buying raw flax from the farmers and dressing it themselves. It is stated in the programme that retting will be performed on an improved system, according to which every kind of water may be used, and the flax may be retted in every season, except during frost, and the fishery laws will not be violated in any way. The company will at the same time establish on forty acres of land a model flax culture, by which an increased product of from 30 to 40 per cent. will be obtained. The flax factories in Ireland work for the most part according to the method used in Courtray, Belgium, the most important difference being that the flax is not retted immediately after being pulled (green retting), but only when it is perfectly dry (dry retting). The retting is performed in the following year as early as possible after the appearance of warm weather, and continues uninterruptedly as long as the weather permits. The further preparation of the flax, viz., breaking and swingling, is now done in Ireland altogether by machines. At first small machines working by hand were introduced, but at present only large ones working by water or horse-power are used. These machines are either set up in certain places or are transported from place to place, and work for payment. The older breaking machine, which is most frequently used, consists of three wooden cylinders, arranged horizontally one above another. The flax-straw is put between the upper two rollers, and comes back, in a broken state, through the two lower ones. This being repeated several times, the flax stalk is flattened and the wood is more crushed than broken. I think the fiber remains wholly uninjured. Only a very limited quantity of the fiber obtained by swingling is used for spinning; and it is calculated that 40,000 tons of swingled flax are wasted every year in Ireland. Only 10,000

tons are shipped to Dundee, where it is manufactured with jute into sackings and drills, and other goods, the remainder being used as litter or burnt. Greater attention has, however, been given to the subject, and it is intended to use swingled flax on a larger scale for spinning and weaving purposes; and, besides the above-mentioned stock company for flax cultivation, another one will be formed in Palmerstown for manufacturing flax and for spinning jute. Notwithstanding the enormous flax cultivation, Ireland is not near able to supply all the spinning mills of the United Kingdom with flax, and 4,609,134 pounds sterling worth had to be imported during ten months of 1864. The importation has, however, not increased considerably, having amounted during ten months in 1862 to 4,000,044, and in 1863 to 3,248,137 pounds sterling. The flax cultivated in Ireland herself is about one-third of the quantity consumed; most of the imports come from Russia, France and Belgium. Belgium sends flax for the high yarn numbers.

Spinning and weaving.—The production of the flax-spinning mills corresponds with the increased demand. The number of spindles in existing factories has increased and new ones have been established. In 1864 Ireland had seventy-four mills with 641,800 spindles, which number has been increased by 5,000 new ones, besides five new mills with 45,000 spindles. According to this statement there are 786,800 spindles at present in operation in Ireland. The total number in the United Kingdom was 1,265,000 in 1862. The value of the yarn exports from the United Kingdom amounted during ten months, from January to November, as follows:—1861, £2,455,094; 1864, £1,706,698; 1863, £2,276,932; 1864, £2,821,913. The yarn production embraces all degrees of fineness. I saw excellent yarns of 230 leas in York Street Mills, Belfast. England and Ireland are unsurpassed up to 350 leas. Also the manufacture of coarser yarns has reached a high degree of perfection; yarns of 150 leas are manufactured, and have an equally round thread without knots. Hand weaving is decreasing more and more, and is used only for the finer yarn numbers over 80 leas. There were twenty-eight power-loom factories in Ireland in 1859, with 3,633 looms. In 1864, however, there were forty-two establishments, with 8,187 looms, which have been considerably increased in 1865. The United Kingdom exported of woven linen goods during ten months, from January to November, as follows:—1861, £3,335,771; 1862, £4,152,725; 1863, £5,234,413; 1864, £6,993,516. The great variety of woven goods is very remarkable. It is to be seen in the various gradations of strength and fineness, as well as of breadth, bleaching, and finish; finally, in dyeing and printing. The variety is especially great in the higher goods, which, for their cheapness and other qualities, supply the place of cotton. They are exported in enormous quantities to Central and South America (West Indies), to Turkey, East India, and China. For home use and the European Continent thicker goods are manufactured.

Bleaching and dressing the woven goods.—In one of the largest bleaching establishments I made the following observations, which, no doubt, will be of interest to the reader, viz.:—In the first instance the raw linen was not submitted to any fermenting process for destroying and loosening the glue. Instead of that process, soaking in lime-water took place, followed by other processes, such as handling with hot soda, washing with Irish fulling, chlorine and acid baths, and laying out on the lawn. As the linen becomes extremely white by bleaching, there was no need of using blue starch; but the starch was used in its pure, white state. The starched linen passed thereafter a drying machine of new construction, the use of which for perfect dressing is very important. It consisted of twelve heated cylinders of thin iron plate, of about 15 inches diameter, arranged horizontally and parallel one behind another. Beneath and between every two cylinders are rolls, constructed of laths, serving as conductors. The linen passes over the first cylinder, then downward around the roll, then upward to the second cylinder, and so on. The first cylinder is heated to the highest degree, the next less, and so on, the last one being moderately hot. Instead of mangles they used two gutta percha or two wood cylinders, with a brass cylinder between them; the threads are pressed extremely smooth by the latter mechanism, which are particularly adapted for loose weavings. Yarn bleaching did not offer anything remarkable. After boiling with soda, handling with chlorine and acid, the bleaching is finished by laying out on the lawn. The drying of the bleached yarns was done either by the air or by artificial heat. The wages of the bleaching establishments are for a workman 1s. 6d. or 2s. a day; for an overseer, 3s. 4d.

Pressing and packing.—These final operations are done with great care. The lapping rooms are light and very clean. The workmen (lappers)—both male and female sexes—wear very clean clothing, and require to have great experience in their business, being brought up to it from childhood. Extreme care is taken in folding the linen, and the pieces look just as if they were folded by a bookbinder. Every piece is looked over before packed, and all faulty or dirty spots marked. The length is exactly measured and written on the ticket. A lapper's wages is 4s. 2d. per day. Particular attention is also paid to the carding and packing.—*American Artizan.*

FISH CULTURE.

BY CHARLES J. ATKINS.

Nearly all our common fishes are *oviparous*, which term, as distinguished from *viviparous*, we may apply to those species of animals which are reproduced by eggs laid in an undeveloped state. In most cases not only are the eggs extruded from the female fish before their developement, but also that contact of the male element which impregnates them, and without which no developement is possible, is effected after extrusion.

The operation of spawning, or depositing and impregnating the eggs, as performed by the parent fishes is essentially as follows. At the spawning season, mature fishes of both sexes repair to a suitable locality; and, having selected a place, a female extrudes her eggs, which sink to the bottom among the pebbles, or, if glutinous, adhere to

sticks, weeds, and stones. At the same time, or immediately afterward, the male emits the fecundating element, which, diffused through the water, comes in contact with the eggs and impregnates them. In due time, nourished by the water in which they are deposited, and quickened by its heat, they develope and hatch into living fish.

Now a little examination into circumstances will make it evident that a great waste must here occur. A multitude of greedy creatures hover around, ready to devour the eggs as soon as they are left by the parent, or are swept within reach of the current; a portion fails to come in contact with the milt; others are destroyed by noxious sediment or parasitic fungi, or are buried deep beneath the shifting sands which the floods may bring down upon them. Should a portion of the eggs escape these dangers, the newly-hatched and defenceless young are eagerly hunted out by all the carnivorous tribes of the water. In the end, comparatively few of the eggs laid result in mature fish; it is perhaps impossible to ascertain the proportion with precision, but one per cent, would be far more than sufficient to maintain and increase the numbers of any species, so enormously fecund are they. Indeed, a rough calculation shows that were one per cent of the eggs of a salmon to result in full grown fish, and were they and their progeny to continue to increase in the same ratio, they would in about sixty years amount in bulk, to many times the size of the earth. Nor is the salmon among the most prolific species. I have counted in a perch (*Perea flavescens*), weighing three and a half ounces, 9,943 eggs; and in a melt (*Osmerus viridescens*), ten inches in length, 25,141. Some of the larger fish produce millions at each spawning.

Now if in some way the eggs can be protected from these various dangers that threaten them when abandoned to the ordinary course of nature, it will at once be seen that a great gain will be made in the number hatched from the spawn of each mother; and if, farther, the young fish can be protected from their enemies until they have acquired size, strength and agility sufficient to care for themselves, another gain will be thus effected.

These two problems are among the most important with which Pisciculture has to deal, but have, we think been satifactorily solved.

An interesting experiment was made in Sweden in 1761, by Charles Frederick Lund. He obtained some breams, perch, and mullets, with mature spawn, and placed them in large submerged or floating wooden boxes, in which he had placed quantities of pine boughs. In these boxes the fish were kept several days, until they had completed the process of spawning; they were then removed. The eggs had adhered to the boughs. These species hatch quickly, and in a short time multitudes of young fish emerged from the boughs. In this way he obtained from fifty female breams, 3,100,000 young; from one hundred female perch, 3,215,000 young; and from one hundred female mullets, 4,000,000 young. These are certainly wonderful results. They were placed in the Lake of Ræxen, and dismissed to care for themselves. In a similar way those species, like the trout, whose eggs fall free from each other to the bottom of the stream, may be made to spawn in places where it will be convenient to protect them by enclosures from marauders; and, with a suitable arrangement of small ponds and streams, the young fry of all species may be separated from the old ones that would devour them.

But the crowning discovery in Pisciculture was that of artificial fecundation. This discovery was made during the last century, but was turned to no practical account, and was hardly practised except in laboratories, when it was re-discovered in France a few years ago, under circumstances that brought its economic bearing prominently before the attention of learned men.

Since the operation of extruding the eggs and milt is essentially mechanical, it can be as well performed by man as by the fish, and, once extruded, the milt performs its own office upon the eggs, and fertilizes them, with no other interference than suffices to bring them into contact. Nay, man can do better than the fish: he can express the eggs into a vessel where none of them will be swept out of reach of the milt, or into the maws of the expectant throng of bystanding fishes; he can then press the milt into the same vessel, and by stirring them together insure that the milt shall reach every egg. This is artificial fecundation. But let us examine the method employed.

The operations of Pisciculturists, who have practised artificial impregnation, have been mostly confined to a few species of the family of Salmonidæ. The processes pursued will therefore apply only in a limited extent to the members of other families.

Perhaps salmon and trout have received the most attention. Both these species alway seek running, shallow water, and spawn in the autumn or early winter. A female and male, both ripe and ready to spawn, seek a proper place, and on a gravelly bed, swept clean of sand for a small space, the female deposits her eggs, and the male his milt. The operation is described with great minuteness by European writers but I think that our brook trout (*Salmo fontinalis*) has not been observed sufficiently to ascertain whether its habits are precisely those of the European trout.

All fishes, when spawning, are so intently engaged upon it, that they take very little notice of anything else. Trout can be captured with the greatest ease at this time—not unfrequently they can be taken with the hand. The following is the artificial process as described by a practical breeder of the brook trout.

The trout, male and female, must be taken with a net, or in some manner that will not injure them, just at the time they are preparing to spawn, and placed in baskets standing in the water in some convenient place. A pan or pail with three or four inches of water in it is brought near the baskets containing the trout. All things being ready, a female trout is taken out of the basket with one hand, and with the other the abdomen is gently rubbed from the gills downward, whereupon the spawn flows in a continuous stream into the vessel. The rubbing is continued until the spawn is wholly extruded, and the trout is then quickly replaced in the water. This operation must not continue more than one minute if possible. On one side of the egg is a small white speck; this is where the impregnation takes place. This side of the egg being lightest, it always falls uppermost. A male trout is now taken, and in like manner the milt is

expressed; it falls through the water and settles upon the eggs. All the trout in the baskets are served in the same manner. The spawn and milt are then placed in shallow vessels, and deposited in water, where they are allowed to remain an hour more. (Other operators find a few minutes sufficient to insure impregnation, and at the end of that time rinse the eggs thoroughly.)

The manner of proceeding with salmon and other species is essentially the same.

The eggs, being thus artificially impregnated, may be deposited in a natural stream, under circumstances as closely as possible resembling those chosen by the fish, and left to themselves; or, as is far better, they may be subjected to artificial hatching. By this way they may be guarded from various mishaps, the supply of water can be so regulated that it will be uniform, and the eggs can be examined from time to time, and dead and diseased ones be removed before they can injure their neighbors.

It is essential that the incubation be conducted under circumstances like those under which it naturally takes place. The temperature, quality, and state of the water are the main conditions. Some pecies spawn in fresh water, and some in salt; some in rapid streams, and some in lakes and ponds; some in winter, and some in summer. The temperature required by trout is about forty one deg. Fahrenheit, ranging, however, from several degrees below this to about fifty deg. while some species of summer-spawning fish require a temperature higher than sixty degrees, The time required for developement varies with different species, and is much affected by temperature. Some species hatch in five days, while the trout is rarely less than fifty days, and at thirty-seven degrees of heat requires one hundred and thirty-six days.

The apparatus employed in artificial incubation is of various kinds. A metal box, with many holes to admit a free circulation of water was one of the first employed; this is immersed in the water. Troughs of stone, vessels of earthenware, willow baskets, and wooden boxes have all been used in the incubation of salmon and trout.

A favorite form of hatching box for trout is a long wooden trough, its bottom inclined sufficiently to cause a gentle flow of water through it, and covered with a layer of gravel; the whole covered in by a lid. The eggs are deposited in the gravel or sand, and a stream of water, an inch or two deep, led through the trough.

At the French Pisciculture establishment at Huningue, and the Stormontfield salmon-breeding ponds, the hatching apparatus consists of a series of horizontal troughs, arranged side by side like the steps of a stairway, through which a stream of water falls in succession from the uppermost.

After the eggs are deposited in the hatching-boxes, a proper supply of pure water must be kept up until they hatch. They must be frequently examined to remove diseased eggs, and guard against the collection of sediment. It is better that they be kept in darkness, for light encourages the growth of a parasitic fungus.

When trout hatch they have still a large portion of the egg attached to the abdomen; that is gradually absorbed, and while it remains they require no food. It is the "yolk-sack." Upon its complete absorption the young trout begins to feed, and must be placed where he can find his own food, or must be regularly supplied with such as is adapted to his infantile condition, and will attract his attention, and tempt his appetite.

The whole process of producing fish, by artificial impregnation and incubation, is in practice remarkably successful. More than ninety per cent of the eggs become living fish. Mr. Ainsworth, the authority quoted above, has this year obtained twenty thousand trout from twenty-one thousand eggs, being more than ninety-five per cent.

In another point of view this process is of vast importance. It facilitates the transportation of species from one water to another. Salmon eggs, fecundated, were carried from Scotland to Australia in 1865; were successfully hatched in the River Plenty; and, having returned from their first migration to the sea, may now be considered as established there. In a similar manner the Merrimac River has been sown with salmon eggs brought from New Brunswick, and a harvest may be expected therefrom.

The rearing of fish in artificial ponds and reservoirs, and then bringing them into marketable and eatable condition by regular and systematic feeding, has been successfully carried out, and it is found to be practicable as an industrial occupation, bringing better returns, when trout are reared, than the growing of any other kind of animal food. Yet to determine with certainty what are the conditions of success in this branch of Pisciculture requires further experiment.

Pisciculture is not a new art. It was practiced among the ancient Romans; yet not as an industrial pursuit, but as a source of amusement to men of wealth and leisure, or to supply with delicacies the tables of a gluttonous nobility. In Catholic countries, since the establishment of monasteries, fish preserves have been commonly attached to those institutions, to supply the devotees with food during their frequent religious fasts. There is no reason, however, to suppose that they had any knowledge of artificial impregnation. In China, it has long been an important branch of industry, and although we know very little of the process that they employ, it is certain that they succeed in making fish an abundant and cheap article of food.

Since the awakening of the public mind to this subject in Europe, government establishments have been put in operation in France and Germany, and private operations of great importance have been carried on in the British Isles. It is thought that primitive abundance may be restored to their now exhausted rivers, and not many years hence an acre of water shall be made to produce as much food for man as an acre of land. In America many persons have engaged in pisciculture as an experiment, and some attempts have been made to carry it farther; but as nothing has been done on a large scale, no great results have yet been attained.—*American Naturalist.*

Chesnut Oil, prepared on a large scale, in France, from horse chesnuts by chemical treatment, is very fluid, absorbable by the skin, and has met with great success as an application for gout and rheumatism. Stearin, syrup of glucose, alcohol, and starch are also among the incidental products.

PROPOSED BRIDGE ACROSS THE STRAITS OF DOVER.

The *Mechanics' Magazine* of the 26 July, contains the following description of a plan for effecting this object, by a Mr. Jones, an English Engineer. His proposed method of procedure is as follows :—

"At a convenient spot on either shore, a space would be levelled at low-water spring tides, and on this would be built a series of very large blocks of brick and Portland cement, faced with granite; or, of cement concrete, faced with brick or granite; an illustration of which may be seen at the works of the Admiralty pier, Dover. The largest used there is about 10 tons, or thereabouts, and Mr. Jones proposes blocks of two or three thousand tons. These being immersed in water every tide, would be in the most favourable circumstances for getting extremely hard, as is well known to all users of Portland cement. The hardness and toughness of such may be judged by what is seen at Dover, where a block of ten tons is lifted by the common dovetail key called a *lewis*, with the same impunity as freestone or granite.

After remaining some weeks in water the blocks would be conveyed to the pier sites, to form the foundations, in the following manner :—A pair of pontoons, connected together with a space between, would be placed on either side of the block, and at low water made fast; powerful hydraulic or other lowering gear would be fixed on the deep iron girders connecting the pontoons, and the block, so to speak, would be slung between them. The rise of the tide would float off the blocks, a simple precaution of sheets of felt, or otherwise, being used to prevent them adhering to the construction bed. Blocks of 3000 tons, about 60 feet long, by 40 feet wide, and 20 feet high, and weighing about 2000 tons only in water, would be easily lifted by two pontoons of say 1500 tons capacity each, on a 14 feet draught of water, and being provided with steam power, would speedily convey them to their destination. Such blocks would form a foundation at once, and, in the deepest part of the channel, eight such would bring a pier up to high water mark—the soundings being from 20 to 24 fathoms. The upper blocks might be of a gradually diminished size, and their weight would defy the fiercest gale, without reckoning that of the superstructure. On these would be built hollow piers in brick and cement, or they might be of grouped iron columns carried to a height of say 150 feet above high water mark for the road platform. The distance in the narrowest part of the Channel is 20 miles, and the piers being about 500 feet apart, it would require 200 piers, and the blocks, when prepared, a pier could be raised from the bottom above water in two days. Supposing 150 days per annum were favourable for the work, with one pair of pontoons, it would take about three years to build the piers, and as the iron work would follow up these, the whole might be completed in four years. The work would advance from either shore, completing the platform as it went, for convenience, and so that gas pipes for lighting the piers at night could be carried down it. The platform, it is proposed, should be carried by lattice girders rigidly suspended from lofty tripod columns on the piers, with diagonal bracing underneath, and carried across quite level, so that the minimum of tractive power and consequent weight of locomotive should be necessary, thus taxing the power and strength of the work as little as possible; such a structure would also present least resistance to the wind.

It may be asked what preparation of the sea-bed would be made for the foundation blocks, and this is claimed as part of the scheme. With a simple apparatus, and a sounding bar, it would be examined, and according as it may be found, of chalk, rock, flints, clay, or sand, would be dealt with as follows :—The rocky bottom would be brought to a level bed by depositing, through a funnel, slow setting cement concrete upon it, and this would be levelled by a sort of rake attached to a pontoon drawn to and fro over it; if of flints, it could be levelled in the same way; and if of clay or sand, a high pressure of water could be forced out under the bottom of the block when deposited, and it would settle into a solid bed. The blocks would be lowered on a rising tide to give power of adjustment, and the pontoons could be provided with water valves for the same purpose. A large pier might be introduced at intervals for lighthouse and signal purposes, and at such a height the carriages would be out of reach of the spray in rough weather. The Chain Pier at Brighton, and numerous jetties, such as Margate, show that a bridge can be erected to stand the fury of the winter gales in the sea without injury. It is proposed that the apparatus for examining the sea-bed, and other contingent purposes, should consist of a stout sheet iron tube, in 10 feet lengths, 3 feet in diameter, capped at the bottom end, and with legs to prevent slipping when lowered on the bottom from a pontoon. One length would be provided with projecting bosses of the nature of a diver's helmet, with glass lights in them; also, by having long armlet gloves of thick india rubber cloth attached, a man could easily perform the few simple operations under water incidental to the plan without admitting water. The upper end being open to the sky, direct communication could be held with the surface, and, in any depth of water, without the usual distressing symptoms caused by the ordinary diving dress or bell to the individual descending; consequently no trained divers would be required, even if they could descend and work at such a depth, and being balanced or sunk by weights, it could be easily moved from place to place.

The main question, of course, in this and all other propositions for benefitting the public is, will it pay? Now, as this question is not based upon the principles of mechanical science, we are in no way bound to discuss it. By Mr. Jones' plan, however, the cost of the structure can be easily and pretty closely estimated. Taking his figures, we have an estimate of five millions as ample, and taking his returns on that capital, we have a splendid revenue resulting; besides the advantage to the converging railways on either side of the Channel and the telegraph companies. Unquestionably a great stimulus would be given to trade between the nations by such a means; and, considering the immense sums sunk in the Atlantic for a telegraph cable, it seems only reasonable that capital should be easily found for so really grand a work as the union of England and France.

INSECTS.

All insects have six legs, unless they have met with accidents. They do not breathe through their mouths, but by means of a great number of little pipes which run through them lengthwise, having openings here and there on the sides of the body where the fresh air is drawn in. These little openings are very curiously contrived—in some cases protected by tiny trap-doors opening on hinges, in others having a strong grating over them of very coarse hairs. Hence, an insect when cut in two, as he does not use his mouth for breathing, and as his brain is not confined to his head, but runs all through his body, will live for many hours in this mutilated state. In fact some insects never eat a mouthful after they are full grown.

Insects have from two to five eyes. Two large eyes called compound eyes, because they are made up of many little eyes united, like a bundle of six sided spy-glasses tied together, large at one end and very small at the other, and looking under the microscope like the meshes of a very fine net. Then there are sometimes three little eyes in addition to the large ones, placed generally on the top of the head, although they occasionally vary their position.

All insects are provided with *antennæ*, which are those little, many-jointed projections extending from the head near the eyes, somewhat like reindeer's horns. These are probably used for feeling, smelling, and hearing with, although their uses have not been definitely settled. They vary much in appearance; sometimes resembling Indian clubs, sometimes fringed like a fir-tree, notched like a saw, plumed like a feather, or armed with teeth like a comb. A few insects have no wings, others have two, others four, but none have more than that number.

Insects pass through several stages of existence before they become fully developed. Most of them are hatched from eggs; then they pass into the larva state, in which they are caterpillar, maggot, or grub, according as they are to become butterfly or beetle. In course of time they go into the pupa, or mummy state, from which they emerge ready for action as perfect insects. In some classes these distinctions are not so strongly marked.

On examining a fly with a microscope, you will find six legs, armed each with two sharp little toes; two big compound eyes covering nearly the whole of the head, and the three little eyes arranged in a triangle; two transparent wings strengthened by a network of veins, and covered with fine hairs to protect them from wear and tear; a pair of tiny winglets, and on each side of the body a little knob which serves for unknown purposes. On closer examination of his mouth you will find a proboscis or trunk, like an elephant's; this is nothing but the lower lip lengthened and armed with three lancets, with which it punctures its food, or exasperates bald-headed old gentlemen. The end of the lip is flattened and grooved like the bottom of a meat dish for gravy. He is provided with a fluid which, running down little canals in his trunk, dissolves soluble substances, so that they are easily sucked up through the same little canals.

On examining the foot closely under the microscope, you will see that it is armed with two little claws, protected by fleshy pads, covered with hairs. Each hair is enlarged at the end, making a little disc, which is kept moist by a fluid continually exuding. The little claws catch on the rough point of any surface, and the moment this is done, the little disks take hold by their edges, while their centers are retracted, leaving a vacuum, and thus creating an atmospheric pressure which sustains the insect against the force of gravitation. While one foot is raised, the others retain their hold, and the rapid movement of the six legs along a ceiling, shows how swift is the instinctive action of this complex apparatus.

According to Kirby and Spence, the common house fly, when undisturbed, makes six hundred strokes with its wing in a second, and when necessary can increase its velocity six-fold.

There is one fact in the natural history of flies that is generally very little understood, and what is true of flies, is equally true with regard to all insects. It is that flies hatched into the winged state never grow any more, either smaller or larger. If he is hatched a small fly, small he remains all the days of his life. His growing and most of his eating, has been done in the larva or maggot state. Then he leads the life of a glutton, eating with apparent relish all most loathsome things, reveling in all sorts of impurities, waxing very fat and aldermanic, as do most large eaters in the human tribe. An old writer well observes, "How few of us are aware that all these creatures now buzzing above our heads once crawled beneath out feet!"—*Riverside Magazine.*

HOW LONG IS A YEAR?

There are a great many people who do not understand the philosophy of the leap year. Some even suppose that leap year was instituted by the goddess Venus only to confer upon ladies the privilege of popping the question, or that February has twenty-nine days that it might have a chance of the luck of odd numbers. Of course it is not necessary to bring any science to bear against such notions. The subject really involves certain important niceties, which we are persuaded not more than one in a thousand clearly comprehends, and for that reason we shall try to elucidate it.

Our civil year is founded upon the period of the revolution of the earth about the sun. We say founded upon, only, for the natural or astronomical year as determined by astronomers is not the same period of time as the civil year. If the natural year had exactly 365 or 366 days, there would be no trouble: the civil year would accord with it and represent precisely the same period of time. But the natural year cannot be divided into an exact number of days; and to complicate the matter still more, astronomers show us that there are several kinds of natural years in consequence of there being several distinct but legitimate ways of measuring the period of the earth's orbit.

We give two examples. Let the earth, the sun and a fixed star be in the same straight line at a given instant. Now the time which will elapse before they will be again in the same relative position is one kind of year. This year is called a sidereal year and its length is 365 d. 6 h. 9 m. 9·6 sec. But if the period be measured on the eclip-

tic, as for example the time which elapses between the sun's crossing one of the equinoctial points and again reaching the same we get a different result. This year is called the equinoctial, tropical or solar year, and its length is 365 d. 5 h. 48 m. 49·7 sec.

Now it has been agreed that this solar year shall be the foundation or standard of the civil year, and that the two shall be brought as nearly as possible into accord. In ancient times the subject was very poorly understood, and the civil year was constantly getting out of reckoning with the sun. The discrepancy evidently became a serious affair, when the natural winter encroached on the summer of the calendar.

Julius Cæsar, 46 B. C., made the first reasonable and substantial reform. He saw that the solar year was about 365¼ days long,—the figures were near enough to the truth to answer his purpose. If the civil year be 365 days, it is a quarter of a day short of a solar year; four civil years would have lost just a whole day. He therefore ordered that every fourth civil year should have 366 days. Thus originated the leap year. By his changes in the reckoning of time, Cæsar's name is made to live forever and to be on the lips of all men. The month July is named in his honor, and the Julian Calendar is still followed, over a considerable part of the earth.

If the solar year were exactly 365¼ days, there would never have arisen an occasion to reform the Julian Calendar. In fact, every Julian year gets in advance of the solar year about ten minutes; in a century nearly a whole day. In Cæsar's time the vernal equinox fell on the 25th of March, in the sixteenth century it had fallen back to the 11th. The difference was getting to be important and the subject was ably discused. The result was that Pope Gregory XII., in 1577, approved and ordered a reform. The change actually took effect in 1582. In honor of the Council of Nice, ten days were dropped from the calendar, in order to bring the vernal equinox for all time on that day of the month, the 21st of March, at which it occurred in the year (325) of the meeting of the council. If there had been respect for the memory of Cæsar, fourteen days instead of ten would have been omitted.

To prevent a discrepancy in the future, between the solar and civil year, it was found that if only those centennial years of which the number after suppressing the two cyphers, is divisible by four, be regarded as leap years, the purpose is accomplished. The plan was adopted In accordance with it 1900 will not be a leap year.

The protestant nations and those under the rule of the Greek Church, of course looked upon a reform instituted by a pope, with no favor. But protestant Germany and Denmark adopted it in 1700; England followed in 1742, and from that time forward "old style" and "new style" of necessity became household words wherever English was spoken. The Greek Church is however still unrelenting, and all those nations which are under its government still adhere to the Julian Calendar. The most conspicious among these nations is Russia. Julian reckoning is now twelve days later than Gregorian. — *Scientific American.*

Machinery and Manufactures.

Leather Splitting.

In the commerce of leather in France, we apply the word crust to that part of the leather which is nearest the flesh, and which is separated from the other portion of the skin bearing the hair. The strength for resistance in a tightly stretched skin is entirely in the portion nearest the flesh, the fibre, as we approach the upper or grain side, gradually becoming looser, and the force to resist stretching, gradually diminishing in such a manner that it is always here that the breaks or cracks in leather begin to manifest themselves, with the slightest increase of the usual strain.

If then, the grain of such leather be removed, the force of resistance and the expansion of the balance will be much more even, and the whole will be better balanced, as it were; the grain will no longer be present to mark by cracks and fissures where the excess of strain began to operate.

Before the genius of inventors was directed to the invention and perfection of leather-splitting machines, leathers were used in their entire thickness, and if only a moderate thickness was required, they obtained it by shaving off as much as they found necessary from the flesh side of the hide; now, for the purpose of preserving its strength and making its capacity for extension even and regular, this was the very contrary of what should have been done.

Since the employment of machines for splitting, the manufacturer is able to employ the grain for the purposes to which it is best adapted, and to make the crust, or flesh side, serviceable to the best advantage, notwithstanding that the latter was in discredit for some time. We well recollect the repugnance with which the general public beheld anything made of the crust of shaved or split leather. People then thought that all parts would crumble into pieces in the hand when the grain was taken off. Since it has entered into consumption it has come to be a great necessity, and is largely used to manufacture saddlery and trim carriages, in trunk making, in forming the tops of sabots and galashes, and when waxed and varnished, &c., in inferior grades of shoes, shoe tips, &c.

The hose and the leather piping we exhibit, are made of the split crust of the leather, as above mentioned; their quality is no less a recommendation than their reasonable price. Tubing and hose made of the entire leather with the grain on, become slacker and tighter by the influence of water, or the weather. With those made of split leather the case is different; the effect of shrinking and expanding is produced in the first wetting they get, and they never again change their form, but remain rigid, notwithstanding all the changes that may take place in the temperature. The grained leather then is easily altered by atmospheric and other influences; the crust, on the contrary, remains firm and not liable to moisture. —*Picot & Co., in La Halle aux Cuirs.*

Tinning Rivets and Tacks.

The *Scientific American* answers the query of a correspondent on this subject as follows:—

The process is very simple, but some manufacturers make a great mystery of it, and endeavour to keep it a secret. Rivets, tacks, and other small articles are tinned in the same manner. First, the tacks should be thoroughly cleaned. For this purpose dilute sulphuric acid is used, only strong enough to remove the grease and whatever scale there may be on the tacks. From the acid they are put into water and rinsed, then taken out and drained. While still damp, powdered salammoniac is sprinkled over them and they are ready to go into the bath. This is merely a cauldron of melted tin. Until the tacks are hot enough to "take" the tin they float on it, but soon as they sink they are ready to be removed. This is done with a perforated ladle or skimmer, and the operator throws the ladle-full of tacks violently against a screen of sheet iron to loosen the excess of tin and prevent the tacks from being soldered together. From the screen they slide down inclined troughs of sheet iron long enough to insure the cooling of the tacks before they reach the bin. These inclines must have considerable pitch so that the tacks cannot stop on the way and become glued to the trough.

This is the grand secret of tinning tacks. The acid cleans them, and the salammoniac acts as a flux. All the tin that rattles off in the form of scales can be saved and remelted. The sale value of tacks tinned is increased about five cents a pound, and the cost is about two cents.

A Novel Scale Rule.

The *American Artizan* says: William Hay, of Dumbarton, Scotland, has invented (and patented in the United States) an improved rule for the use of mechanics; this rule is marked with scales, whereby it may be employed not only for measuring surfaces in the ordinary way, but also for ascertaining the circumference of a circle of any given radius; also, for finding the side of a square equal to the area of a given circle; also, for finding the radius of a circle equal in area to a given square; also, for dividing a circle into any desired number of equal parts; also, for finding the side of the greatest square that can be inscribed within a given circle; and also the circle that will circumscribe a given square. This scale renders the rule capable of much more universal employment in different kinds of work than those heretofore in use.

The claim of this invention is published in the official list this week.

Pine Tree Wool.

At a factory in Breslau, pine-tree wool is now spun and woven into a kind of flannel, which is largely used as blankets in hospitals, barracks, and prisons, in that city and in Vienna with manifest advantage, for pine-wool drives away all disagreeable and noxious insects from the localities in which it is used. It can be used as stuffing for chairs, sofas, and mattresses in the same way as horse-hair; and some qualities are woven into a kind of cloth of which garments of many kinds can be made. It is said to be favourable to health as well as to cleanliness. The waste liquor from the pine-vats yields a valuable medicine; and from the waste fiber there is manufactured gas to light the factory.—*American Artizan.*

Terra Alba.

The extent to which this fine white earth is employed in adulterating pulverized sugar, confectionary, flour, prepared cocoa, spices, milk, &c., is incalculable. Dishonesty gives the law to many a traffic and manufacture in these days, and compels those who would rather be honest (so they imagine) to "do as others do." A chalky taste in the delicate white cracker, a tastelessness in bread, a whity scum in the tea cup from a spoonful of snowy sugar, with many another uncomprehended indication, betray the presence of the ever-present adulterator. Two-thirds their weight of terra alba has been obtained from lozenges' This comparatively new ingredient is imported from Ireland, and that largely, costing only about one dollar and a quarter per cwt.—*Scientific American.*

Air Cylinder Graining Machine.

While every other trade has had the benefit of the inventor's skill, the painter has been left to plod along after the manner of his father of the last century, doing his work in the slowest and most expensive method. In the graining machine we have, however, something that while it will lessen the cost of work to the consumer, will facilitate the task of the workman and render the work more satisfactory to both. Finishing interiors in imitation of woods, grained in oil colors, is in good taste and in harmony with all the prevailing styles of building. It would also be more economical than any other style of finish, were it not for the tediousness and difficulty of getting even a tolerable resemblance by the present method of hand graining. To meet these wants, the Air Cylinder Graining Machine has been invented, and after many years of extensive experiment, has been successfully adapted to all the grainer's uses. The machine is simple in its operation, rapid in execution, and true to nature. It reverses the common mode of graining, which is to spread the color all over the work and then to rub out the lights, a plan which requires not only a skilled hand and a practised eye to determine the pattern, but also a deal of labor to wipe it out clean, upon which latter the excellence of the work depends. The machine patterns are obtained directly from the fiber of the wood, so arranged that they take up the color, transfer it to the work, and produce the dark shading of the wood, leaving the lights perfectly clean. The machine is constructed of a vulcanized rubber cylinder, in combination with an elastic belt, in which the figure of wood is cast. It is supplied with a feeding apparatus, and is so arranged that different bands representing various woods may be employed at pleasure. The cylinder can also be regulated to different widths of panels.

The ordinary graining colors are used. The machine will prove most useful and economical in many branches of manufacture. Owing to the elasticity of the air cylinder, convex, and even concave surfaces, when the depression is not too sharp, may be grained with as much facility as a

flat surface. In many businesses where veneering is used solely for ornament and not for strength, the necessity for that tedious operation will disappear entirely, for as handseme exteriors can be produced by this machine on soft native woods, as are now obtained by the costly process of overlaying with expensive imported woods.

Indeed there is hardly a practical limit to the use of the machine, for its advantages are many and obvious. First, it does many times more work than can be done by hand. Second, it does not require skilled labor. Third, it produces work true to nature and uniformly true.

The machine is manufactured by Heath, Smith & Co., 282 Pearl street, New York, under the superintendence of the patentee, Mr. Adams. Messrs. H. S. & Co. will be happy to show parties interested samples of work done with the machine at their office.—*Scientific American.*

Impromptu Hat.

A French machine in the Exposition exhibits the manufacture of a finished felt hat, ready for use, in fifty minutes. The first operation consists in blowing out, by means of a fan, about four ounces of rabbit's fur upon a revolving cone or mold of copper, pierced with holes, from which the air is exhausted, causing the fur to adhere to the cone. It is then covered with a wet cloth and steeped in a tub of hot water for a few minutes, after which it undergoes the process of drying, heating, rolling, binding, and lining with silk, and comes out a perfect hat.

The Sampson Car Wheel.

It is tested by the New York Central Railroad Company, and found to be a decided success.

On the 12th inst., an excursion took place over the New York Central Railroad, that part of it running from Troy to Schenectady, for the purpose of testing the merits of a new and most important invention in the matter of car wheels, by Mr. Elnathan Sampson, of Lansingburgh, Rensselaer County, New York, and of which Mr. Sampson, Hon. Marcus P. Norton and Edwin Chamberlain, Esq., of Troy, are the owners. The new and improved wheels were attached to two cars, one a passenger and one a baggage car, both of which were filled by a large number of prominent railroad and other gentlemen interested in important inventions. This invention, which is destined to wholly revolutionize for the better the rotary power and character of railway rolling stock and incidental machinery, consists in the conical and lateral tread, combined with the flange of the wheel, the design of which is in passing the curve of the track the outer wheel shall pass over the outer rail in the same time that the inner wheel passes over the inner rail, obviating any sliding of the outer wheel, thereby preventing the twisting of the axle, straining of the journal bearings and boxes of the axle, straining of the wheel, and the usual wearing and tearing of the rail. In short this invention actually relieves all friction not incident to an air line track. Cars containing or moving upon this wheel will pass all curves in the road with as much ease and with the same friction as upon an air line track, so that no more power is required to move heavy freight or passenger trains upon and over railway curves than upon a straight or air line track. This being the case, there must, of course, be a great economy in fuel and oil, no less than in the general wear and tear of the locomotive engine and entire running gear or machinery. Prominent railway and practical men upon the excursion carefully estimated that quite or nearly one-third of the power was saved in moving heavy trains over or upon curves. Hence it is manifest that the railroad rails will wear a greater length of time (especially those which form the curve) than has hitherto been the case with the ordinary wheel now in use. Upon actual trial it is found that this wheel will adjust the truck of the cars to the condition of the track at the time and over which it is passing.

Another great point of public interest in the invention is that by the use of the improved wheel there is far less liability of the cars being thrown from the track. Indeed there is great additional security against the cars being thrown from the track while passing rail joints, curves, or over any irregularities in the rails of the track. Then again there is much less lateral motion to the cars in passing over any portion of the track than by the ordinary wheel now in use. In the new wheel the lateral motion against the rail is scarcely perceptible, and is calculated to draw one-third more around a curve. The tread of the wheel is so constructed as to increase its diameter, thus adapting itself to the curves over which it passes. The late excursion train on its return trip ran a distance of twenty-two miles in twenty-seven minutes and thirty seconds, as guaged by L. H. Tupper, of Troy, and formerly superintendent of the Rensselaer and Saratoga Railroad, and did not once touch the guiding flange in the whole distance of forty-six miles going and coming; and it is well known that the branch connection of the New York Central Railroad running between Troy and Schenectady is the most crooked piece of road to be found anywhere in the United States.

Summary.

R. M. Wanzer & Co., of Hamilton, announce that the jurors of the Paris Exposition have awarded them the *first and highest prize Medal*, for the best family shuttle sewing machine in the world.——At the Glenn's Falls Gas Works, Troy, N. Y., 115 pounds of dried peat yielded 78 feet of gas, or 5·81 feet of gas to the pound, while the best coal makes not more 4·41 to the pound, the price of the peat being much less per ton than that usually employed in the gas manufacture.——An invention has been patented in New York city, for winding up a watch by the agency of its stem.—— The distillation of pine wood is carried on in New Orleans, realizing, as reported, from a cord of "fat" pine 40 gallons of turpentine, 1 barrel of pitch, 100 gallons of pyroligneous acid and 50 bushels of charcoal; the whole worth $60 and costing $10.—— Messrs. Fowler, of Leeds, England, can complete one set of steam-ploughing machinery daily; and Messrs. Howard, of Bedford, can deliver one completely fitted and furnished iron plough every quarter of an hour. At least one hundred and twenty different men have their alloted bits and parts to fabricate in each of Messrs. Howards ploughs,

and yet rough pig and bar iron entering the factory at one end can be transformed and delivered at the other end as a complete double-wheel plow, with every fitting and adjustment ready for work in the brief space of an hour.——Webb & Son's Tannery, at Combs, Suffolk, England, has 12,000 nearly finished skins in one department. The firm manufactures its own gas, draws its own supply of water from an artesian well on the premises, have their own wheelwrights, blacksmiths, coopers, carpenters and painters, and other trades necessary; insurance and improvement societies, and saving's banks for their workmen, and other various economical appliances. ——Mr. Wm. Rowan, of Belfast, has recently patented some new practical improvements in machinery for preparing flax, hemp, etc. See *Mechanics Magazine* July 26, for descriptions and illustrations.——Fifty thousand tons of soap used in silk manufacture, were formerly allowed to pass off to waste in the Rhone. Most of this is now recovered by the aid of sulpuret of carbon, and is used again in manufacture.——A sufficient number of Enfield rifles have now been converted into breech-loaders, on the Snyder system, to arm the whole of the infantry at home, a large number of those on foreign service, and the Royal Marines, the Artillery, and Cavalry carbines have now commenced. The reports from regiments continue to be in the highest degree satisfactory.——The four dials of the clock at the British House of Parliament are each 22 ft. diameter. The winding up of the striking mechanism occupies two hours. The pendulum is 15 ft. long; the wheels are of cast iron; the hour bell is 8 ft. high and 9 ft. diameter, and weighs 15 tons. The weight of the hammer exceeds 400 lbs.—— Major Palliser receives £10,000 this year, and £5,000 next year, as a recognition of the value of his chilled system of shot; and Mr. Frazer, C.E., receives £5,000 as a first instalment from the Government for his system of cheap constructions, as deputy assistant at the Royal Gun Factories, at Woolwich.

Useful Receipts.

A beautiful Alloy.

It is stated that an American has discovered a beautiful alloy, which has been most successfully applied as a substitute for gold: it is composed of pure copper, 100 parts; pure tin, 17 parts; magnesia, 6 parts; tartar of commerce, 9 parts; sal-ammonia, 3·6 parts; and quicklime, 1·6 parts. The copper is first melted, then the lime, magnesia, sal-ammoniac, and tartar are added, a little at a time, and the whole is briskly stirred for about half an hour, so as to mix thoroughly, after which tin is thrown on the surface in small grains, stirring until entirely fused. The crucible is now covered, and the fusion kept up for about thirty-five minutes, when the dross is skimmed off, and the alloy found ready for use. It is quite malleable and ductile, and may be drawn, stamped, chased, beaten into powder or into leaves, like gold leaf; in all which conditions it is not distinguishable from gold, even by good judges, except by its inferior weight. The alloy has already been largely applied in the United States, and requires only to be known in Great Britain to become a general favorite. So says the London *Engineer*.

A new Fire and Water-proof Cement.

Two parts of bright iron filings, sifted through a fine sieve, and one part of dry clay, in powder, carefully mixed with vinegar into a smooth and uniform paste: it must be used immediately, as it sets with great rapidity. The above is by Dr. Inneman, who says it is excellent for apparatus used in the distillation of fatty bodies and volatile oils, for sealing soap boilers, coppers, air pumps, superheating steam apparatus, and steam pipes.

A new Artificial Stone.

M. Sorel has invented a new kind of artificial stone. A saturated solution of chloride of magnesium has the power of combining with an indefinite amount of calcined magnesia to form a perfectly insoluble compound of chloride of magnesium and magnesia, which sets into an extremely hard mass, capable of receiving a polish like marble. Of this material the inventor makes billiard balls, and various ornamental objects. But a thinner paste of the kind mentioned is, it seems, able to hold together and consolidate from fifteen to twenty times its weight of sand and other materials, and so forming a rougher kind of stone suitable for tiles and flags, and which will even resist sea-water. These materials may be coloured by any of the ordinary mineral colours for ornamental purposes.

A new Anaesthetic.

A new anaesthetic has come into fashion of late: it is quadrichloride of carbon, which possesses an agreeable smell of quinces, and can produce insensibility in less than a minute. This insensibility may be maintained with or without loss of consciousness; its effects cease speedily when desired, and are not followed by vomiting. It has also been used for obstinate headache.—*Mech. Magazine.*

A Refreshing Beverage.

Dr. Waller Lewis, in describing the precaution against cholera adopted at the General Post Office, says:—"The men employed in sorting letters and newspapers suffer much from thirst, especially in the hot weather, and consequently drink much water while engaged in their duties. For some time past the officers of all classes are supplied with a most agreeable drink, which not only assuages the thirst, but has, moreover, strong antiseptic and anti-diarrhœal properties. It is called orangeade, and is thus composed: Take of dilate sulphuric acid, concentrated infusion of orange peel, each twelve drachms; syrup of orange peel, five fluid ounces. This quantity is added to two imperial gallons of water. A large wineglassful is taken at a draught, mixed with more or less water, according to the taste. The officers drink this with pleasure. It is being consumed in large quantities daily, and I am convinced it will be the means of warding off a great deal of sickness.—*Mark Lane Express.*

A new Mode of preparing Tar-water.

Tar in a thousand different forms is the pharmaceutical preparation now mostly in vogue. M. E. Guyot has made a special subject of it, and has reason to be proud of the success of his tar liquors prepared in the following manner:—Concentrated tar from Norway 24lbs., water 20 quarts, carbonate of soda 2¼ lbs.; the whole is then heated in a distilling apparatus in a sand bath. He then takes the liquor which has not passed over the still, and adds a sufficient quantity of water so as to produce 40 quarts of liquid. It is then allowed to settle, and the clear part poured over into a barrel. The volatile portions obtained are then added, and the whole well mixed together for some minutes, and left to stand for several days, and then filtered. The result thus obtained is a dark brown liquor, of a strong aromatic taste, mixing perfectly with water, and giving tar-water. Thirty-two grammes (one ounce) contain one grain of resinous matter. —*Chemical News.*

Bleaching of Gums.

Mucilage, says Picciotto, may be completely decolorized by means of recently precipitated gelatinous alumina, which fixes the color on itself and leaves a clear solution.

To Purify Water.

To purify water, by a process promulgated by a Mr. Booth, of Birmingham, put in it a neutral solution of bi-sulphate of alumina, in the proportion of one ounce to 438 gallons. The sulphuric acid of the sulphate decomposes the bi-carbonate of lime in the water, and forms an insoluble sulphate of lime instead. The hydrate of alumina being set free, forms with the organic matter in the water another insoluble compound. Both these fall to the bottom, and the remaining freed element, carbonic acid, lends an agreeable quality to the water.

Welding Composition.

For iron or steel or both together, calcine and pulverize together 100 parts iron or steel filings, 10 sal ammoniac, 6 borax, 5 balsam copaiva or copœiba. One of the pieces is to be heated red, carefully cleaned of scale, the composition is to be spread upon it, and the other pieces applied at a white heat and welded with the hammer.

Drilling Glass.

To the old mode of boring glass with a file wet with oil of turpentine, a correspondent of the *Chemical News* adds an amendment from a German source, confirmed by his experience, to the effect that dilute sulphuric acid is much more effective, with less wear of the tool, than oil of turpentine. It is stated that at Berlin, glass castings for pump barrels, &c., are drilled, planed and bored like iron ones, and in the same lathes and machines, by the aid of sulphuric acid.

To Cut glass to any shape, without a diamond, hold it quite level under water, and with a pair of strong scissors clip it away by small bits from the edges.

Practical Memoranda.

Perfumes and Preventives of Moldiness.

An interesting paper on this subject has been published by Dr. Macculloch. We presume that our readers are aware that moldiness is occasioned by the growth of minute vegetables. Ink, paste, leather, and seeds, are the substances that most frequently suffer from it. The effect of cloves in preserving ink is well known; any of the essential oils answer equally well. Leather may be kept free from mold by the same substances. The Russian leather, which is perfumed with the tar of birch, never becomes moldy; indeed, it prevents it from occurring in other bodies. A few drops of any essential oil are sufficient also to keep books entirely free from it. For harness, oil of turpentine is recommended. Bookbinders, in general, employ alum for preserving their paste; but mold frequently forms on it. Shoemaker's resin is sometimes also used for the same purpose, but it is less effectual than oil of turpentine. The best preventives, however, are the essential oils, even in small quantity, as those of peppermint, anise, or cassia, by which paste may be kept almost any length of time; indeed, it has, in this way, been preserved for years. The paste recommended by Dr. Macculloch is made in the usual way, with flour, some brown sugar, and a little corrosive sublimate; the sugar keeping it flexible when dry, and the sublimate preventing it from fermenting, and from being attacked by insects. After it is made, a few drops of any of the essential oils are added. Paste made in this way dries when exposed to the air, and may be used merely by wetting it. If required to be kept always ready for use, it ought to be put into covered pots. Seeds may also be preserved by the essential oils; and this is of great consequence, when they are to be sent to a distance. Of course moisture must be excluded as much as possible, as the oils or ottos prevent only the bad effects of mold.—*Scientific American*

Variegated Marble.

To imitate any of the fine veined marbles an exchange advises to heat the solid block to be operated upon, so that its pores will be opened to receive the colors. These latter consist of an alcoholic solution of alkanet root, to produce a rich lavendar; madder lake to make a rich crimson; indigo a blue; verdigris, green; and gamboge, yellow. The several colors are to be tastily put on in the desired pattern, and will be rendered permanent by being absorbed in cooling the marble.

How to keep Hams through the Summer.

After your hams have taken salt, hang them up and smoke them well, then take them down and dip them in boiling water for a few seconds, that will kill all the eggs of insects, if there should be any on them, then roll them in dry ashes while wet, and hang them up again; smoke them more if you choose. I know this to be a good way to keep them, for I have tried it for two or three years; it is cheaper than canvassing, and a great deal better.

This will do also for shoulders and sides; those that do their bacon in this way will never have any bugs or skippers on their meat.—*Rural World*

Transplanting Trees.

If people planting orchards would mark the north side of the tree with red chalk, before taking them up, and, when set out have them put in the ground in their natural position, a larger proportion it is said, would live; as ignoring this law of nature is the cause of many transplanted trees dying. If the north be exposed to the south, the heat of the sun is too great for that side of the tree to bear, and therefore it dries up and decays.

Cleansing New Tea Canisters.

A correspondent of the *Grocer* in answer to an enquirer, says: If you will put a clear red-hot cinder into your canisters, well shaking it about, so as not to melt the solder, you will find them fit for use immediately.

Electro-deposited Copper.

Electro-deposited copper is generally very brittle, which at times is a great disadvantage. M. Bouillet says this may be remedied by adding a very minute quantity—merely a trace, in fact—of gelatine, which renders it as malleable as rolled metal, while that thrown down from a single solution of sulphate has all the defects of cast copper.

Statistical Information.

Debts and Taxation of American Cities.

From an article under this heading, in the New York *Financial and Commercial Chronicle*, we cut the following tables, which will be found of interest in comparing with debts and taxation of our Canadian cities and towns :—

"The following is a statement of the amount of taxes assessed in the cities named for city and county purposes for the years 1860 and 1866, and their relation to population :

	Amount. 1860.	1866.	Rat' p. capi. 1860.	1866.
New York	$7,649,873	$15,606,896	$9 40	$17 34
Philadelphia	2,334,252	5,084.539	4 13	8 17
Boston	2,294,533	4,224,202	12 90	21 98
Cincinnati	1,298,621	2,010.323	8 06	10 39
Chicago	373,315	1,719.064	3 42	8 57
San Francisco	796,666	1,496,657	14 03	18 71

The increase in the city and county taxation shown in these figures is astounding. In New York city these taxes now amount to $17 34 per head, against $9,40 in 1860; in Boston the increase is $9 08 per head; in Philadelphia $4,04; in Cincinnati, $2 33; in Chicago $5,15, and in San Francisco $4 68. In order, however, to ascertain the *whole* amount of taxation to which our city populations are subject, it is necessary to add to the foregoing the share *per capita* of taxes levied for State purposes, and also of federal imposts. The amount of State taxes levied in these States, and the proportion *per capita*, compare as follows :

	Amount of Taxes. 1860.	1866.	Tax per capita. 1860.	1866.
New York	$4.376.167	$17,369,043	$1 13	$1 84
Pennsylvania	2.368.967	4,060,148	0 81	1 27
Massachusetts	901.010	3,137.531	0 73	2 49
Ohio	1,504.713	3.867.167	1 50	1 50
Illinois	1,825,792	2,514.033	1 07	1 17
California	1,131,063	2,233,492	2 99	4 96

The following is a statement of the population, taxation, customs and debt of the United States in 1860 and 1866, and their relation to population :

	1860	1866.		1860.	1866
Population	31.500.000	35.000,000			
Internal revenue		$309,226.813	*per capita* $		$8 83
Customs	53.187,512	179,046,651	"	1 09	5 12
National Deb	64.769 703	2,783,425,879	"	2 06	79 53

The whole taxation per head of the populations of the respective cities may be thus summarized :

	City & Co. 1860.	1866.	State. 1860.	1866.	Federal. 1860.	1866.	Total. 1860.	1866.
	$ c	$ c	$ c	$ c	$ c	$ c.	$ c	$ c
San Francisco	14 03	18 71	2 99	4 96	1 69	13 95	18 71	37 62
New York	9 40	17 34	1 13	1 84	1 69	13 95	12 12	33 13
Philadelphia	4 13	8 17	0 81	1 27	1 69	13 95	6 63	23 39
Boston	12 90	21 98	0 73	2 49	1 69	13 95	15 32	38 42
Cincinnati	8 06	10 39	1 50	1 50	1 69	13 95	11 25	25 84
Chicago	3 42	8 57	1 07	1 17	1 69	13 95	6 18	23 69

It will appear from a comparison of these figures that the total taxation of our city population, so far as may be junged from the cities here instanced, has increased from about $12 per head in 1860 to $30 per head in 1866. There is considerable diversity in the proportions between the different cities, and the ratio of increase also varies materially at the several places; but this may be taken as the average augmentation of our burthens since the year antecedent to the war. Allowing five persons to each family, it would follow that the amount of taxation paid directly and indirectly by our city population is $150 per family, against $60 in 1860, showing an average increase of $90 per family. This immense addition to our burthens must materially affect the social and political future of the country, and calls loudly upon the State and federal legislatures to retrench in every possible way the expenditures under their control."

The Speed of Trains on European Railways.

A comparison of a large number of examples has enabled the English Railway Commission to make the following statement:—"In England the express trains run generally, including stoppages, about 40 miles per hour; the average of all the examples of the quickest trains (omitting suburban) gives 36½ miles per hour; the ordinary trains run generally from 18 to 30 miles per hour; the average of all the examples of the slowest trains gives 19½ miles per hour. In France the express trains run, including stoppages, 25 to 30 miles per hour; the average of the quickest examples is 31 miles; the ordinary trains run from 16 to 25 miles per hour; the average of all the examples of the slowest trains is 18 miles per hour. In Belgium the quickest trains run from 29 to 35 miles per hour; the slowest 18 to 23. In Prussia the quickest is 29 miles; the slowest 17 to 21. In Austria the quickest is 20 to 29 miles; the slowest 14 to 21. In Bavaria and along the Rhine the quickest is 24 to 32 miles; the slowest 13 to 24 miles. In Italy the quickest is 24 to 30 miles; the slowest 15 to 24 miles.—*American Artizan.*

POPULATION OF TORONTO.

The census of the city of Toronto has just been taken, and the following is the result. It will be seen that ladies considerably preponderate over the gentlemen. In 1861 there were 1,467 more females than males. This year, 1867, there are 798 more:

CENSUS OF TORONTO, 1861,

	Males.	Females.	Total.
St. Andrew's Ward	3,064	3,188	5,252
St. David's Ward	3,834	4,070	7,904
St. George's Ward	1,344	1,479	2,823
St. James' Ward	3,942	4,464	8,406
St. John's Ward	3,800	4,234	8,034
St. Lawrence Ward	1,978	1,703	3,681
St. Patrick's Ward	2,757	3,052	5,809
Religious, Collegiate and other public institutions	958	954	1,912
Total in 1861	21,677	23,144	44,821

CENSUS OF TORONTO, 1867.

	Males.	Females.	Total.
St. Lawrence Ward	1,817	1,541	3,358
St. David's Ward	4,221	4,763	8,984
St. James' Ward	4,080	4,832	8,912
St. John's Ward	4,376	4,897	9,273
St. Patrick's Ward	3,129	3,404	6,533
St. George's Ward	2,931	1,800	4,731
St. Andrew's Ward	3,555	3,670	7,225
Total in 1867	24,109	24,907	49,016

Velocity per Hour.

The speed of our ocean steamers in crossing the Atlantic rarely exceeds 11 miles per hour; the speed of river steamers is from 14 to 24 miles per hour; of a race horse from 29 to 30; of a bird 50 to 60; of a high wind 20, and of a hurricane 80 miles; of sound 804; of mechanical force in air 750; of the earth around the sun 68,000; of light, as demonstrated by Foucault's apparatus, 690,000,000 miles and yet this inconceivable speed is little more than half the velocity of static electricity, which latter Wheatstone has shown to be 1,040,000,000 miles an hour.

If the earth were a cannon ball shot at the sun from its present distance, and with the velocity it now travels, and if simultaneous with the explosion a telegram was sent to the solar inhabitants, the electricity would pass the intervening space of 95,000,000 miles and the message be received in five minutes; the earth would be seen coming toward them after the lapse of eight minutes; the inhabitants would have nearly two months to prepare for the shock, which would be received over ten years before they heard the explosion.—*Scientific American.*

Statistics of Human Life.

The total number of human beings on the earth is now computed, in round numbers, at 1,000,000,000. They speak 3,064 now known tongues, and in which upward of 1,100 religions or creeds are preached. The average age of life is 33⅓ years. One-fourth of all born die before they reach the age of 7 years, and the half before the 17th year. Out of 100 persons only six reach the age of 60 years and upward, while only one in 1,000 reaches the age of 100 years. Out of 500 only one attains 80 years. Out of the thousand million living persons 330,000,000 die annually, 86,400 daily, 3,600 every hour, 60 every minute, consequently one every second. The loss is however, balanced by the gain in new births. Tall men are supposed to live longer than short ones. Women are generally stronger proportionately than men until their 50th year, afterwards less so. Marriages are in proportion to single life (bachelors and spinsters) as 100: 75. Both births and deaths are more frequent in the night than in the day. One fourth of men are capable of bearing arms, but not one of 1,000 is by nature inclined for the profession. The more civilized a country is the more full of vigor, life, and health are the people. The notion that education enfeebles and degenerates the human frame is not borne out by fact.—*Exchange.*

Reciprocity—and New Brunswick.

Under the Reciprocity treaty,—

New Brunswick bought	Bbls. Flour.
From the United States in 1865	205,373
From Upper Canada in 1865	28,000
In favor of United States	177,373

During the year subsequent to the Abrogation of Reciprocity, she purchased

From Upper Canada in 1866	177,000
From the United States in 1866	68,000
In favor of Upper Canada	109,090

The Consumption of Alcoholic Liquors.

At a recent meeting of the British Scientific Association, Mr. Wilkinson read a paper on the intoxicating liquors consumed by the people of the United Kingdom in 1865. Of gin and whiskey 20,211,155 gallons were consumed, and of rum and brandy 6,732,217 gallons. The wines charged with duty were 11,993,760 gallons whilst the malt retained for brewing was 47,249,093 bushels, which gave an average of 24½ gallons per head in the year from the youngest to the oldest. Thus the gallons of alcohol consumed were 52,619,737, divided as follows:—Ardent spirits, 13,771,686; wines, 2,398,752; and beer and ale, 52,619,737. The value of this was:—British spirits, £20,811,155; foreign and colonial, £8,415; ardent spirits, £29,226,426; wines, £10,794,384; malt liquors, £48,599,066; total, £88,619,876. This sum exceeded by nearly £23,000,000 the gross expenditure of the United Kingdom in 1865. A brief discussion ensued. Professor Levi said it was a sad reflection that such a large sum should be spent by the working classes in strong drinks The Rev. W. Caine said he knew working men earning 30*s.* a week, who spent 7*s.* 6*d.* per week in drink, and when out of work a week or two they were compelled to apply to the parish. Englishmen ought to be ashamed of having so many workhouses. Mr. Williamson said there was little inducement for the working classes to save, because when out of work they had no relief afforded until their previous savings were exhausted. Mr. A. Hill observed that in Birmingham he had adopted a plan of pay-

ing wages on the Wednesday instead of Saturday, and found it answer well; he also got the men to allow the women to receive the money, for it was safe in their hands. The President said there was nothing inquisitorial in inquiring how the working classes spent their earnings, for the middle and higher classes were obliged to give in written statements as to how they spent their incomes.

Summary.

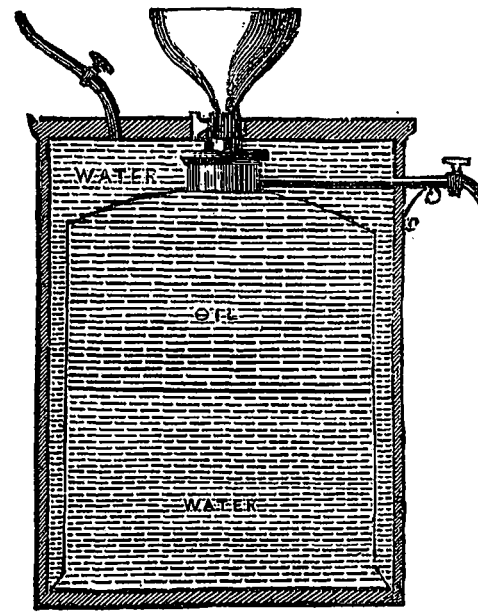
Steel Pen Manufacturers in Birmingham employ 380 men and 2,000 women and girls; 98,000 gross of pens are turned out weekly, in which ten tons of steel, worth $15,000 are used. Thirty years ago these pens sold at 5*s.* per gross, they now bring only 1½*d* to 1¾*d*.——There were 1.732 registered newspapers in the United Kingdom, in 1866, viz. 1,372 in England, 55 in Wales, 144 in Scotland, and 161 in Ireland.——The Atlantic Cable Company's receipts during April, amounted to $178,700 in gold, the largest number of messages being sent from Europe. Their business from the opening on July 28, 1866 to the end of April last, had brought them $1,221,646 in gold.——The supply of Ice gathered for the New York Market, this year, is about 600,000 tons, being 55,000 tons over last year.——Since 1836, there have been established throughout the world 160,000 miles of telegraph lines, comprising 400,000 miles of wire, and working through 14,000 stations. The total length of Submarine cables laid is 19,923 miles.——In 1866, Newcastle exported 2,560,947 tons of coal; Sunderland 1,145,570 tons; Cardiff 1,861,329. The United Kingdom supplied France with 1,931,236 tons; and the quantity of Combustible Minerals exported from the United Kingdom by sea was 10,720,824 tons.——France exported to England, from January 1866 to October 1866, eggs to the value of $7,100,000; butter and cheese $13,200,000; Poultry $400,000; Feathers, $2,400,000. So says the American *Agriculturist*.——The exports of Railway iron from the United Kingdom, for the four months ending April 30, amounted to 135,875 tons, as against 130,803 for the same period in 1866, and 92,018 tons for the corresponding four months of 1865.——Sir Rowland Hill states that the number of persons yearly killed or injured on the Railways throughout the United Kingdom, is less than the number killed or injured by ordinary vehicles in London alone.——A United States recent statistical return sets down the entire area of the Republic, including the Lakes and Rivers, at 3,250,009 square miles. The Public Lands 1,465,468,000 acres, of which 474,160,551 have been surveyed.——The population of London is estimated by the Registrar General at 3,082,372; Liverpool, 492,439; Manchester, 362,823; Birmingham, 343,948.

A creosoted sleeper, put down on the Stockton and Darlington Railway, in England, in August, 1841, was taken up March 14, 1867, after nearly twenty-five years' service. The grain of the wood although slightly discolored by creosote, is as fresh and apparently as tough as that of newly-sawed timber, and the odor of creosote is as strong as if the wood had just been operated upon.

Petroleum Items.

Storage of Petroleum.

The accompanying cut represents, in section, a reservoir for keeping quantities of oil in store which has been tried on a large scale in the docks of Marseilles. It consists of an outer cistern always filled, or nearly filled, with water, and a bell or inverted reservoir for the oil. There are communications between the two vessels below, so that as the oil is drawn off the water rises in its place, and when more oil is added the water is driven back from the bell into the outer cylinder. The operation is perfectly simple; the oil is poured into the bell through the funnel and stop-cock, which is shut off when the oil is all in its place. The outer cistern is then filled with water by means of the pipe, as shown in the illustration, when the



oil in the bell is completely surrounded by water. When the oil is to be drawn off, the side tap is opened, and the pressure of the water upwards forces out the oil through the horizontal tube, more water being let into the outer cistern to increase the pressure, if necessary. The arrangement is the invention of an engineer named Chiandi. According to experiments made by the captain of Pompiers, or firemen, of Marseilles, it seems that it is impossible to set light to the oil in the bell by fire outside. The surface of the reservoir has even been covered with flames without the slightest effect being produced. Another advantage is the doing away with casks for the storage of oil, which is set down by the authorities of the docks of Marseilles at a cost of more than half-a-crown per barrel per annum. The whole apparatus is made of sheet iron.—*Oil Trade Review.*

It is said that George Peabody sawed wood for a night's lodging at Concord, N. H., fifty years ago

Petroleum as Fuel.

The experiments which for several months have been in progress at Boston, looking to the successful application of petroleum as fuel for steamships, have been watched with much interest and their results have been very important. These results, as claimed by the inventor of the system under trial, are a saving of four or five to one of space required for the storage of fuel, and of at least five-sixths of the labour required for feeding and tending the fires, to say nothing of the actual cost, which depends upon the relative prices of coal and oil. Application was made to the Secretary of the Navy in November last, for unity to test the practicability of petroleum as fuel upon a Government vessel. The Department had already, in 1862 appointed a committee of naval engineers to experiment upon this subject, and upon this application a Board of three Chief Engineers was ordered to examine the proposed experiments, the gunboat "Palos" being selected for the trial. Previous to entering upon the petroleum trial, her engines were tested with coal, thirty-six revolutions per minute with thirty pounds of steam, being obtained. In the first petroleum test, thirty-four revolutions were obtained with the same head of steam, and in the second test, fifty revolutions, with a pressure of thirty pounds. A comparison of the weight of the oil and the coal showed that one pound of oil had done the work of eight pounds of coal, and the general comparison of weight has shown one barrel of petroleum to be equal to one ton of coal.

Crude oils are used of a gravity ranging from 31 to 46 degrees. The oil is first conveyed directly to a cast-iron retort, and vaporized by means of a slight fire underneath. Due proportions of steam and common air are incorporated with the vapour, and the gases thus evolved constitute the fuel. This burns with an intense heat, and the combustion is so perfect that no smoke is visible at the outlet of the smoke-stack. The fire is under perfect control, and there being no ashes, clinker, nor refuse coal to clog the fires, they may be run an indefinite time without stoppage for cleaning. The burning of coal upon the "Palos" required the services of twenty-one firemen and coal-passers; with the petroleum only three men were needed. This same principle may be applied to locomotives as well as steamers, and, indeed, upon the Franklin and Warren Railroad, in Western Pennsylvania, a petroleum burning apparatus has been successfully employed. The petroleum regions are making still further use of the oil by applying the necessary apparatus to the fires of the engine houses at the wells, thus saving a very large outlay for wood or coal. During the height of the speculative fever, when dozens of wells were being sunk upon each acre in the favourite localities, all the coal for the engines was transported for miles over frightful roads at a great wear and tear of horses and waggons, and at a corresponding cost to the well owner. Nearly all this great expense might have been saved, had the use of petroleum for fuel been practically understood. The experiments at Boston are to be continued, and petroleum tested upon a sea voyage. The importance of the subject should insure for it a rigid and persistent investigation. Should the results of the experiments continue to be satisfactory, the carrying capacity of our steamers will be largely increased, while the pay-rolls will be greatly diminished, and a vessel may leave New York with enough fuel on board to propel her round the world.—*N. Y. World.*

Petroleum and Freezing Water.

At one of the Scientific Institutions of New York. Prof. van der Wyde, so says the *American Artizan*, explained the chemical composition of petroleum, and also made the experiment of freezing water in a vacuum. The professor stated that the agents that have been used for this purpose are ether, ammonia, and liquid carbonic acid gas; but he had employed liquid petroleum gas with good results. This gas can be easily collected at the oil distilleries, as it at present is not utilized, and the whole expense would be the cost of collecting it. The professor then poured water into testing-tubes, placed these tubes in a wine-glass, poured a quantity of the petroleum gas into the glass, and placed the whole under the receiver of an air-pump; after exhausting the air and allowing the test-tubes to remain in the vacuum for a few minutes, they were removed and the water contained in them was found to be frozen quite solid. The professor then stated that he thought that ice could be produced at a less cost than that of collecting it in winter. His plan is to form two iron vessels similar to locomotive boilers and fitted with tubes in the same manner. He would place the air-pump between the two vessels or reservoirs, so that the liquids or gases might be pumped from one to the other alternately as the ice was formed.

Australian Oil.

An Australian paper announces the recent discovery of a new liquid gum, or oil, in that country. A tract of land not less than ten miles square had been discovered which everywhere abounded with bubbling springs of this gum, or oil, while all around were vast quantites of the gum solidified into the consistency of india rubber. This when exposed to a fire, burns with a bright flame, accompanied by a thick smoke and a smell like old grease. The substance is light and floats in water.

Miscellaneous.

The Metric System.

The International Congress, recently assembled in Paris, in connection with the great Exposition, to devise a uniform system of weights, coins, and measures, have made a report, in which it is stated that "it is most desirable that Governments take, henceforth, the following measures, viz:—

1. To order the teaching of the metric system in public schools, and to require that it should form part of the public examinations.

2. To introduce its use into scientific publications, in public statistics, in postal arrangements, in the custom houses, and other branches of Government administration.

3. The commission does not consider, as appertaining to its mission, the duty of making stand-

ards the exact prototypes of those of Paris. The Government of each country will take upon itself the verification of each of these standards."

The *Scientific American* says:—"Responsive to the first recommendation of the Commission we notice that in our own state the metric system of weights and measures has recently received a new and powerful impetus. At a recent meeting of the Teachers' Association of the State of New York, after an able discussion of the subject it was concluded that the system should be taught in the common schools and academies of the State. We understand that text books adapted to the system have been under preparation, and will be ready for use at the beginning of the next academic year. Several of the colleges also have added the metrical system to the ordinary subjects of examination for matriculation. If these plans are faithfully carried out, the final abolition of our present incongruous weights and measures is near at hand."

Would it not be well that our educational authorites should give this subject some consideration? It would be a sign of progress if our young Dominion take an early and decided step to prepare for the introduction of this system into Canada.

Preparing Oxygen.

We may call the attention of our readers to a process for preparing oxygen which is very simple and inexpensive. It was proposed some time ago, by Mr. Mallet, to take advantage of the well-known fact that subchloride of copper, when exposed to the air, absorbs a large quantity of oxygen, producing an oxychloride of the metal. The latter when gently heated, readily parts with the oxygen which it has absorbed, and returns to its original condition. Thus, by alternate exposure to the air and heating, it can be made to play the part of an effective separator of oxygen from the atmosphere. We will now give a few details of the new process.

Preparation of Subchloride of Copper.—This salt is prepared with moderate facility by digesting four parts of finely-divided metallic copper and five of the common black oxide of the metal in hydrochloric acid. Prolonged digestion is required in order to affect this object, together with the presence of a sufficient excess of acid. The whole is evaporated to dryness as quickly as possible, and the dry residue preserved for use.

Preparation of Oxygen.—The subchloride of copper, prepared as above, is very finely powdered and intimately mixed with half its weight or rather more, of fine white sand. A little water is then added, and the mixture well agitated in a large vessel. After a few hours it will have absorbed all the oxygen from the air which it is capable of doing: and, when required for use, the mixture should be placed in a suitable gas-generating vessel, and gentle heat applied. Oxygen is then steadily given off in considerable quantity and may be collected in the usual way.

The residue in the retort, when moistened with water and exposed to the air as before, absorbs a fresh quantity of the gas, which may be obtained by heating, and this succession continued for a considerable time.—*British Journal of Photography.*

The Suffocation of Fires.

One of the most notable instances of extinguishing a fire which could not be reached by water was that of a coal-mine in Scotland, in 1834. It had been burning thirty years, and baffled all efforts to extinguish it. Mr. Goldsworthy Gurney, who was distinguished for the application of the steam jet for ventilating mines, was asked if he could extinguish it. He undertook the work. He covered the openings of the mine, leaving only two holes, into one of which he drove, by the steam jet, the products of combustion from a coke fire, a mixture of impure carbonic acid and nitrogen. In about six weeks the fire was extinguished. The difficulty was chiefly in cooling the heated mass, so that when fresh air was admitted combustion could not recommence. This was effected by mixing the spray of water with the jet of suffocating gas. Well purified gases of this kind would suffocate fires in stores, without soiling the goods.—*American Artizan.*

Arbitration in the Building Trades.

The carpenters and builders of the Potteries and Newcastle have, instead of striking or locking out, adopted the sensible plan of submitting their difficulties to arbitration—one arbitrator chosen by each side, with Mr. Forbes, architect, as umpire. The result is a series of rules just issued. The working hours are to be 56½ hours per week, except in the winter months, when they will number 54½, at 6¼d; superior workmen to be rated; overtime to be reckoned 1¼ hour per hour till eight, and 1½ hour per hour afterwards. Within a mile, the workman is to walk in his own time; beyond a mile an hour per three miles, to be paid in going only; beyond three, a sum to be agreed. Disputes are to be settled by six masters, six men, and an umpire. Objections to a rule or rules are to be specified on the 31st December, by requisition of six men to six masters, or *vice versa*, and a settlement thereof to be effected before March 1st.—*Builder.*

How to Judge the Character of a Horse.

I offer the following suggestions, the result of my close observation and experience: If the color be light-sorrel or chesnut, his feet, legs and face white—these are marks of kindness. If he is broad and full between the eyes, he may be depended on as a horse of good sense, and capable of being trained to anything: as respects such horses, the more kindly you treat them the better you will be treated in return. Nor will a horse of this description stand a whip if well fed. If you want a safe horse, avoid one that is dish-faced. He may be so far gentle as not to scare, but he will have too much go-ahead in him to be safe with every body. If you want a fool, but a horse of great bottom, get a deep bay with not a white hair about him. If his face is a little dished so much the worse. Let no man ride such a horse that is not an expert rider; they are always tricky and unsafe.

If you want one that will never give out, never buy a large over-grown one. A black horse can not stand heat, a white one cold. If you want a gentle horse, get one with more or less white about the head, the more the better. Selections thus made are of great docility and gentleness.—*Country Gentleman.*

The Alexandra Orphanage.

The arangements for the infant orphanage, of which the foundation stone was recently laid by the Duchess of Sutherland, at Hornsey-rise, are very different from those existing in similar institutions, in England. There will be a large central building, comprising the schools, dining-hall, domestic offices, the laundry, etc. There will then be built, in pairs, separate houses, each to accommodate 25 infants, placed under the care of competent nurses, who will have the entire charge of them from their rising in the morning, until they retire to rest, with the exception of the time they are under instruction. These separate houses will be connected by a covered way with the central buildings, which in winter will be enclosed. To each house there will be a district play-ground for the twenty-five orphans.

The Cost of Artificial Light.

Prof. Edward Frankland has recently delivered a course of lectures before the Royal Institution of Great Britain, and from his sixth lecture we extract the following table. The prices in the original are given in shillings and pence, and these we have reduced to dollars and cents by assuming one penny as equal to three cents:—

COMPARATIVE COST *of the Light of* 20 *Sperm Candles, each burning for* 10 *hours, at the rate of* 120 *grains per hour.*

Wax	$2 59	Cannel Gas	$0 09
Spermaceti	2 40	Paraffin	1 38
Tallow	96	Paraffin Oil	18
Sperm Oil	66	Petroleum	23
Coal Gas	12½		

This table is based on the commercial rates of London. But the American prices are not materially different, and do not show any safe escape from the tyranny of the gas companies.—*Scientific American.*

Poultry Manure.

As has often been said, more care should be taken in economizing the manure of the poultry-house and hen-roost. Geyerlin says on this point:—In France, most eminent chemists have proved by analysis that poultry manure is a most valuable fertilizer, and yet, for want of a proper system in housing poultry, it has as yet not been render available to rural economy. The celebrated Vanquelin says that when the value of manures are considered in relation to the amount of azote they contain, the poultry manure is one of the most active; and when, as a means of comparison, the following manures are taken, in parts of 1000, it will be found that:

Horse Manure contains,	4.0	parts of azote
Guano as imported,	49.7	"
Guano when sifted of vegetables and stones,	53.9	"
Poultry Manure	83.0	"

Burning Tar for Caterpillars.

A friend of mine, a year or so since, discovered by accident, while burning coal tar, that the boiling, or burning of it under trees infested with caterpillars would kill the last one of them. The trees near the boiling or burning tar (I saw them myself) were literally covered with caterpillars, and every one fell and died under the trees. If the tar be put into a long handled frying pan, and set on fire, it could be carried from tree to tree, and kept under each tree until the desired end is accomplished. This hint to fruit growers should be sufficient.—I. I. HITE, *in Va. Farmer.*

Summary.

London, (England,) has a voluntary *Street Reform Society*, which "collects facts, expose abuses, agitate reforms, enforce and improve existing regulations, and take a general oversight of street arrangements, vehicles, traffic and sanitary matters;" an excellent institution for any city, town, or village.——Cryolite, the mineral from which the new metal *aluminium* is most easily reduced abounds in Greenland, which now supplies most of this metal to the arts.——Scientific chemists and experimenters, and all well informed sanitary officers now agree that saturated solutions of copperas, and carbolic acid, are at once the best and cheapest disinfectants that can be used against cholera.——A Yankee has invented a sheep shearing machine which operates just like a reaper or mower, and would mow a swath of wool an inch and a half wide. The motion is got by means of a little wind engine in the handle, which is to be driven by a force-pump or bellows forcing wind into it through a flexible tube.——M. Soret has proved the density of ozone to be one and a half times that of oxygen, by the test of diffusion, the relative velocities of which correspond to the theoretical calculation of the assumption of the above proportion; as well as by comparisons of volume, in which it is found that by converting ozone into oxygen, its volume is increased one half.——A mill was lately set on fire in Philadelphia, by the engineer attempting to temper a spring, by plunging it red hot into a can of lubricating oil.——The latest experiment in pisiculture has been the raising of the salmon in the river Derwent. Three years since the first batch of salmon ova arrived on those shores, having been transported sixteen thousand miles on ice. After this protracted journey the fish hatched from the ova, were turned out into the river, and now the inhabitants are rejoicing over a fine run of veritable salmon ——The artesian wells sunk five years ago at Smyrna, by English workmen, have been so much appreciated that the inhabitants have themselves since made numbers of them in the neighbourhood.——A gentleman of many years experience in Australia, states that gold has been found in fourteen different place in the Highlands of Scotland. He also found lead, copper, silver, and other ores.——The human voice, when speaking with clear articulation, and supplied with good lungs, will fill 400,000 cubic feet of air, provided they be enclosed in a proper manner, and the voice be placed and directed advantageously. The same voice singing can fill with equal facility 600,000 cubic feet.——The new Royal Albert Hall will be eight times the size of Westminister Hall——The Chief Secretary of Ireland, owns a fine ostrich, which recently laid an egg. The following telegram was sent to him by his steward: "My lord, as your Lordship is out of the country, I have procured the biggest goose I could find to sit on the ostrich's egg."——Hungary has adopted the decimal system of coinage.