THE JOURNAL

OF THE

# Board of Arts and Manufactures

FOR UPPER CANADA.

JUNE, 1867.

## PROVINCIAL EXHIBITION PRIZE LIST.

This number of the *Journal* contains the Prize List for the Arts and Manufactures department of the next Provincial Exhibition, to be held in the city of Kingston during the month of September of the present year.

Last year the Committee having charge of this department secured a great many improvements, both in the arrangement of prizes and classification of goods. In the Fine Arts classes especially was this observable. Previously, no distinction was made between original works and copies; and the terms "professional" and "amateur," as applied to artists, were indefinite, and generally so differently understood in their application, even by those who were without doubt professional artists, as to result in continual difficulties, and in numerous *protests* being made to the Association. The terms have now a published definite meaning, which cannot be misunderstood by exhibitors. This year further improvements have been made, by striking out the entire list of prizes for "professional copies," and reducing the number of prizes for "amateur originals." The Committee have thus been enabled to add a few prizes to the remaining divisions, and also slightly to increase the several amounts offered in prizes to both professionals and amateurs.

It is gratifying to the Committee to know that their efforts to improve this department meet with the full appreciation of artists; one of whom, in a recent communication to us, said, "I wish I could hope that the arrangements for the Fine Arts at Kingston would not fall short of yours at Toronto, which were in all respects excellent; the display being most creditable to the opportunities and circumstances of the Province." Another leading artist writes: "I must, at the risk of being thought a flatterer, say, that the Board of Arts has been the greatest boon to professionals in this new country," and expresses a hope that the Board may long continue to have the management of this department. We regret that the Board has not the means for more extended usefulness, not only in this but in the *Decorative* and *Industrial* arts.

It will be noticed that in the Prize List the Fine Arts have been separated into two classes. The number of entries, and the merits of the several productions, having progressed so rapidly within the past two or three years, have rendered this change necessary, so as to enable the Judges to complete their onerous duties either in proper time, or with satisfaction to themselves or the exhibitors. The first class now comprises all works in oil, statuary and photography; the second class all water colours, pencils, crayons, sepias, pen-and-ink sketches, &c. This change, we have no doubt, will give satisfaction.

It will be observed that the class heretofore termed "Decorative and Useful Arts," has been superseded by what is believed to be a more correct classification, its several sections having been distributed into classes with which they respectively the nearest assimilate. With so limited a number of classes, there will always be a difficulty in arranging many articles in the proper positions: the only alternative is to place them with things similar in materials or uses, or that will best come under the consideration of the same Committee of Judges. Thus, in the new class we have Designs, materials and workmanship in Building construction, and such other articles as might most fittingly be judged by a committee of architects and civil engineers, rather than by any of the other committees of Judges. In the various departments of wood, iron, leather and woollen manufactures, are severally placed the raw materials, furnishings and tools connected with the respective trades, so as to bring them under the same judges as the finished work. This arrangement, no doubt, tends to secure the most efficient judgment possible under the circumstances.

The Ladies' department, next to the Fine Arts, is always the most extensive in the Exhibition, and imposes a large amount of labour upon the lady Judges. This, it will be observed, is also now divided into two classes, the first embracing chiefly all kinds of needle-work, plain or fancy, and knitting, netting, tatting, &c. The second class includes all work in flowers, hair, moss, shells, cones, seeds, wax and worsted. This change will greatly facilitate the work of the Judges.

Other improvements will no doubt hereafter be introduced, as circumstances from year to year may demonstrate their necessity. In the mean time, we have no hesitation in saying that the present list is a very good one, and we trust that the competition induced by it may be in every way satisfactory.

## KINGSTON EXHIBITION BUILDINGS.

We had recently an oppurtunity, in company with the Council of the Agricultural Association and the Local Committee, of visiting the Exhibition Palace and Grounds at Kingston. *Unfortunately* the day of our visit was an exceedingly wet one, the rain pouring down during the whole time, and covering the grounds with a series of ponds or small lakes. *Fortunately*, on the other hand, the rain enabled us to see where and to what extent the present roofing of the Crystal Palace is capable of keeping out the wet, and protecting Exhibitor's goods. The building is in the form of a cross, the highest portion, or the Nave, is lofty, with a lean-to story of about one-third the width of the main portion all around the building. The vertical walls of the lean-to, and of the main portion of the Nave above the lean-to, are of ribbed glass; the roof of the lean-to is also glass, laid on with a lap at the ends same as is usually the case with roofs of Greenhouses. The roof of the higher portion of the Nave is covered with shingles. This latter roof was found to be in good condition, and without leaks, except at or around the cupola over the Fountain, and in some of the angles—the whole of which can be easily remedied. We wish we could say as much for the glass roof of the lean-to, but, unfortunately, the rain literally ran through the joints or laps of the glass, and we are satisfied that no patching or reputtying can entirely remedy this defect so as to make it secure. The glass roof also admits too much light, destroying the effect desirable in exhibiting goods. The only effectual remedy for this portion is to take off the glass and cover the lean-to with shingles; it would then be sure against leakage, and in the matter of light vastly improved—the vertical walls admitting all that would be desirable. In the wing to be devoted to the Fine Arts, unless the roof and walls of the lean-to are covered or lined with some opaque material, it will be impossible to show any picture to advantage. The lean-to roof being shingled, and the walls lined and coloured a maroon, or dull red, it would then be nearly if not quite equal to the Fine Arts Gallery erected in Toronto for the last Exhibition. We should think the glass and sashes of this roof might be sold so as to realize almost the amount required to replace them with shingles. We trust the Local Committee will see the desirability of making these improvements, so as to give confidence to Exhibitors that valuable Pictures and Manufactures will be properly protected from the weather, and at the same time be shown to advantage.

With these indicated improvements to the main building, and a temporary shed put up as in Toronto last year for heavy machinery and coarse Manufactures, this department would have sufficient accomodation; and the Building heretofore known as the Mechanical Hall could be exclusively appropriated to the Horticultural Department, and Agricultural grains, seeds and roots, for which it furnishes ample space and is well adapted. It would, however, be a great improvement to this Building if the Poultry sheds could be removed from the outside; for as now placed they obstruct more than one-half the light that should enter the windows of the lower storey, rendering it too dark for proper inspection of gooods placed there. This building is 168 ft. long, by 36 ft. wide, and is two stories high—the upper flat of which, by making a good outside staircase at the southern end would be admirably adapted for the entire Horticultural Department; the grains, seeds and roots taking the lower portion.

It was too wet to make any general inspection of the stabling and sheds for Horses and Cattle, but, seen at a little distance, they appeared to be in very good condition. Not being so immediately interested in this portion of the arrangements, we did not pay much attention to it; but as the Mayor and Council of the City of Kingston, have given their pledge to have every-thing sufficient provided in the way of necessary and safe accomodation, and as these Kingston gentlemen pride themselves in being "always up to the mark," we presume that Exhibitors may rest in confidence that all will be done that can reasonably be expected.

## THE BIRDS OF WESTERN CANADA.

The *Journal* for January contained a Catalogue of Birds known to inhabit Western Canada, as prepared for this Board by the Rev. Prof. Hincks, F. L. S., &c., of University College, Toronto, as a guide for making as complete a collection as possible for the Paris Exhibition. In the last number of the *Canadian Journal*, the Professor directs attention to this catalogue, and also to a "List of Birds observed near Hamilton, C. W., by Thomas McIlwraith, extracted from the Proceedings of the Essex Institute, vol. v., 1866."

As a slight typographical error occurred in printing our list, and as Mr. McIlwraith includes several species not included in *it*, we think it best to publish the Professor's remarks in full:

"We have here two catalogues of the birds of Western Canada: one as general as it could be made from the information within the author's reach; the other professedly local, and the expression of actual personal knowledge and observation, yet the latter reaches 241 species, including several not found in the more general list, which only numbers 271. It is much to be regretted that Mr. McIlwraith's list was not, like an earlier one, which he communicated to this journal, some years since, among the materials accessible in compiling Professor Hincks' list, which it was hoped might be a useful aid to lovers of ornithology, throughout the country. For their convenience, we will here give the names of the birds added by Mr. McIlwraith, which may be inserted in their places in the more general catalogue. But we must first notice the difficulty of comparing the two lists, from the different order in which the birds are placed, and the great difference in the names employed.

The writer of this article being the compiler of one list, has of course no idea of adding to its authority by any expression of approbation here. He performed a very humble labour, at the request of the Board of Arts and Manufactures, to assist in the public object of sending to the Paris Exhibition as good a set as the time would allow of being collected of the feathered inhabitants of Western Canada. He employed the arrangement and nomenclature to which he is accustomed, and which seemed to him most likely to be of general use. In immediate reference to Mr. McIlwraith's list, he adds now a few words of explanation. At the head of his own catalogue is a key to its arrangement. To assist comparison, he will here attempt to explain Dr. Baird's plan, which is followed by Mr. McIlwraith. Neither of the two, it will be observed, is that found in ornithological works. First, Dr. Baird begins with the birds of prey—our second order,—and with the family Vulturidæ—our third family in this order,—which, indeed, does not appear in our catalogue, as we learn for the first time from Mr. McIlwraith's present list, that Cathartes aura, the turkey-buzzard (his only vulture) visits Canada occasionally. We place the Eagles first, as the most powerful and specially Raptorial group; then the Falcons; then the Vultures, and last of all the Owls. There are also differences in the order of the sub-families. Dr. Baird, not only like Cuvier, puts Insessores, the perching birds, after the birds of prey, but also after the order Scansores, and not receiving Cuvier's Suborders of Insessores, he adopts a new set, which would mislead the student of ordinary ornithological works. We believe it comes very near the system explained by the editor of Orr & Co.'s English edition of Cuvier, in his additions to the text. Thus we have Humming-birds, Swifts, represented by our Chimney-swallow, Night-hawks, Kingfishers, and then the general body of perching birds, amidst which are introduced the Swallows. The remaining orders occur in the usual series: Gallinaceous birds, Waders, Swimmers. We cannot now criticise this system, or bring it into comparison with our own. We only wish to give the reader some aid in comparing the different lists. But the chief difficulty will be found in the names employed. Dr. Baird assumes that species must not be supposed to be common to Europe and America; hence Aquila chrysætos becomes A. Canadensis; Circus cyaneus, C. Hudsonius; Falco peregrinus, Falco anatum, &c. &c.; besides which, small sections, or subgenera, are all distinguished by generic names, increasing their number in a manner very trying to the memory, and which, in fact, nearly takes away the use of generic groups; besides all which, there are a few instances in which the decisions of Dr. Baird and Dr. George Gray, respecting the generic names proper to be adopted, differ. It is, then, scarcely to be wondered at that so large a proportion of our birds appear under different names, in lists derived from such different authorities. With great respect for Dr. Baird's scientific character and acquirements, we think a wise discretion is exercised in preferring Dr. Gray's names for our Canadian use. We know that some excellent practical ornithologists amongst us think that even he has carried sub-division too far; but few would be satisfied with the vague generic characters of earlier times, and it is desirable to follow some widely recognized authority. Looking around, we can find none better than Dr. George Gray.

We may now give the additions to our general list of the birds of Western Canada, derived from Mr. McIlwraith's latest Hamilton list:

Ord. Insessores. Subord. Dentirostres.
Fam. Laniidæ: 1. Myiobius Traillii. Traill's Fly-catcher.
Subord. Conirostres.
Fam. Sturnidæ: 2. Xanthornis varius. The orchard oriole.
Ord. Raptores. Fam. Aquilidæ.
3. Buteo Bairdii. Baird's buzzard.
4. Buteo elegans.
Fam. Vulturidæ.
5. Cathartes aura. The Turkey-buzzard.
Ord. Grallatores. Fam. Charadridæ.
6. Charadrius hiaticula. The piping plover.
Ord. Natatores. Fam. Laridæ.
7. Stercorarius pomarinus.
8. Hydrochelidon fissipes.
Fam. Anatidæ: 9. Anser frontalis.
Fam. Alcidæ: 10. Uria grylle.
11. Uria Troile.

Of these eleven species, Xanthornis varius was known to us as Canadian, but accidentally omitted We hesitated about the two species of Uria, but did not consider that we had certain evidence. Both species of Buteo, and the Anser, we still regard as uncertain as to their being good species.

We add here, that in our list Ibis falcinellus should have been I. guarauna, which is equivalent with I. Ordii, of Mr. McIlwraith's list. Phaleropidæ should have been made a family, and Alcidæ occurs twice, being in the first instance a misprint for Colymbidæ Divers. We shall be glad to record any further additions to the list of our native birds. Mr. McIlwraith deserves the gratitude of all Canadian ornithologists."

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Hard rubber type is said to be manufactured at Dalston, England, at one-third the cost of metalic type and of equal durability.

Tannin is present in 140 plants, caoutchouc in 96, and gutta-percha in 7.

A coating of three parts lard and one part resin applied to farm tools of iron or steel will effectually prevent rust.

# PRIZE LIST FOR 1867.

## ARTS AND MANUFACTURES DEPARTMENT.

[No Exhibitor will be awarded more than one prize in the same section of any class in this Department.]

*(COMPETITION OPEN TO THE WORLD.)*

### CLASSIFICATION.

Class 35—Cabinet Ware, and other Wood and Hair Manufactures.
" 36—Carriages and Sleighs, and parts thereof.
" 37—Chemical Manufactures and Preparations.
" 38—Drawings, Architectural and Mechanical; Engraving; Building Materials and Constructions; Pottery, &c., &c.
" 39—Fine Arts:—Oil Paintings, Statuary, and Photography.
" 40—Fine Arts:—Water Colors, Pencils, Crayons, &c.
" 41—Groceries and Provisions.
" 42—Ladies' Work: — Braiding, Embroidery, Needle Work, &c.
Class 43—Ladies' Work:—Flower, Hair, Moss, Wax, and Worsted Work, &c.
" 44—Machinery, Castings, and Tools.
" 45—Metal Work (miscellaneous), incl. Stoves.
" 46—Musical Instruments.
" 47—Natural History.
" 48—Paper, Printing, Penmanship, Bookbinding and Type.
" 49—Saddle, Engine Hose, Trunkmakers' Work, Leather, &c.
" 50—Shoe and Bootmakers' Work, Tools, and Leather.
" 51—Woollen, Flax, and Cotton Goods; Furs, and Wearing Apparel.

### Class 35—Cabinet Ware, and other Wood and Hair Manufactures.

| Sect. | *Cabinet Ware.* | $ c. |
|---|---|---|
| 1. | Bedroom Furniture, set of | 15 00 |
| | 2nd do | 8 00 |
| 2. | Carving in Wood, decorative | 10 00 |
| | 2nd do | 6 00 |
| 3. | Centre Table | 8 00 |
| | 2nd do. | 4 00 |
| 4. | Drawing-room Sofa | 8 00 |
| | 2nd do. | 4 00 |
| 5. | Drawing-room Chairs, set of | 8 00 |
| | 2nd do | 4 00 |
| 6. | Dining-room Furniture, set of | 15 00 |
| | 2nd do | 8 00 |
| 7. | Inlaid Work, of Canadian Woods | 8 00 |
| | 2nd do | 4 00 |
| 8. | Side Board | 8 00 |
| | 2nd do | 4 00 |
| 9. | Wardrobe | 6 00 |
| | 2nd do | 3 00 |
| | *Miscellaneous.* | |
| 10. | Brushes, an assortment | 6 00 |
| | 2nd do | 4 00 |
| 11. | Coopers' Work | 6 00 |
| | 2nd do | 8 00 |
| 12. | Corn Brooms, 1 doz. | 2 00 |
| | 2nd do. | 1 00 |
| 13. | Handles for Tools of Carpenters, Blacksmiths, Gunsmiths, Watchmakers, &c., collection of | 8 00 |
| | 2nd do | 4 00 |
| 14. | Joiners' Work. assortment of | 10 00 |
| | 2nd do | 6 00 |
| 15. | Machine-wrought Moulding and Flooring, 100, feet of each | 6 00 |
| | 2nd do | 8 00 |
| 16. | Turning in Wood, collection of specimens. | 6 00 |
| | 2nd do | 8 00 |
| 17. | Turned Hollow Wooden Ware, assortment of | 6 00 |
| | 2nd do | 8 00 |
| 18. | Veneers from Canadian Woods, undressed. | 8 00 |
| | 2nd do | 4 00 |
| 19. | Veneers from Canadian woods, dressed and polished | 10 00 |
| | 2nd do | 6 00 |
| 20. | Wash Tubs and Pails, factory made, three of each | 4 00 |
| | 2nd do | 2 00 |
| 21. | Willow Ware, six specimens | 4 00 |
| | 2nd do | 2 00 |
| 22. | Extra entries | |

### Class 36—Carriages and Sleighs, and parts thereof.

| Sect. | | $ c. |
|---|---|---|
| 1. | Axle, wrought-iron | 4 00 |
| | 2nd do. | 2 00 |
| 2. | Bent Shafts, half.a-dozen | 3 00 |
| | 2nd do | 2 00 |
| 3. | Bows, for Carriage Tops, two sets | 3 00 |
| | 2nd do | 2 00 |
| 4. | Buggy, double-seated | 10 00 |
| | 2nd do | 6 00 |
| 5. | Buggy, single-seated | 8 00 |
| | 2nd do. | 5 00 |
| 6. | Buggy, trotting | 6 00 |
| | 2nd do. | 4 00 |
| 7. | Carriage, two-horse, pleasure | 18 00 |
| | 2nd do | 12 00 |
| 8. | Carriage, one-horse, pleasure | 12 00 |
| | 2nd do | 8 00 |
| 9. | Carriage, Child's | 4 00 |
| | 2nd do | 2 00 |
| 10. | Carriage Rims and Felloes, and machine-made Spokes, the best assortment | 7 00 |
| | 2nd do do | 4 00 |
| 11. | Dog Cart | 7 00 |
| | 2nd do | 4 00 |
| 12. | Express Waggon | 7 00 |
| | 2nd do | 4 00 |
| 13. | Sleigh, two-horse, pleasure | 15 00 |
| | 2nd do | 8 00 |
| 14. | Sleigh, one-horse, pleasure | 10 00 |
| | 2nd do | 6 00 |
| 15. | Springs, one set Steel Carriage | 5 00 |
| | 2nd do | 3 00 |

| Sect. | | $ c. |
|---|---|---|
| 16. | Sulky, trotting | 5 00 |
| | 2nd do | 3 00 |
| 17. | Wheels, one pair of Carriage, unpainted | 4 00 |
| | 2nd do do | 2 00 |
| 18. | Extra entries. | |

### Class 37—Chemical Manufactures and Preparations.

| Sect. | | $ c. |
|---|---|---|
| 1. | Colours, assortment, in Oil, Pulp and Powder | 6 00 |
| | 2nd do | 4 00 |
| 2. | Essential Oils, assortment of | 6 00 |
| | 2nd do | 4 00 |
| 3. | Glue, 14 lbs | 3 00 |
| | 2nd do | 2 00 |
| 4. | Medicinal Herbs, Roots and Plants, native growth | 12 00 |
| | 2nd do | 7 00 |
| 5. | Oils—Linseed | 6 00 |
| | 2nd do | 4 00 |
| 6. | Oil, Neat's foot, half-gallon | 2 00 |
| | 2nd do | 1 00 |
| 7. | Printing Inks, an assortment | 6 00 |
| | 2nd do | 3 00 |
| 8. | Pitch, 30 lbs | 5 00 |
| | 2nd do | 3 00 |
| 9. | Resin, 30 lbs | 5 00 |
| | 2nd do | 3 00 |
| 10. | Tar, 1 gallon | 3 00 |
| | 2nd do | 2 00 |
| 11. | Turpentine, Spirits of, 1 gallon | 5 00 |
| | 2nd do | 3 00 |
| 12. | Extra entries. | |

### Class 38—Drawings—Architectural and Mechanical; Engravings; Building Materials and Constructions; Pottery, &c.

| Sect. | | $ c. |
|---|---|---|
| 1. | Bricks, pressed, 1 doz | 2 00 |
| | 2nd do | 1 00 |
| 2. | Bricks, Kiln burnt, 1 doz | 2 00 |
| | 2nd do | 1 00 |
| 3. | Cements, best assortment, for building purposes | 6 00 |
| | 2nd do | 4 00 |
| 4. | Drawing of machinery in perspective | 6 00 |
| | 2nd do do | 4 00 |
| 5. | Decorative house painting | 6 00 |
| | 2nd do | 4 00 |
| 6. | Engraving on Wood, with proof | 6 00 |
| | 2nd do | 4 00 |
| 7. | Engraving on Copper, with proof | 6 00 |
| | 2nd do | 4 00 |
| 8. | Filterer, for water | 3 00 |
| | 2nd do | 2 00 |
| 9. | Geometrical drawings of engine or mill work, coloured | 6 00 |
| | 2nd do do | 4 00 |
| 10. | Iron-castings for building construction | 8 00 |
| | 2nd do do | 6 00 |
| 11. | Lithographic Drawing, plain | 6 00 |
| | 2nd do | 4 00 |
| 12. | Lithographic Drawing, colours printed | 6 00 |
| | 2nd do do | 4 00 |
| 13. | Lithography, commercial work, in black or colors | 6 00 |
| | 2nd do do | 4 00 |
| 14. | Mantelpiece in marble | 8 00 |
| | 2nd do | 5 00 |
| 15. | Mathematical, Philosophical and Surveyors' Instruments, collection of | 15 00 |
| | 2nd do do | 10 00 |
| 16. | Modelling in Plaster | 6 00 |
| | 2nd do | 4 00 |
| 17. | Monumental Headstone | 6 00 |
| | 2nd do | 4 00 |
| 18. | Picture Frame, ornamented, gilt | 8 00 |
| | 2nd do do | 5 00 |
| 19. | Pottery, an assortment | 6 00 |
| | 2nd do | 4 00 |
| 20. | Sewerage Pipes, Stoneware, assortment of sizes | 8 00 |
| | 2nd do | 5 00 |
| 21. | Sign Writing | 5 00 |
| | 2nd do | 3 00 |
| 22. | Slates for roofing | 6 00 |
| | 2nd do | 4 00 |
| 23. | Stained Glass, collection of specimens | 12 00 |
| | 2nd do do | 8 00 |
| 24. | Stench Traps for drains, stoneware | 3 00 |
| | 2nd do do | 2 00 |
| 25. | Stoneware, an assortment | 8 00 |
| | 2nd do do | 5 00 |
| 26. | Stone, native, for building purposes | 10 00 |
| | 2nd do do | 7 00 |
| 27. | Stone-Mason's work, in building construction | 8 00 |
| | 2nd do | 5 00 |
| 28. | Extra entries | |

### Class 39—Fine Arts.

*Professional* List—Oil* (Originals.†)

All views from Nature in any section of this or next class, to have attached the name of locality, or other necessary particulars, where view was obtained.

| Sect. | | $ c. |
|---|---|---|
| 1. | Any subject | 15 00 |
| | 2nd do | 10 00 |
| 2. | Animals, from life | 12 00 |
| | 2nd do | 8 00 |
| 3. | Flowers, grouped or single | 10 00 |
| | 2nd do | 6 00 |
| 4. | Historical or general Figure subject | 12 00 |
| | 2nd do do | 8 00 |
| 5. | Landscape, Canadian subject | 12 00 |
| | 2nd do | 8 00 |
| | 3rd do | 5 00 |
| 6. | Landscape or Marine Painting, not Canadian subject | 10 00 |
| | 2nd do | 6 00 |
| 7. | Marine Painting, Canadian subject | 12 00 |
| | 2nd do do | 8 00 |
| 8. | Portrait | 10 00 |
| | 2nd do | 7 00 |
| | 3rd do | 4 00 |
| 9. | Still Life | 10 00 |
| | 2nd do | 6 00 |

*Amateur* List—Oil* (Originals. †)

| Sect. | | $ c. |
|---|---|---|
| 10. | Animals from life | 8 00 |
| | 2nd do | 5 00 |
| 11. | Historical or general figure subject | 8 00 |
| | 2nd do do | 5 00 |

*Professional Artists are to be understood as those who paint or teach for a livelihood, or as a matter of profit, or who habitually sell or offer for sale their productions; or who have at any previous time habitually painted or taught for a livelihood or for profit.

† Evidence of originality to be furnished by the exhibitor, whenever required by the Judges or the Committee.

* Amateur artists are to be understood as those who *do not* paint or teach for a livelihood, or for profit, or habitually sell or offer for sale their productions; and who have not at any time heretofore done so.

† Evidence of originality to be furnished by the exhibitor, whenever required by the judges or the committee.

| | | $ c. |
|---|---|---|
| 12. | Landscape or Marine View, Canadian subject | 8 00 |
| | 2nd do | 5 00 |
| 13. | Portrait | 8 00 |
| | 2nd do | 5 00 |

*Amateur List—Oil* (Copies.)

| | | |
|---|---|---|
| 14. | Animals, grouped or single | 7 00 |
| | 2nd do | 4 00 |
| 15. | Flowers, grouped or single | 7 00 |
| | 2nd do | 4 00 |
| 16. | Historical or general figure subject | 7 00 |
| | 2nd do do | 4 00 |
| 17. | Landscape | 7 00 |
| | 2nd do | 4 00 |
| 18. | Marine view | 7 00 |
| | 2nd do | 4 00 |
| 19. | Portrait | 7 00 |
| | 2nd do | 4 00 |
| 20. | Still life | 7 00 |
| | 2nd do | 4 00 |

*Professional or Amateur—Figure Subjects* (Originals.)

| | | |
|---|---|---|
| 21, | Carving in wood | 12 00 |
| | 2nd do | 8 00 |
| 22. | Carving in stone, in relief | 12 00 |
| | 2nd do do | 8 00 |
| 23. | Model, in clay or wax, with plaster cast | 10 00 |
| | 2nd do do | 6 00 |
| 24. | Statue or group, in stone | 15 00 |
| | 2nd do | 10 00 |

*Photography.**

| | | |
|---|---|---|
| 25. | Ambrotypes, collection of | 6 00 |
| | 2nd do | 4 00 |
| 26. | Photograph portraits, collection of, in duplicate, one set coloured | 10 00 |
| | 2nd do | 6 00 |
| 27. | Photograph portraits, collection of, plain | 8 00 |
| | 2nd do do | 5 00 |
| 28. | Photograph landscapes and views, collection of | 8 00 |
| | 2nd do | 5 00 |
| 29. | Photograph portrait, finished in oil | 8 00 |
| | 2nd do do | 5 00 |
| 30. | Photograph portrait, finished in Indian Ink | 6 00 |
| | 2nd do do | 4 00 |
| 31. | Photograph portrait, finished in water col's | 6 00 |
| | 2nd do do | 4 00 |
| 32. | Extra entries | |

**Class 40—Fine Arts.**

*Professional List*—(Originals).

(Definitions same as in previous class.)

*Water Colours.*

| | | |
|---|---|---|
| 1. | Any subject | $10 00 |
| | 2nd do | 8 00 |
| 2. | Animals from life | 8 00 |
| | 2nd do | 6 00 |
| 3. | Flowers, grouped or single | 7 00 |
| | 2nd do | 5 00 |
| 4. | Historical or general figure subject | 8 00 |
| | 2nd do | 6 00 |
| 5. | Landscape, Canadian subject | 8 00 |
| | 2nd do | 6 00 |
| | 3rd do | 4 00 |
| 6. | Landscape or Marine View, not Canadian subject | 8 00 |
| | 2nd do. | 6 00 |

* In coloured photographs the name of the artist who colours, as well as the name of the photographer, to be attached to all specimens.

| | | $ c. |
|---|---|---|
| 7. | Marine View, Canadian subject | 8 00 |
| | 2nd do | 6 00 |
| | 3rd do | 4 00 |
| 8. | Portrait | 7 00 |
| | 2nd do | 5 00 |
| 9. | Still life | 7 00 |
| | 2nd do | 5 00 |

*Pencils, Crayons, &c.*

| | | |
|---|---|---|
| 10. | Crayon, Coloured | 6 00 |
| | 2nd do | 4 00 |
| 11. | Crayon, plain | 6 00 |
| | 2nd do. | 4 00 |
| 12. | Crayon or Pencil Portrait | 6 00 |
| | 2nd do | 4 00 |
| 13. | Pen and Ink Sketch | 6 00 |
| | 2nd do | 4 00 |
| 14. | Pencil Drawing | 6 00 |
| | 2nd do | 4 00 |
| 15. | Sepia Drawing | 6 00 |
| | 3nd do | 4 00 |

*Amateur List* (Originals.)

(Definitions same as in previous Class.)

*Water Colours.*

| | | |
|---|---|---|
| 16. | Animals from life | 7 00 |
| | 2nd do. | 5 00 |
| 17. | Flowers, grouped or single | 6 00 |
| | 2nd do | 4 00 |
| 18. | Historical or general figure subject | 7 00 |
| | 2nd do do | 5 00 |
| 19. | Landscape or Marine View, Canadian subject | 7 00 |
| | 2nd do | 5 00 |

*Pencils, Crayons, &c.*

| | | |
|---|---|---|
| 20. | Crayon, coloured | 5 00 |
| | 2nd. do | 3 00 |
| 21. | Crayon, plain | 5 00 |
| | 2nd do | 3 00 |
| 22. | Crayon or Pencil Portrait | 5 00 |
| | 2nd do | 3 00 |
| 23. | Pencil Drawing | 5 00 |
| | 2nd do | 3 00 |
| 24. | Pen and Ink Sketch | 5 00 |
| | 2nd do | 3 00 |
| 25. | Sepia | 5 00 |
| | 2nd do | 3 00 |

*Amateur List* (Copies.)

*Water Colours..*

| | | |
|---|---|---|
| 26. | Animals, grouped or single | 5 00 |
| | 2nd do. | 3 00 |
| 27. | Flowers, grouped or single | 5 00 |
| | 2nd do | 3 00 |
| 28. | Historical or general figure subject | 5 00 |
| | 2nd do | 3 00 |
| 29. | Landscape | 5 00 |
| | 2nd do | 3 00 |
| 30. | Marine View | 5 00 |
| | 2nd do | 3 00 |
| 31. | Still life | 5 00 |
| | 2nd do | 3 00 |

*Pencils, Crayons, &c.*

| | | |
|---|---|---|
| 32. | Crayon, coloured | 4 00 |
| | 2nd do | 2 00 |
| 33. | Crayon, plain | 4 00 |
| | 2nd do | 2 00 |
| 34. | Crayon or Pencil Portrait | 4 00 |
| | 2nd do | 2 00 |
| 35. | Pen and Ink Sketch | 4 00 |
| | 2nd do | 2 00 |

| | | $ c. |
|---|---|---|
| 36. | Pencil Drawing | 4 00 |
| | 2nd do | 2 00 |
| 37. | Sepia | 4 00 |
| | 2nd do | 2 00 |
| 38. | Extra entries | |

**Class 41—Groceries and Provisions.**

| Sect. | | $ c. |
|---|---|---|
| 1. | Barley, Pearl, 25 lbs | 3 00 |
| | 2nd do | 2 00 |
| 2. | Barley, Pot, 25 lbs | 3 00 |
| | 2nd do | 2 00 |
| 3. | Bottled Fruits, an assortment, manufactured for sale | 6 00 |
| | 2nd do | 4 00 |
| 4. | Bottled Pickles, an assortment, manufactured for sale | 6 00 |
| | 2nd do | 4 00 |
| 5. | Buckwheat Flour, 25 lbs | 3 00 |
| | 2nd do | 2 00 |
| 6. | Chickory, 20 lbs., prepared | 3 00 |
| | 2nd do | 2 00 |
| 7. | Indian Corn Meal, 25 lbs | 3 00 |
| | 2nd do | 2 00 |
| 8. | Oatmeal, 25 lbs | 3 00 |
| | 2nd do | 2 00 |
| 9. | Sauces for table use, an assortment, manufactured for sale | 6 00 |
| | 2nd do | 4 00 |
| 10. | Soap, one box of common | 4 00 |
| | 2nd do | 3 00 |
| 11. | Soaps, collection of assorted fancy | 6 00 |
| | 2nd do do | 4 00 |
| 12. | Starch, 12 lbs., Corn | 2 00 |
| | 2nd do | 1 00 |
| 13. | Starch, 12 lbs., Flour | 2 00 |
| | 2nd do | 1 00 |
| 14. | Starch, 12 lbs., Potato | 2 00 |
| | 2nd do | 1 00 |
| 15. | Sugar, 20 lbs., Sorghum | 5 00 |
| | 2nd do | 3 00 |
| 16. | Sugar, 1 loaf refined | 5 00 |
| | 2nd do | 3 00 |
| 17. | Tobacco, 14 lbs., Canadian manufacture | 5 00 |
| | 2nd do do | 3 00 |
| 18. | Wheat Flour, 50 lbs | 7 00 |
| | 2nd do | 5 00 |
| 19. | Extra entries | |

**Class 42—Ladies' Work.***

*Braiding, Embroidery, Needle-work, &c.*

| Sect. | | $ c. |
|---|---|---|
| 1. | Bead Work | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 2. | Braiding | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 3. | Crotchet Work | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 4. | Embroidery in Muslin | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 5. | Embroidery in Cotton | 3 00 |
| | 2nd do | 2 00 |
| | 3rd ds | 1 00 |
| 6. | Embroidery in Silk | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 7. | Embroidery in Worsted | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 8. | Guipure Work | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 9. | Knitting | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 10. | Lace Work | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 11. | Machine Sewing, Family | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 12. | Needle Work, Ornamental | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 13. | Netting, Fancy | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 14. | Plait for bonnets or hats, of Canadian straw | 3 00 |
| | 2nd do do | 2 00 |
| | 3rd do do | 1 00 |
| 15. | Quilt, Silk | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 16. | Quilt, Patch-work | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 17. | Shirt, Gentleman's | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 18. | Tatting | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 19. | Indian Bead Work | |
| 20. | Extra entries | |

* All articles competing in this Class must be strictly the production of Ladies, and entered in the names of such; and no prize will be awarded but in conformity with this rule.

**Class 43—Ladies' Work.***

*Flower, Hair, Moss, Wax and Worsted-work, &c.*

| Sect. | | $ c. |
|---|---|---|
| 1. | Cone Work | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 2. | Flowers, Silver Wire | 2 00 |
| | 2nd do | 1 00 |
| | 3rd do | 0 50 |
| 3. | Flowers, Feather | 2 00 |
| | 2nd do | 1 00 |
| | 3rd do | 0 50 |
| 4. | Gloves, 3 pairs | 2 00 |
| | 2nd do | 1 00 |
| | 3rd do | 0 50 |
| 5. | Hair Work | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 6. | Mittens, 2 pairs Woollen | 2 00 |
| | 2nd do | 1 00 |
| | 3rd do | 0 50 |
| 7. | Moss Picture | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |

* All articles competing in this Class must be strictly the production of ladies, and entered in the names of such; and no prizes will be awarded but in conformity with this rule.

| | | $ c. |
|---|---|---|
| 8. | Moss Work | 2 00 |
| | 2nd do | 1 00 |
| | 3rd do | 0 50 |
| 9. | Shell Work | 2 00 |
| | 2nd do | 1 00 |
| | 3rd do | 0 50 |
| 10. | Socks, 3 pairs Woollen | 2 00 |
| | 2nd do | 1 00 |
| | 3rd do | 0 50 |
| 11. | Stockings, 3 pairs Woollen | 2 00 |
| | 2nd do | 1 00 |
| | 3rd do | 0 50 |
| 12. | Wax Flowers | 5 00 |
| | 2nd do | 3 00 |
| | 3rd do | 1 50 |
| 13. | Wax Fruit | 5 00 |
| | 2nd do | 3 00 |
| | 3rd do | 1 50 |
| 14. | Wax Shells, a collection of | 5 00 |
| | 2nd do | 3 00 |
| | 3rd do | 1 50 |
| 15. | Worsted Work | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 16. | Worsted Work, Fancy, for framing | 3 00 |
| | 2nd do do | 2 00 |
| | 3rd do do | 1 00 |
| 17. | Worsted Work, Raised | 3 00 |
| | 2nd do | 2 00 |
| | 3rd do | 1 00 |
| 18. | Wreath, Flower | 2 00 |
| | 2nd do | 1 00 |
| | 3rd do | 0 50 |
| 19. | Wreath, Seed | 2 00 |
| | 2nd do | 1 00 |
| | 3rd do | 0 50 |
| 20. | Extra entries. | |

### Class 44—Machinery, Castings, and Tools.

| Sect. | | $ c. |
|---|---|---|
| 1. | Blacksmith's Bellows | 6 00 |
| | 2nd do | 4 00 |
| 2. | Castings for General Machinery | 15 00 |
| | 2nd do | 8 00 |
| 3. | Cast Wheeel, Spur or Bevel, not less than 50 lbs. weight | 8 00 |
| | 2nd do do | 5 00 |
| 4. | Castings for Railways, Railroad Cars, and Locomotives, assortment of | 20 00 |
| | 2nd do | 12 00 |
| 5. | Cordwood Sawing Machine, horse-power | 10 00 |
| | 2nd do do | 6 00 |
| 6. | Cordwood Sawing Machine, hand-power | 8 00 |
| | 2nd do do | 5 00 |
| 7. | Hand-Power Weaving Loom | 6 00 |
| | 2nd do | 4 00 |
| 8. | Edge Tools, an assortment | 20 00 |
| | 2nd do | 12 00 |
| 9. | Engine, Steam, stationary, of one to four-horse power, in operation | 15 00 |
| | 2nd do | 10 00 |
| 10. | Engine, Steam, stationary, five-horse power and upwards, in operation | 25 00 |
| | 2nd do | 15 00 |
| 11. | Fire Engine, Steam, in operation on the ground | 25 00 |
| | 2nd do | 15 00 |
| 12. | Fire Engine, hand-power | 15 00 |
| | 2nd do | 10 00 |
| 13. | Machines for Planing and Drilling Metals. | 12 00 |
| | 2nd do do | 8 00 |
| 14. | Pump, in Metal | 5 00 |
| | 2nd do | 3 00 |
| 15. | Refrigerator | 5 00 |
| | 2nd do | 3 00 |
| 16. | Saws, an assortment | 10 00 |
| | 2nd do | 6 00 |
| 17. | Saw-mill, Steam, in operation | 20 00 |
| | 2nd do do | 12 00 |
| 18. | Sash and Moulding Machines | 12 00 |
| | 2nd do do | 8 00 |
| 19. | Sugar and Coffee Mills | 6 00 |
| | 2nd do | 4 00 |
| 20. | Scales, Platform | 5 00 |
| | 2nd do | 3 00 |
| 21. | Scales, Counter | 3 00 |
| | 2nd do | 2 00 |
| 22. | Shingle-splting Machine | 6 00 |
| | 2nd do | 4 00 |
| 23. | Skates, an assortment of | 5 00 |
| | 2nd do | 3 00 |
| 24. | Tools for Working in Metals, assortment of. | 12 00 |
| | 2nd do do | 7 00 |
| 25. | Turning Lathe | 8 00 |
| | 2nd do | 5 00 |
| 26. | Valves and Gearing, for Working Steam Expansively, either in model or otherwise; principle of working to be the point of competition | 12 00 |
| | 2nd do. | 7 00 |
| 27. | Extra entries | |

### Class 45—Metal Work (Miscellaneous) including Stoves.

| Sect. | *Miscellaneous* | $ c. |
|---|---|---|
| 1. | Coppersmiths' Work, an assortment | 8 00 |
| | 2nd do do | 5 00 |
| 2. | Engineers' Brass Work, an assortment | 8 00 |
| | 2nd do do | 5 00 |
| 3. | Fire Arms, an assortment | 8 00 |
| | 2nd do | 5 00 |
| 4. | Files, collection of cast Steel | 3 00 |
| | 2nd do | 2 00 |
| 5. | Fire-proof office Safe | 8 00 |
| | 2nd do | 5 00 |
| 6. | Gas Fixtures, an assortment | 7 00 |
| | 2nd do | 4 00 |
| 7. | Goldsmiths' Work | 6 00 |
| | 2nd do | 4 00 |
| 8. | Gold and Silver leaf | 4 00 |
| | 2nd do | 3 00 |
| 9. | Iron Fencing and Gate, ornamental | 8 00 |
| | 2nd do do | 5 00 |
| 10. | Iron Work from the hammer, ornamental | 7 00 |
| | 2nd do do | 4 00 |
| 11. | Iron Work, ornamental cast | 7 00 |
| | 2nd do | 4 00 |
| 12. | Lock—Combination Bank Lock | 8 00 |
| | 2nd do do | 5 00 |
| 13. | Locksmiths' Work, an assortment | 8 00 |
| | 2nd do do | 5 00 |
| 14. | Malleable Hardware Manufactures an assortment | 8 00 |
| | 2nd do | 5 00 |
| 15. | Nails, 20 lbs., pressed | 6 00 |
| | 2nd do | 4 00 |
| 16. | Nails, 20 lbs., cut | 6 00 |
| | 2nd do | 4 00 |
| 17. | Plumbers' Work, an assortment | 8 00 |
| | 2nd do do | 5 00 |
| 18. | Screws and Bolts, an assortment | 6 00 |
| | 2nd do do | 4 00 |

| | | $ c. |
|---|---|---|
| 19. | Sheet Brass Work, an assortment | 8 00 |
| | 2nd do do | 5 00 |
| 20. | Silversmiths' Work | 6 00 |
| | 2nd do | 4 00 |
| 21. | Tinsmiths' Work, an assortment | 6 00 |
| | 2nd do do | 4 00 |
| 22. | Tinsmiths' Lacquered Work, an assortment | 6 00 |
| | 2nd do do | 4 00 |
| 23. | Wire Work, an assortment | 6 00 |
| | 2nd do | 4 00 |
| | *Stoves.* | |
| 24. | Cooking Stove for wood | 6 00 |
| | 2nd do | 4 00 |
| 25. | Cooking Stove for Coal | 6 00 |
| | 2nd do | 4 00 |
| 26. | Furniture for Cooking Stove, one set | 5 00 |
| | 2nd do do | 3 00 |
| 27. | Hall Stove, for wood | 5 00 |
| | 2nd do | 3 00 |
| 28. | Hall Stove, for coal | 5 00 |
| | 2nd do | 3 00 |
| 29. | Parlour Stove, for wood | 5 00 |
| | 2nd do | 3 00 |
| 30. | Parlour Stove, for coal | 5 00 |
| | 2nd do | 3 00 |
| 31. | Parlour Grate | 5 00 |
| | 2nd do | 3 00 |
| 32. | Parlour Fire-place complete, including setting of grate so as to economise fuel, and arrangement for ventilating room | 10 00 |
| | 2nd do do | 6 00 |
| 33. | Extra entries | |

**Class 46—Musical Instruments.**

| Sect. | | $ c. |
|---|---|---|
| 1. | Harmonium | 12 00 |
| | 2nd do | 8 00 |
| 2, | Melodeon | 6 00 |
| | 2nd do | 4 00 |
| 3. | Organ, Church | 30 00 |
| | 2nd do | 20 00 |
| 4. | Piano, Grand | 20 00 |
| | 2dd do | 12 00 |
| 5. | Piano, Square | 15 00 |
| | 2nd do | 10 00 |
| 6. | Piano, Cottage | 10 00 |
| | 2nd do | 6 00 |
| 7. | Piano of any kind | 15 00 |
| 8. | Extra entries | |

**Class 47—Natural History.**

| Sect. | | $ c. |
|---|---|---|
| 1. | BIRDS—Collection of Native, Stuffed, classified, and common and technical names attached | 8 00 |
| | 2nd do | 6 00 |
| 2. | FISHES—Collection of Native, stuffed or preserved in spirits, and common and technical names attached | 8 00 |
| | 2nd do | 6 00 |
| 3. | INSECTS—Collection of Native, classified, and common and technical names attached | 8 00 |
| | 2nd do | 6 00 |
| 4. | MAMMALIA AND REPTILES—Collection of Native, stuffed or preserved in spirits, classified, and common and technical names attached | 8 00 |
| | 2nd do | 6 00 |
| 5. | MINERALS—Collection of Native, named and classified | 8 00 |
| | 2nd do | 6 00 |
| 6. | PLANTS—Collection of Native, arranged in their natural families, and named | 8 00 |
| | 2nd do do | 6 00 |
| 7. | STUFFED BIRDS AND ANIMALS of any country, collection of | 8 00 |
| | 2nd do | 6 00 |
| 8. | Extra entries | |

**Class 48—Paper, Printing, Penmanship, Bookbinding, and Type.**

| Sect. | | $ c. |
|---|---|---|
| 1. | Bookbinding, (blank-book) assortment of | 5 00 |
| | 2nd do do | 3 00 |
| 2. | Bookbinding (letter-press) assortment of | 5 00 |
| | 2nd do do | 3 00 |
| 3. | Letter-press Printing, plain | 5 00 |
| | 2nd do | 3 00 |
| 4. | Letter-press Printing, ornamental | 5 00 |
| | 2nd do | 3 00 |
| 5. | Letter-press, Printing—Posters, plain and ornamental | 5 00 |
| | 2nd do | 3 00 |
| 6. | Millboard and Strawboard, assortment | 5 00 |
| | 2nd do do | 3 00 |
| 7. | Paper Hangings (Canadian Paper) one dozen rolls, assorted | 6 00 |
| | 2nd do | 4 00 |
| 8. | Papers—Printing, Writing, and Wrapping, one ream of each | 6 00 |
| | 2nd do | 4 00 |
| 9. | Papers—Blotting and Coloured, one ream of each | 6 00 |
| | 2nd do | 4 00 |
| 10. | Penmanship, Business Hand without flourishes | 4 00 |
| | 2nd do do | 2 00 |
| 11. | Penmanship, ornamental (not pen and ink pictures) | 4 00 |
| | 2nd do do | 2 00 |
| 12. | Pocket-books Wallets, &c., an assortment | 5 00 |
| | 2nd do do | 3 00 |
| 13. | Extra entries | |

**Class 49—Saddle, Engine Hose, Trunk-makers' work, Leather, &c.**

| Sect. | *Saddlery, &c.,* | $ c. |
|---|---|---|
| 1. | Collars, an assortment | 5 00 |
| | 2nd do | 3 00 |
| 2. | Engine Hose and Joints, $2\frac{3}{4}$ inches diameter, 50 feet of copper rivetted | 8 00 |
| | 2nd do | 5 00 |
| 3. | Harness, set of double carriage | 8 00 |
| | 2nd do | 5 00 |
| 4. | Harness, set of single carriage | 7 00 |
| | 2nd do | 4 00 |
| 5. | Harness, set of team | 5 00 |
| | 2nd do | 3 00 |
| 6. | Harness, set of Express | 6 00 |
| | 2nd do | 4 00 |
| 7. | India Rubber Belting, Engine-Hose, &c., an assortment | 8 00 |
| | 2nd do | 5 00 |
| 8. | Leather Machine Belting, as assortment | 8 00 |
| | 2nd do do | 5 00 |
| 9. | Saddle, Ladies' full quilted | 8 00 |
| | 2nd do | 5 00 |
| 10. | Saddle, Ladies' quilted safe | 6 00 |
| | 2nd do | 4 00 |

| | | $ c. |
|---|---|---|
| 11. | Saddle, Gentlemen's full-quilted | 7 00 |
| | 2nd do do | 4 00 |
| 12. | Saddle, Gentlemen's plain shaftoe | 6 00 |
| | 2nd do do | 4 00 |
| 13. | Trunks, an assortment | 8 00 |
| | 2nd do | 5 00 |
| 14. | Valises and Travelling Bags, an assortment | 5 00 |
| | 2nd do do | 3 00 |
| 15. | Whips, an assortment | 5 00 |
| | 2nd do | 3 00 |
| 16. | Thongs, an assortment | 3 00 |
| | 2nd do | 2 00 |

*Saddle and Harness Stock.*

| | | |
|---|---|---|
| 17. | Check for Horse Collars, one piece | 6 00 |
| | 2nd do do | 4 00 |
| 18. | Belt Leather, 30 lbs | 4 00 |
| | 2nd do | 3 00 |
| 19. | Brown Strap and Bridle, one side of each | 4 00 |
| | 2nd do do | 3 00 |
| 20. | Carriage Cover, two skins (whole) | 4 00 |
| | 2nd do | 3 00 |
| 21. | Deer Skins, three dressed | 3 00 |
| | 2nd do | 2 00 |
| 22. | Harness Leather, two sides | 4 00 |
| | 2nd do | 3 00 |
| 23. | Hames, carriage or gig, best assortment | 5 00 |
| | 2nd do do | 3 00 |
| 24. | Hames, team or cart, best assortment | 5 00 |
| | 2nd do do | 3 00 |
| 25. | Hog Skins for saddles, three | 4 00 |
| | 2nd do | 3 00 |
| 26. | Horse Blankets, two pairs | 5 00 |
| | 2nd do | 3 00 |
| 27. | Kersey, for horse clothing, one piece | 8 00 |
| | 2nd do do | 5 00 |
| 28. | Patent Leather, for carriage or harness work, 20 feet | 6 00 |
| | 2nd do | 4 00 |
| 29. | Skirting for saddles, two sides | 4 00 |
| | 2nd do | 3 00 |
| 30. | Extra entries. | |

**Class 50—Shoe and Bootmakers' Work, Leather, &c.**

| Sect. | *Boots, &c.* | $ c. |
|---|---|---|
| 1. | Boots, Ladies', an assortment | 7 00 |
| | 2nd do | 4 00 |
| 2. | Boots, Gentlemen's, sewed, an assortment. | 7 00 |
| | 2nd do do | 4 00 |
| 3. | Boots, machine-made, an assortment. | 7 00 |
| | 2nd do do | 4 00 |
| 4. | Boots, pegged, an assortment | 5 00 |
| | 2nd do | 3 00 |

*Shoemaker's Tools and Stock.*

| | | |
|---|---|---|
| 5. | Boot and Shoemakers' Tools, an assortment | 8 00 |
| | 2nd do do | 5 00 |
| 6. | Boot and Shoemakers' Lasts, and Trees, an assortment | 8 00 |
| | 2nd do | 5 00 |
| 7. | Shoemakers' Pegs, an assortment | 4 00 |
| | 2nd do do | 3 00 |
| 8. | Shoes, india rubber, an assortment | 6 00 |
| | 2nd do do | 4 00 |
| 9. | Calf Skins, two | 3 00 |
| | 2nd do | 2 00 |
| 10. | Calf Skins, two, grained | 3 00 |
| | 2nd do | 2 00 |
| 11. | Calf Skins, two morocco | 3 00 |
| | 2nd do | 2 00 |
| 12. | Cordovan, two skins | 3 00 |
| | 2nd do | 2 00 |
| 13. | Dog Skins, two dressed | 3 00 |
| | 2nd do | 2 00 |
| 14. | Kip Skins, two sides | 3 00 |
| | 2nd do | 2 00 |
| 15. | Kip skins, two, grained | 3 00 |
| | 2nd do | 2 00 |
| 16. | Linings, six skins | 3 00 |
| | 2nd do | 2 00 |
| 17. | Patent Leather, for bootmakers, 20 ft. | 6 00 |
| | 2nd do do | 4 00 |
| 18. | Sheep Skins, six coloured | 3 00 |
| | 2nd do | 2 00 |
| 19. | Sole Leather, two sides | 3 00 |
| | 2nd do | 2 00 |
| 20. | Upper Leather, two sides | 3 00 |
| | 2nd do | 2 00 |
| 21. | Upper Leather, grained, two sides | 3 00 |
| | 2nd do do | 2 00 |
| 21 | Extra entries | |

[Oak-tanned leather must be entered under the head of extras, and not in competition with hemlock-tanned.]

**Class 51—Woollen, Flax and Cotton Goods, Furs and Wearing Apparel.***

| Sect. | | $ c. |
|---|---|---|
| 1. | Bags, from Flax or Hemp the growth of Canada, one dozen | 8 00 |
| | 2nd do | 5 00 |
| 2. | Bags, one dozen Cotton | 4 00 |
| | 2nd do | 3 00 |
| 3. | Blankets, Woollen, one pair | 6 00 |
| | 2nd do | 4 00 |
| 4. | Calico, unbleached, one piece | 5 00 |
| | 2nd do | 3 00 |
| 5. | Caps, Cloth, an assortment | 5 00 |
| | 2nd do | 3 00 |
| 6. | Carpet, Woollen, one piece | 8 00 |
| | 2nd do | 5 00 |
| 7. | Carpet, Woollen Stair, one piece | 7 00 |
| | 2nd do | 4 00 |
| 8. | Carpet, Rag, one piece | 5 00 |
| | 2nd do | 3 00 |
| 9. | Cassimere Cloth, from Merino Wool, one piece | 7 00 |
| | 2nd do do | 4 00 |
| 10. | Cloth, Fulled, one piece | 7 00 |
| | 2nd do | 4 00 |
| 11. | Cloth, Broad, one piece | 7 00 |
| | 2nd do | 4 00 |
| 12. | Counterpanes, two | 5 00 |
| | 2nd do | 3 00 |
| 13. | Cordage and Twines, from Canadian Flax or Hemp, assortment of | 10 00 |
| | 2nd do do | 6 00 |
| 14. | Drawers, factory-made, woollen, six pairs. | 5 00 |
| | 2nd do do | 3 00 |
| 15. | Flannel, factory-made, one piece | 5 00 |
| | 2nd do do | 3 00 |
| 16. | Flannel, not factory-made, one piece | 5 00 |
| | 2nd do do | 3 00 |
| 17. | Flannel, Scarlet, one piece | 5 00 |
| | 2nd do do | 3 00 |
| 18. | Fur Cap and Gloves | 5 00 |
| | 2nd do | 3 00 |

* All fabrics must be entered by the actual Manufacturer, or weaver; and no prizes will be otherwise awarded.

| | | $ c. |
|---|---|---|
| 19. | Fur Sleigh Robes—including buffalo, wolf, and raccoon, an assortment | 15 00 |
| | 2nd do | 8 00 |
| 20. | Gloves and Mits, 3 pairs of each, factory-made, woollen | 4 00 |
| | 2nd do do | 2 00 |
| 21. | Gloves and Mits of any leather, an assortment | 5 00 |
| | 2nd do do | 3 00 |
| 22. | Linen Goods, unbleached, one piece | 5 00 |
| | 2nd do do | 3 00 |
| 23. | Linen Sheeting, bleached, one piece | 5 00 |
| | 2nd do do | 3 00 |
| 24. | Oxford Grey Cloth, one piece | 5 00 |
| | 2nd do do | 3 00 |
| 25. | Overcoat of Canadian cloth | 5 00 |
| | 2nd do do | 3 00 |
| 26. | Satinet, black, one piece | 6 00 |
| | 2nd do do | 4 00 |
| 27. | Satinet, mixed, one piece | 5 00 |
| | 2nd do do | 3 00 |
| 28. | Shawls, home made | 4 00 |
| | 2nd do | 2 00 |
| 29. | Sheepskin Mats, dressed and coloured, an assortment | 6 00 |
| | 2nd do do | 4 00 |
| 30. | Shirts, factory made, three of each, woollen and Angola | 5 00 |
| | 2nd do do | 3 00 |
| 31. | Silk and Felt Hats | 5 00 |
| | 2nd do | 3 00 |
| 32. | Stockings and Socks, factory-made, woollen, three pairs of each | 4 00 |
| | 2nd do do | 2 00 |
| 33. | Stockings and Socks, factory-made, mixed woollen and cotton, three pairs of each. | 4 00 |
| | 2nd do do | 2 00 |
| 34. | Suit of Clothes of Canadian cloth | 8 00 |
| | 2nd do do | 5 00 |
| 35. | Tweed, winter, one piece | 6 00 |
| | 2nd do | 4 00 |
| 36. | Tweed, summer, one piece | 6 00 |
| | 2nd do | 4 00 |
| 37. | Twine, linen and cotton, an assortment | 3 00 |
| | 2nd do do | 2 00 |
| 38. | Winsey, checked, one piece | 5 00 |
| | 2nd do do | 3 00 |
| 39. | Woollen Cloths, Tweeds, &c., an assortment | 10 00 |
| | 2nd do do | 6 00 |
| 40. | Woollen Shawls, Stockings, Drawers, Shirts and Mitts, an assortment | 10 00 |
| | 2nd do do | 6 00 |
| 41. | Yarn, white and dyed, one lb. of each | 3 00 |
| | 2nd do do | 2 00 |
| 42. | Yarn, fleecy woollen, for knitting, one lb. | 3 00 |
| | 2nd do do | 2 00 |
| 43. | Yarn, cotton, two pounds | 3 00 |
| | 2nd do | 2 00 |
| 44. | Yarn, linen, two pounds | 3 00 |
| | 2nd do | 2 00 |
| 45. | Extra entries | |

English papers notice a novel preparation of metallic zinc which is easily pulverized and applied with oil as a paint for ships' bottoms, to prevent fouling.

The heavier the gunpowder the greater is its explosive power.

"Fast" and "Slow" writers—Swift and Crabbe.

# Board of Arts and Manufactures

## FOR UPPER CANADA.

### TRADE MARKS.

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

*(Continued from page 120.)*

Tuckett & Billings, Hamilton. Trade Mark:—"The Beaver Brand Chewing Tobacco," on a colored label; with a Beaver and crown in centre, surrounded with a maple wreath. Recorded in Vol. A, folio 163 (No. 296). April 24th, 1867.

Tuckett & Billings, Hamilton. Trade Mark.—"Anne Belle" ½ lb. on a colored label. Recorded in Vol. A, folio 164 (No. 296). April 24th, 1867.

Tuckett & Billings, Hamilton. Trade Mark:—"Royal Oak Brand Chewing Tobacco," on a colored label, with a large oak tree in the centre. Recorded in Vol. A, folio 165 (No. 296). April 24th, 1867.

Dr. H. Guérin, Montreal. Trade Mark:—"Dr. Guérin's Poudre Divine." Recorded in Vol. A., folio 167 (No. 323). April 29th, 1867.

Charles C. Jerome, London, C. W. Trade Mark:—A colored label, with inscription, "Orange Appetiser" & "De Curacoa Bitters." Recorded in Vol. A., folio 168 (No. 253). May 2nd, 1867.

Kerry Brothers & Crathern, Montreal. Trade Mark: A shield, with the initials K. B. & C. in the quarterings, and above and below the words, "St. George Drug Mills and Laboratory." Recorded in Vol. A., folio 169 (No. 273). May 3rd, 1867.

George Mortimer, Ottawa. Trade Mark:—Head of a dog, in profile, with mouth slightly open and tongue protruding; underneath, the words "Canadian Cough Emulsion." Recorded in Vol. A., folio 171 (No. 348). May 10th, 1867.

A. T. Brown, Boston, U.S. Trade Mark:—"Brown's Vermifuge Comfits or Worm Lozenges," in the oval centre of a square label. Recorded in Vol. A., folio 171 (No. 349). May 10th, 1867.

# Proceedings of Institutions.

### ANNUAL MEETING OF THE TORONTO MECHANICS' INSTITUTE.

The Annual Meeting of members was held in the Lecture Room, on Monday, the 13th May, Mr. J. J. Withrow, 1st Vice-President, in the chair.

The meeting having organized, the Secretary read the Report of the retiring Board, from which we make the following selections.

The property held by the Institute is estimated at the same value as at the close of the past year—the additions made to the number of books in the library, and the fitting up of the large class room, since the date of last report, being considered by your Directors as fully equivalent to the loss by ordinary wear and tear of the building and furniture. Full details of the assets and liabilities will be found in appendix A to this report.

**The Membership.**

During the year there has been but a slight increase in the membership of the Institute; but in anticipation of the probable increase of population, consequent upon the establishment of the Local Government in Toronto, and by devoting more earnest attention to this important department, it is believed that a much larger increase may be secured during the ensuing year.

| | |
|---|---|
| The number of members at the date of last Report was | 643 |
| Subscribers | 239 |
| Honorary Members | 18 |
| Life Members | 78 |
| Making a total of | 978 |
| From which deduct—by deaths, removals and withdrawals | 334 |
| Leaving | 644 |
| New Members and Subscribers admitted during the year | 374 |
| Total | 1018 |
| Classified thus— | |
| Life Members | 76 |
| Honorary Members | 17 |
| Members | 622 |
| Subscribers | 303 |
| Total | 1018 |

**The Finances.**

The Treasurer's statement, as audited, and published in detail in Appendix B, shows total receipts for the year $7,478 31; expenditure $7,251 87; balance in hand $226 44.

**The Library and Reading Room.**

Your Directors, through the active supervision of the "Library Committee," have given much attention to the continuous replenishment of the Library and Reading Room during the past year; and although the expenditure for books and periodicals has not amounted to the sum expended during the year ended May, 1866, it has considerably exceeded that of the previous year. The list of papers and magazines regularly supplied to the Reading Room, will be found in appendix C.

| | |
|---|---|
| The number of books in the Library at the date of the last annual report was | 6,958 |
| Added during the year by purchase | 339 |
| Bound up from Reading Room | 94 |
| Total | 7,391 |
| Lost and worn out during the year | 120 |
| Now in Library | 7,271 |

| | Vols. in Lib. | Issued. |
|---|---|---|
| Biography | 587 | 871 |
| History | 657 | 714 |
| Miscellaneous | 577 | 1,012 |
| Novels and Tales | 2,170 | 19,001 |
| Periodical Literature | 1,110 | 3,331 |
| Poetry and the Drama | 235 | 540 |
| Science and Art | 590 | 585 |
| Religious Literature | 163 | 252 |
| Voyages and Travels | 503 | 1,045 |
| Illustrated Works | 221 | |
| Library of Reference | 458 | |
| | 7,271 | 27,351 |

Your Directors cannot but express their regret that the larger proportion of issues, upwards of two-thirds of the whole, continues to be in the department of "Novels and Tales." Notwithstanding that many of these are works of a standard or instructive character for this class of publications, it yet indicates that sufficient attention is not given to the more practical and useful works contained in the library.

Next to Novels and Tales, and in the following order, the issues were respectively in Periodical Literature, Voyages and Travels, Biography, History, Science and Art, Poetry and the Drama, Religion, and Miscellaneous Works.

Your Directors would earnestly and especially urge the younger members of the Institute, upon whose present conduct in life and course of reading and studies depends so much their future success, to avoid at least the lighter department of fiction, and study such works as shall fit them for the sterner and more practical duties of life.

The issue of a number of copies of the standard Reviews and Magazines, at a charge of two cents per day, each, has been successfully continued during the year. The project which originated with their predecessors, of opening a "Ladies' Reading-Room," has not yet been accomplished, owing to the want of a proper room for the purpose not being at the disposal of your Directors.

**The Evening Classes.**

The importance of this department of the operations of the Institute was so fully dwelt upon in the report of last year, and again in the report presented at the public awarding of Prizes during the past month, that it is scarcely necessary to enter into any lengthened remarks on this occasion. Your Directors cannot, however, refrain from urging upon parents and employers of youth engaged in business, the duty of both morally and practically supporting so efficient and economical a means of instruction as the Institute thus supplies. It is not when boys are attending school, as a general rule, that the importance of sound and useful instruction is impressed upon their minds; and were it otherwise, there are many branches of study necessary for the mechanic and practical man, that the ordinary schools of the country afford no means of becoming acquainted with. The actual requirements of business bring these studies home to the minds of the thoughtful, and the Institute secures competent teachers, and furnishes all the other necessary facilities for the acquirement of such instruction; and blind indeed to their interests must be the youths, and the parents and employers of such, who need instruction and yet fail to avail themselves of it when so liberally offered. Were the leading mechanics and manufacturers to follow the generous example of the Directors of the Northern Railroad, this department of the Institute might constitute it a "People's College"—a pride to our mechanics and an honour to our Metropolitan city.

The total expenditure for payment of Teachers, Prizes, fitting up class rooms, gas and fuel is given as $585 85; receipts $536 00; balance deficit $49-35; a portion of which is said to be fairly chargeable to classes in future years. Other details of these classes were given in the last No. of this Journal.

**Entertainments.**

From various causes, not necessary to be discussed in this report, the profits arising from the several entertainments have been much less than for the previous year. The total receipts from this source of revenue for the year ended May, 1866, were $5,095 42; expenditure $3,715 37; profits $1,880 05. The total receipts for the year just closed have been $3,279 31; expenditure $2,950 04; profits $329 27; or $1,050 78 less profits than for the previous year.

Classifying the various kinds of entertainments the following are the results:—

| | | |
|---|---|---|
| Four Oratorios | $673 22 | $494 96 |
| Five Operatic Concerts | 613 62 | 528 40 |
| Nine Concerts and Reunions | 920 63 | 916 67 |
| Three Glee Club Concerts | 127 07 | 123 04 |
| Mr. Vandenhoff's Readings | 573 65 | 503 26 |
| Mr. Pope's and Mr. Taverners Readings | 49 12 | 87 51 |
| One Excursion | 322 00 | 296 20 |
| | $3279 31 | $2950 04 |

### The Exhibition.

The seventh exhibition in connection with the Institute was opened on Wednesday, the 3rd of April—being open altogether thirteen days. The total receipts (at 10 cents each admission) were $627 10; expenses $465 97; leaving a balance of profit to the Institute of $161 13; or less than the profits on the exhibition of 1866 by $190 00, and of the previous year by $34 38. These results for the present year were to a great extent owing to the very unfavorable state of the weather during the earlier days of the exhibition, and in part from the fact of the novelty of these exhibitions having to a certain extent passed away.

Although scarcely any of the articles exhibited had been shown before, yet the committee of management in their report to the board, say:—"They have grave doubts as to the propriety of attempting to continue these exhibitions annually—certainly *not*, unless they can be more varied in their several features from year to year, than has been the case so far. These exhibitions have, undoubtedly, been both interesting and instructive, tending to create a taste for the beautiful in nature and art where it did not before exist, and improving it where it already had an existence; and their discontinuance altogether would be a cause of regret to many; but from the experience gained by your committee, it appears evident that new material for continuing these exhibitions on a similar plan is becoming every year less available."

The cordial thanks of the members of the Institute are due to the lady and gentlemen contributors, a list of whom is given in appendix D, for their generosity in lending so many articles of beauty and value for the occasion. It will rest with the Directors to be elected this evening, to say whether or not there shall be an exhibition during the incoming year; and if so, upon the active co-operation of the members as to whether it shall be a success or a failure."

The report concludes by noticing the change in the Secretaryship during the year—Mr. Longman having resigned and Mr. John Moss having been appointed to the vacancy.

The Report was unanimously adopted, when Scrutineers were appointed and the ballot taken for office-bearers for the ensuing year, which resulted in the following gentlemen being elected:

J. J. Withrow, *President*; W. P. Marston, 1*st Vice-President*; H. E. Clarke, 2*nd Vice-President*; W. Edwards, *Treasurer*; F. W. Cumberland, Daniel Spry, H. Langley, J. Carty, W. H. Sheppard, F. W. Coate, W. Halley, Thomas McCrosson, Arthur D. Lamb, John Downey, W. S. Lee, and Robert Wilkes, *Directors*.

While the Scrutineers were preparing their return, a friendly discussion was engaged in as to the best mode to adopt to increase the membership of the Institute. Several members urged that a canvas be instituted under the direction of the Board—one gentleman said he made it a condition with all his Employees, that they should connect themselves with the Mechanics' Institute or some similar Association; and as an instance of the benefit to be derived from such a course, he stated that the services of one of the young men in his business has been doubled in value to him, through his connection with the Institute classes during the past session.

It was finally resolved that a general canvas should be made; and at the same time it was urged that Employers generally would find it to their interest to induce young men to join the Institute, or even to present the younger ones with free tickets.

One certain means suggested of increasing the membership was that each member should, during the year, endeavour to induce one friend at least to become a member; and a hope was expressed that this would be done.

The Financial details are as follows:—

### Appendix A.

LIABILITIES.

| | |
|---|---|
| Mortgage on Building and ground | $18,400 00 |
| Sundry accounts | 526 59 |
| Note under discount | 300 00 |
| Balance down | 38,784 13 |
| | $58,010 72 |

ASSETS.

| | |
|---|---|
| Real Estate | $50,000 00 |
| Library and Furniture | 7,517 45 |
| Members' subscriptions due | 172 40 |
| Rents | 94 43 |
| Cash on hand | 226 44 |
| | $58,010 72 |

### Appendix B.

RECEIPTS.

| | |
|---|---|
| Balance cash, 1st May, 1866 | $235 25 |
| New Members and Subscribers | 869 50 |
| Old Members and Subscribers | 1,179 25 |
| Rents from all sources | 2,845 40 |
| Fines and Fees | 117 55 |
| Magazines lent from Library | 48 96 |
| Newspapers sold | 50 49 |
| Catalogues sold | 9 60 |
| Lost books paid for | 4 75 |
| Fees from pupils of classes | 430 50 |
| Northern Railway Company for classes | 100 00 |
| Received from Exhibition | 161 13 |
| " " Entertainments | 681 89 |
| Discounts | 700 00 |
| Sundries | 44 04 |
| | $7,478 31 |

EXPENDITURE.

| | |
|---|---|
| Books | $350 74 |
| Newspapers and Magazines | 274 26 |
| Stationery and Blank Books | 15 81 |
| Binding | 170 75 |
| Printing and Advertising | 115 79 |
| Postage | 110 86 |
| Fuel | 398 25 |
| Gas and Oil | 952 45 |
| Water and Ice | 84 00 |
| Insurance | 146 00 |
| Repairs | 463 02 |
| Salaries of Officials | 1,658 04 |
| Additional assistance | 113 70 |
| Class Teachers and Prizes | 372 65 |
| Entertainments | 427 75 |
| Interest on Mortgage | 1,104 00 |
| " to Bank | 24 14 |
| Carpet, matting, &c | 50 12 |
| Note retired | 400 00 |
| Petty disbursements | 16 04 |
| Loss on American silver | 3 50 |
| Cash in hand | 226 44 |
| | $7,478 31 |

# Selected Articles.

## PETROLEUM AS STEAM FUEL.

(*From the Oil Trade Review.*)

It does not appear that any of the many expermenters with mineral oils as an economical substitute for coal in the raising of steam have yet found the philosopher's stone. Yet the number of experimenters are on the increase, both at home, in Canada, and in the United States. No doubt some of these gentlemen are stimulated to exert themselves in order that a profitable use may be found for the present waste products of the oil retorts and the excessive production of oil. We have in a previous number mentioned the process on trial at Messrs. Field's Candle Works. The patentees are Messrs. Wise, Field, and Ayden, and we are informed that these gentlemen are still continuing the trials with partial and varying success; but, according to accounts which have appeared in some engineering papers, the progress made since their first experiment in January last has been very trifling indeed. We have not seen this process, but, judging from the paragraphs which are floating about, it appears to be very nearly allied to that adopted by Messrs. Sim and Barff, and some time since described and illustrated in *The Oil Trade Review*. It appears, in an account of some recent trials at Messrs. Field's, that the oil is allowed to fall through a narrow orifice in a continuous stream about one-eighth of an inch in diameter, or, in other words, flowing at the rate of about three gallons per hour. As the oil falls vertically it is met by a superheated steam-jet, which blows the oil in a cloud of spray against hot tiles, and lime on a coal grate, a coal fire being first used to get up steam for the superheated blast. The apparatus is fitted to the furnace of a Cornish boiler, and with the consumption of oil stated above the steam was maintained at a pressure of from 32lb. to 35lb. per square inch, and keeping going the engines, usually worked by the boiler with the furnace coal. The amount of water evaporated was 10 cubic feet per hour for 100 square feet of surface of boiler.

In the same furnace trials have lately been made with Mr. Vincent Lee's patent peat fuel, which, it is said, was very successful in raising steam quickly; but there was no opportunity of testing its powers of keeping up the steam or of ascertaining the quantity of water evaporated by a given weight of fuel, so that, practically speaking, the result was *nil*. This peat fuel is ordinary peat compressed and saturated with mineral oil or its refuse. The smoke on firing up is dense, but a much smaller volume is given out from this peat than from north-country coals. At times no smoke was visible, and the colour was of a light brown. The peat fuel does not leave any ashes or cinders, and, consequently, cannot clinker or choke the fire-bars. The residue is like the ashes from tobacco. We are inclined to think that the combination of refuse oil and peat, of which latter we possess an unlimited supply, will prove much less expensive than the cheapest product of mineral oils alone, for, should any of the trials prove successful, it will at once have an immense effect upon the now nominal value of the waste products of the works.

We have to notice two patents, one taken out by Mr. J. Hamilton, and another by Mr. A. F. Stoddard, somewhat similar to each other, and both apparently based upon the idea carried out in Mr. Mackenzie's process, which has been fully described in these columns. Mr. Mackenzie saturates coal dust—the waste from pit workings—with the refuse of oil works, while Mr. Stoddard's mixture is described in his specification in the following words:—

It consists essentially in mixing the oily, fatty, pitchy, and other residues of shale oil, petroleum, or other mineral oil, after their most valuable volatile gases, spirits, and oils have been abstracted from them by distillation for various useful purposes, with coal and coal dross, or "slack," by preference in a finely crushed or ground pulverized state as an absorbent, so as to saturate or moisten the coal with the said inflammable residue of mineral oils.

This patent is dated September 24, 1866; that by Mr. Hamilton is one day later, and his recipe runs thus:—

One ton of finely-sifted anthracite coal, or other screened or pulverized bituminous coal, known as duff or culm, 2 cwt. of sawdust, and 40 gallons of heated coal-tar, or other material, such as the still "bottoms" or residuum left after the distillation of mineral oils.

It will be seen that these three processes are very similar to each other. We are not aware that any one of the compositions has yet been tried in raising steam, but we have reason to believe that Mr. Mackenzie's has been proved to be a very economical material for the production of gas.

Mr. Richardson still continues his experiments in the Dockyard at Woolwich. The Government have granted him the use of the boiler of the gun-boat *Teazer*, and a small sum of money to defray the cost of his trial, which is to be made on a large scale, and with the idea of making a thoroughly practical comparison between the use of mineral oils and anthracite coal.

We have not received any information regarding Messrs. Sim and Barff's experiments since we last referred to them, but we have some recollection of seeing it stated in one of the daily papers that these gentlemen were still hard at work preparing for a trial on a large scale. A company has been formed with the object of carrying out and applying the invention, and offices have been taken in Cannon-street.

To Captain Schpakovski—a Russian—belongs the credit of producing the "newest thing" in the application of liquids, as steam fuel. We have received the following particulars of his process:—He has constructed a peculiar lamp, the flame of which, fed by turpentine, rises to the extraordinary height of two feet, and it issues from the burner with the noise that resembles that caused by the rush of steam out of the pipe; its colour is yellowish-white, and its temperature is that of the fusing point of steel. The quantity of turpentine consumed by the lamp in connexion with the pulverizer is from two to five pounds per hour. Capt. Schpakovski commenced his public experiments with the fusion of fine steel wire, which, after a few seconds, began to melt and burn away in sparks. He then gave the flame a horizontal direction, and melted a piece of copper. He also exhibited a crucible, intended with the aid of the pulverizer to melt a piece of copper weighing from five to ten pounds. The application to which Captain Schpakovski attaches the greatest importance, however, is the heating of the boilers of steamboats. He has constructed a small vessel, 24 feet long and 5 feet wide, with an engine of two-horse power, which performs six and a half knots an hour. The boiler is heated by four pulverizers, the turpentine being stored forward, and conducted through a tube, furnished with a regulator, to the pulverizer. The consumption of the liquid is stated to be equal to three pounds per hour per horse-power. The captain is now engaged in the construction of a vessel of three times the above power, and he expects, in consequence of improvements in the boiler, to be able to reduce the consumption to about half the above amount. It is said that orders for twenty steamers for St. Petersburg and the neighbouring places have already been received, and that it is proposed to establish communication, by means of small vessels on Captain Schpakovski principle, on the Neva, between the town and the islands, so that passengers may be conveyed through the canals of the Moika and of Tontaka to the central station on the Neva, where the large vessels lie that run between that place and the islands. It is not pretended that the heating by means of turpentine will cost less per hour than coals, but as the former will not require the fires to be lighted more than ten minutes before starting there will be great economy in the case of very short runs, like those on the Neva, which only occupy about half an hour. The new method is also applied to night signals, the lantern giving three times as much light as those at present in use.

In London (Canada West), and in the oil producing regions of Canada, experiments are being almost daily tried. The papers we receive from Canada contain glowing descriptions of the immense success of all of these, but, as we have had no direct confirmation of the reports—and we have waited patiently for the same for a considerable time—we feel constrained to take the stories with a grain of salt, and to conclude that Canada has not advanced a step further than has Great Britain in the successful application of these oils as an *economical* substitute for coal. But we hope on, as do all men who feel an interest in the subject.

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(*From the Montreal Trade Review.*)

The following is a letter written by G. B. N. Tower Esq., late Chief Engineer, U. S. Navy, with regard to experiments being made in the U. S. steamer *Palos*, with an apparatus invented by Col. Henry Foote, of Oil City, Pa., for burning petroleum. The results of the experiments seem to prove that the problem which has engaged attention so long has at last been solved, and that as a generator of steam, petroleum will take the place of coal until by the increased demand for the former and the decreasing consumption of the latter, the prices of both commodities shall be more nearly equalized:

Boston, April 6th, 1867.

Dear Sir,—Some weeks since you requested me to give you a statement of my connection with the use of Petroleum as fuel, and this being the first leisure moment I shall improve my opportunity to answer your request.

In 1862, on my return from sea, I met Chief Engineer Wood and Stimers, who had been ordered, together with Chief Engineer Whipple to investigate the practibility and economy of Shaw and Linton's patent for burning petroleum under boilers, instead of coal. As they spoke highly of it, I examined it. The oil was made to flow through the axis of a truncated cone, corrugated horizontally, and running down the inclined surface, its progress was partially arrested by the circular basins, until it was consumed. This was a very crude affair, but a ratio of 2 to 1 in heating power was established. In 1865, while detailed as Chief Marine Engineer on Gen. Hatch's staff at Charleston, I had occasion to visit New York city. Some friends asked me to go with them and examine a new apparatus for burning petroleum. I found an ordinary grate, divided by a muffle running from front to rear, and an ordinary light coal fire was burning, keeping the muffle hot. On letting on water and oil, by separate pipes, a sheet of flame, 40 or 50 feet long, issued from the muffle and passed through the flues, evolving great heat and generating steam quite rapidly. I immediately offered, in case they would furnish me with one muffle as a pattern, to build the others in the Government workshops at Charleston, S. C., and place them on board the Government transport, "De Kalb," being satisfied that it would increase her speed very materially. This was agreed to but owing to some disputes among the shareholders I went back without having a pattern, and, of course, the matter dropped.

Early in 1866, I resigned my commission as Chief Engineer in the U. S. Navy, and came to Boston, and engaged in engineering pursuits. In November I was called upon to visit and examine an apparatus for burning petroleum, invented by Col. Henry R. Foote, and was so much struck by the simplicity of its arrangement, the ease which it was managed and the completeness of the combustion, that I spent nearly three hours in loooking it over. I went several times afterwards, in company with other parties, to enjoy their surprise, and to examine it again. After some weeks, it was decided to apply to the U. S. Government to appoint a board to examine it, and I unhesitatingly wrote and signed a recommendation to the Secretary of the Navy. A board of Naval Engineers was ordered, they examined it and their report was so favorable that orders were sent from the Bureau of Steam Engineering, placing at the disposal of Col. Foote the United States steamer "Palos," to be fitted with his invention. A certain amount of money was also appropriated by Government for the expenses, and every facility in the way of tools, workshops and labour afforded him. While Col. Foote was experimenting the construction of his apparatus, a series of experiments with coal were made on the "Palos" by orders from Government. In the first experiment, fires were lighted under one boiler only, and the coal was limited to 8 lbs. per square foot of grate surface; but after running the engines 50 minutes the steam had fallen so low that the engines stopped, there being only 5 lbs. pressure in the boiler. It was then determined to use both boilers, with 8 lbs. of grate surface per hour, which was done, the experiment lasting for three days consecutively. Every pound of coal was weighed, and every ounce of water measured. The engines made 33 revolutions per minute, and steam was carried at 30 lbs. by throttling closely. The evaporation was very good, giving between 7 and 8 lbs. of water per pound of coal. After thoroughly cleaning the flues the last experiment was commenced, and continued also for three days. There was no limit to the coal, but only 36 revolutions could be obtained from the engines, and the evaporation only slightly increased, being about 8 lbs. of water per pound of coal.

On the 21st of March, Col. Foote's apparatus having been fitted to the "Palos," fires were lighted under one boiler; steam was rapidly generated, and the engine driven at 34 revolutions, with thirty pounds of steam, for nearly three hours, when we extinguished the fires to make some needed changes. All felt well satisfied with the first trial—as it was not to be expected that the apparatus could be perfectly proportioned at the first, and it was assumed from the first that the fires would have to be lighted a few hours at a time, for several days before the apparatus could be pronounced to be perfectly adjusted. On Thursday, the 4th of April, the fires were lighted under both boilers, and, in 47 minutes from lighting the first fire, we had 30 lbs. of steam, and started the engines; and although the throttle was wide open, and the engines were making 50 revolutions, the steam increased, and we were obliged to shut off two of the fires; but the engine still kept up her revolutions, and the steam held steadily. On comparing the number of pounds of oil used, to the number of pounds of coal needed to produce the same effect, as ascertained by former experiments, the ratio was found to be 1 lb. of oil to 8 of coal.

We are now daily making changes and lighting fires to see the effect of the alterations, and are at this moment burning less than half the oil, with the same effect as regards quantity of water evaporated.

I cannot conclude without thanking you for the zeal you have manifested in regard to these experiments. Many of the slight changes made were at your suggestion, and they have shown their great utility at once.

I presume we shall be associated together for some time yet, and it gives me much pleasure to have so able a coadjutor. I am yours very truly,

G. B. N. Tower,

*Late Chief Engineer U. S. Navy.*

Henry Lester, Esq.,
American House, Boston, Mass.

The *Oil Trade Review* says:—"A large common service boiler, one belonging to the *Teazer* gunboat, is being fitted up at Woolwich Dockyard for trials between coal and oil as fuels. Two days are to be given to coal—the first with the usual firing, the second with forced firing, to obtain the highest results the boiler is capable of giving. The coal grates are then to be taken out, and oil grates under Mr. Richardson's directions substituted.

## PETROLEUM—THE UTILIZATION OF WASTE.

In our issue of November 3 last we had occasion to notice a patent taken out by Mr. J. Lundy, of Leith, to protect his method of treating the residues obtained from the distillation and purification of mineral oils. Subsequently reference was made to the process successfully adopted by Mr. A. M. Fell, manager of the West Calder Oil Company's Works, and some samples of the commercial products obtained from residue by Mr. Fell, which were at the time in our office, were examined with much interest by many persons connected with the mineral oil trade. We have now received from the West Calder Oil Company a box of samples, which show plainly that Mr. Fell has made great progress in his efforts to turn the refuse of his Company's works into money. The samples, which will be on view for a few weeks at *The Oil Trade Review* Office, consist of—

1. A piece of pitch from the still, very dense, of exceptionally good quality, and eminently adapted for the manufacture of artificial fuel.

2. Samples of coke obtained by continuing the process a little further. This is a very pure carbonaceous substance, and in appearance and form unlike the coke which generally comes from oil stills. It is evidently a valuable coke for special purposes.

3. About half a pint of the first product from the refining waste. This is a liquid of about the same colour and consistency as copal varnish, and by the uninitiated might be mistaken for that substance. The smell is unobjectionable, and not so strong as that emitted by the previous specimens sent to us from the West Calder Works.

4. A sample of burning oil from the above. It is of a very pale straw colour, of 820 gravity, and, generally speaking, an excellent sample of burning oil. We are not informed in what proportion it is yielded from the first product.

5. Lubricating oil of a colour to suit the stupid prejudice of the age in favor of a pale tint. The gravity of this is 860, and the smell almost without trace of the chemicals.

6. Pit hutch oil. A greenish fluid of the consistency of treacle. Although we have recollections of scenting a more agreeable perfume than is given out by the contents of this bottle, we also remember suffering under a worse smell coming from a similar product. As hutch oil it is likely to become a favourite article. Price 9*l.* per ton.

7. Sample of waggon grease, another product of the waste. A stiff paste, of peculiar smoothness, possessing no more smell than a fair sample of crude shale oil. Sold at 8*l.* 10s. per ton.

8. Sample of hot neck grease, similar to but finer than the last-named, but not quite so dense. This

grease is used largely in malleable iron works. Price 14*l*. per ton.

9. Pit grease or wire-rope composition, used for protecting pit ropes and miscellaneous purposes. The quality is exceptionably good, and if more of it were available it would soon supplant the kinds now in use. The price is 12*l*. per ton.

10. A canister of sheep dip, a substance with which we have not the honour to be acquainted. Before opening the canister, however, the idea was forced upon us that if it betrayed too much of the smell of paraffin, the sheep might object to have any connexion with it. We were agreeably surprised to find that the natural smell has been neutralized, and, so far, as we can judge, completely so. This sheep wash is sold at 3d. per lb. It is described by Mr. Fell as non-poisonous, a thorough skin purifier, not injurious to the health of the animal, and a decided improver of the wool. It is also recommended as a cure for all the ills that dog-flesh is heir to—such as mange, ticks, fleas.

We consider the progress in the utilization of refining waste here evidenced to be of the utmost importance, and it will be of still greater importance should the trade in the staple produce of refiners continue for any length of time in its present unfortunate position.—*The Oil Trade Review.*

## LUBRICATING PETROLEUM AS A SICCATIVE OIL.

From a correspondent in West Virginia we have received a communication on the use of the heavy petroleums—lubricating oils—as vehicles for pigments. He believes they are equal and, in some cases, superior to linseed oil for this purpose. He quotes scientific and other authorities in support of his position. A series of experiments were made with linseed oil and Pennsylvania and West Virginia heavy petroleums in a lighted room kept at 60° F. On metal the linseed oil dried in seven days, the Pennsylvania petroleum in nine days. On glass, linseed dried in ten days, Pennsylvania in one month, and West Virginia in seven days. On wood, the experiments showed in ten coatings, each applied as soon as the preceding coat was dry; linseed dry in thirty-six hours, Pennsylvania petroleum in thirty-five, and West Virginia in twenty-four.

The writer says he has seen several houses, brick and wood, which have been painted a year or more with this oil as a vehicle, and thus far the petroleum paint stands as well as that mixed with linseed. The Baltimore and Ohio Railroad Company use the petroleum for painting their cars and consume more for this purpose than for lubricating. Other statements are made to show that the lubricating petroleum is well fitted to take the place of linseed oil and that it is very much cheaper.

We are not prepared to view the substitution of this hydrocarbon for the linseed oil, so sanguinely as our correspondent. One of the facts stated by him is that the petroleum oil absorbs one sixtieth the amount of oxygen that raw linseed oil does and one fifteenth that of boiled linseed. This may be an advantage, but we do not so understand it. In drying, the linseed oil does not evaporate, but, combining with oxygen, is transformed into an elastic gum which holds the particles of paint in one mass. Petroleums holds in suspension rather than in chemical combination a certain amount of asphaltum and paraffine. When the oil is evaporated there will be left this asphaltum or paraffine, a brittle substance incapable of holding the paint powder in cohesion. It may be, however, that used with litharge, japan, and a portion of linseed oil these heavy petroleums may be adapted to some kinds of work and answer as well the purpose as pure linseed oil.—*Scientific American.*

## DANGER OF OUR ARTIFICIAL LIGHTS.

On this subject the *Scientific American* says:—Gas explosions are always the result of carelessness or thoughtlessness. It is probably the least dangerous agent for producing light, since the relinquishment of whale and lard oil for this purpose, but the ignorance or thoughtlessness of people make it sometimes a very dangerous substance. Confined in pipes it is perfectly safe. It cannot explode nor even burn until mixed with the oxygen of the atmosphere, and it has the valuable quality of denoting its presence when mingled with the air we breathe. In this form it is dangerous, yet when a meter or the pipes located in a vault or dark cellar leak, it is too common a practice to enter the room with a light to examine the leak, when of course an explosion takes place. This can be readily prevented by first ventilating the room through doors and windows. There can be no excuse for these accidents nor for the blowing out of a gas light leaving the pipe open for the escape of the gas, a trick usually ascribed to country visitors to cities, but not seldom performed by those who should know better. Cases of death by asphyxia in sleeping rooms from this inexcusable carelessness are not unfrequent.

Camphene and burning fluid have been largely superseded by kerosene, yet they are still used to a limited extent, the fluid being burned by a wick in the ordinary manner or used to generate a gas in the lamp itself. In whatever manner employed these mixtures of alcohol and turpentine are dangerous, as many fatal accidents have proved. We know of no method of preventing the danger attending their use, and are glad they are going out of fashion. But it may be doubted whether in exchanging them for kerosene we are not "jumping from the frying pan into the fire."

Kerosene accidents are altogether too common. It would seem that this hydro-carbon might be made at least non-explosive; that it can be made non-inflammable is impossible without destroying its light-producing qualities. But many serious and fatal accidents are continually occurring by explosions of kerosene lamps. A low distillation of the oil would easily remove the more etherial substances in its composition, which, at temperatures not excessive, generate an explosive gas. There should be some simple means of testing kerosene to detect the presence of these volatile elements. Beyond that, only care in the use of kerosene promises to avert its dangers.

It is commonly burned in glass lamps. Now glass is one of the most unreliable substances known, and if not properly annealed will sometimes, even when untouched, fall in pieces as though shattered by a blow. Very likely many of the so-called explosions of kerosene lamps occur by the fracture of the glass lamp containing the oil. An eminent chemist tells us that a few days ago a glass bottle which he had used for years, and which contained collodion, suddenly shivered into fragments while standing on a table where it had remained untouched for weeks, and a flask he had used for distilling benzine broke in a similar manner after it was laid aside.

The practice of blowing out the light when the flame is full, by throwing the breath down the chimney is pernicious. If the wick is loose in the tube the flame may be forced into the lamp and instantly ignite the surface gas or the oil itself. A better practice is to turn the flame down to a flicker and then blow it out. Lamps of metal would seem to be preferable to those made of so treacherous a material as glass, although they are not so elegant.

It is hardly credible that manufacturers or venders of kerosene would willingly deal in a dangerous article containing explosive elements, as their reputation and consequent profits depend upon the quality of the fluid, but the presence of naphtha and benzine in much of it now sold is susceptible of proof. Legislative interference, aided by science, appears to be demanded as a protection to consumers ; for it cannot be expected that the people at large are to become analytical chemists in order to judge of the quality of the oil they use. Either this, or we must go back to the use of the old fashioned lamp, the breaking of which is attended with no more serious consequences than the formation of a grease spot.

## WASTE SUBSTANCES USEFUL AS MANURES.

BY DR. J. S. HOUGHTON, PHIL.

(*Read before the Pennsylvania Horticultural Society, March* 5, 1867.)

The subject of Manures, though it commends itself but little to the general attention of mankind, is one of commanding interest to the cultivators of the soil. We *must* give it attention, whether we like it or not. In our relation to this matter, we are like the hero in the old Fairy tale, who, in his search for the Garden of Eternal Delights, was compelled to eat his way through an immense mountain of unpalatable rice before he could enter the land of perennial flowers, where the gorgeous plums and golden apples blossomed.

In all large towns and cities a great variety of substances may be obtained, of a waste or refuse character, which possess no small value as fertilizing agents, when applied to the soil of the garden or farm. The art of increasing the fertility of the soil by the application of manures of this kind, though much studied by scientific and practical men, is still involved in some degree of mystery and uncertainty. The product of the stable and barnyard is admitted by nearly all our most distinguished farmers and horticulturists to be the most perfect fertilizing agent, take it all in all, that can be found. The chief difficulty about stable manure is, that it requires a vast amount of it to elevate the productive power of the soil to the highest point of fertility, and hence the expense renders it too costly for even market gardeners.

It may be a question also, whether this much-lauded product of the stable would alone be capable (if employed in even an unlimited quantity) of maintaining a market garden at the common point of productiveness for a long series of years.—Whether this question has been settled by actual experience, I am not aware.

Next to stable manure, the product of the cess-pools of large cities has been supposed to possess a higher value as a fertilizing agent than any other material; and indeed, in an economical point of view, it is preferred by market gardeners to the first-named substance. I was surprised to learn, from a recent work by Peter Henderson, a distinguished market-gardener of New York, that the richest product of the cess-pools, when applied as a manure upon market gardens, fails to maintain them, for any long period, at a profitable point of fertility; in other words, that market gardens, manured with even extravagant quantities of such material, decline in productive capacity to such a degree, that the gardeners are compelled every few years to change the character of the manures employed.

This is a most instructive fact. My own observation of market gardens had impressed me with the idea that manures were applied, on nearly all of them, in a most wasteful and unscientific manner, and that, as a result, the lands were in what might be called a *diseased* condition. Still, I supposed that they might be denominated rich, and would, by rotation and good culture, produce maximum crops, even under a continuance of the same system of manuring. A scientific man would of course have resort to lime, soda, potash and bone-dust, as a corrective of this *diseased* condition, so to speak; but I would not readily doubt the intrinsic value of the manures employed.

The statement made by Mr. Henderson is so new and so striking, that I quote the language:

"In applying manure to the soil," he says, "we have long ago discovered the great importance of an alternation of different kinds. When I first began business as a market-gardener, I had opportunities of getting large quantities of rich material from the scavengers of Jersey city: this was mixed with stable manure, charcoal, sawdust, or any other absorbent most convenient, and applied, so mixed, at the rate of about thirty tons per acre. The crops raised with this manure were enormous for two or three years, but it gradually began to lose its effect; and, in *five years* from the time we began to use it, it required nearly double the weight of this compost to produce even an average crop."

Mr. Henderson adds that, with the soil abundantly supplied with rich composts, he has found the use of guano, at the rate of 1,200 lbs. per acre, and bone-dust at the rate of 2000 per acre, highly useful in alternation, or in combination with even stable manure.

I have made these preliminary remarks for the purpose of showing that even the best (or richest) manures, when employed in an unskilful manner, are not sure to produce the desired result, in high farming or gardening; and I hope also to show that some waste substances, little esteemed by many persons, possess a high value as manure, at least when used in combination with the usual manures of the garden, in that admirable laboratory, the compost heap.

I now proceed to the enumeration of "Waste Substances:"

### Tanner's Waste.

The hair, pieces of skin, and effete lime, producd as a waste by tanners, properly composted, has a value far exceeding its usual cost, when compared with stable manure. It has long been sold in this city at 50c. per horse-load. It should be mixed with loam, and frequently turned, until well decomposed. As a permanent fertilizer, it is of much value, on nearly all soils and for all purposes. The waste produced by morocco-dressers and furriers is more valuable than that from common tanneries.

### Brewer's Waste.

The waste hops of the breweries form a valuable substance. It is especially useful as a top-dressing or mulching for strawberry beds, in winter to protect the plants from the frost, and in summer to keep the fruit clean and to shade the soil. The chief constituents of hops, when decomposed, is about the same as those of leaf mould or rotten straw, perhaps less varied and important, but still they have been found highly useful as a fertilizer, when ploughed in in large quantities, upon the richest market gardens. Chemistry alone is not sufficient to explain some facts like this.

### Old Lime Rubbish.

The plastering taken from old walls, especially that which contains hair, is an article well worth gathering for many purposes, more particularly for the fruit and flower garden. I have come to the conclusion that effete lime, that which has been burnt and slacked for a long time, is much more valuable than is commonly supposed. Lime, when united with sand and hair, in plastering mortar, produces, no doubt, nitrate of lime, asd valuable silicates and sulphates, which renders old lime rubbish more valuable than even fresh-burnt lime. Fruit trees, flowers, and even vegetables, seem always to luxuriate in old lime, such as old shell beds, the site of old buildings, &c. Some remarkable instances of this might be cited. Old lime rubbish should be pounded up and screened, and made as fine as possible before it is used. It will be found most useful, perhaps, in very rich garden soils, or in those which are close, wet and heavy.

### Pork-Packers' Salt.

The refuse salt of the pork-packing houses may often be bought for one-third the price of clean salt, and in small quantities, is highly useful. This salt contains much fat, blood, and animal matter. Strewn upon the garden at the rate of five to ten bushels to the acre, in the fall or early in the spring, it has the effect, in most cases, of driving away cut-worms and other injurious insects; it keeps the soil moist, and it aids in the chemical actions which are constantly going on in the soil. My opinion is, that it aids materially in the decomposition of the rocks or silicates in the soil, and no doubt also effects useful combinations with nitrogen and other elements. Ten bushels of salt per acre should not be applied just before sewing seed, as that quantity might prove dangerous to vegetation at first. Smaller quantities may be applied every year.

It is chiefly, however, as a useful agent to mix with fresh lime, that I would recommend refuse salt. One bushel of salt, mixed with three bushels of fresh lime, and at once slacked under cover, and frequently turned, makes a compost, so to speak, of great value. As an agent for decomposing sods or other rough vegetable matter, it is almost equal to potash or wood ashes, and vastly superior to lime alone. As a fertilizer also, applied to rich garden soil, especially sour soils, it is of greater value than lime, and much more economical; for five bushels of it will do the work of twenty bushels of lime.

I may here remark that in my opinion the application of lime is too much neglected by gardeners, both in the garden and compost heap; and I will further add, that it is probable that there is not so much difference as has been supposed between fresh or caustic lime, and old lime or slacked lime. Indeed I am inclined to think that ground limestone (which has never been burned) and ground marble may be quite as useful, in the hands of the gardener, for many purposes where the slow action of lime is desired, as even freshly burned and freshly slacked lime, if not more so. This is a point worth looking into.

Old lime rubbish and effete lime are particularly acceptable to the roots of fruit trees, grape vines, and soft-wooded plants.

One or two more hints on lime. It is very desirable as a top-dressing for lawns. A perfect piece of lawn grass can scarcely be obtained without it. The application should be light, and frequently repeated, and the lime should not be too caustic.

Mr. Henderson, in his recent work on Market Gardening, before referred to, notices the remarkable fact that there is a large tract of land occupied by market-gardeners, at Communipaw, N. J., the soil of which contains a large amount of shell lime, deposited from the ocean, and there the disease known as "club root" in the cabbage has never been seen, although crop after crop of this vegetable has been taken from the soil for many years. Mr. Henderson hence rather rashly assumes that "club root" is caused by an insect, and that shell lime is a certain remedy for it. He does not prove the existence of the insect, nor does he show, by other cases of cure, that lime is the sure remedy. The fact which he states respecting the Communipaw soil is, nevertheless, a valuable one.

### Brick Rubbish.

Old brick rubbish, especially that of soft bricks, is not without value as a fertilizer in the garden. Brick rubbish is, of course, *burnt clay*, and furnishes at least a silicate of alumina, and some lime, potash, magnesia and iron. Under the influence of decaying vegetable matter, brick rubbish will be decomposed in the soil, and will yield up its inorganic constituents to plants in the same way that decaying rocks do. On rich, heavy and moist soils, I think brick rubbish will pay for handling.

### Rotten Rock.

Similar to brick rubbish in quality and in value is rotten rock, or the soft surface stone of some quarries, consisting of shaly and micaceous limestones, which are easily broken with a hammer. This sort of rock, when applied to soils rich in vegetable matter, is readily decomposed, and yields mineral substances of much value to trees and plants.

### Old Headland Sods and Turfy Loam.

The waste land along fences and headlands produces a material known to gardeners as "turfy loam," which in some respects has no equal as a fertilizer for certain purposes, in potting and making borders for plants, and can scarcely be imitated with success by any admixture of other ingredients by either practical or scientific men. "The top spit of an old pasture" has been distinguished, time out of mind, for peculiar and mysterious virtues, which no compost could equal. Simple loam, stable manure, sand and chopped straw, mixed and turned for several months, in a theoretical view of things, ought to be quite equal to the chopped sod from old headlands; but gardeners generally will not admit this to be the fact, and they are probably right. I am rather of the opinion that the sod of the old headlands (say twenty years undisturbed) may be considered as a sort of natural laboratory wherein nature has composted and prepared vegetable and mineral matters in her own skilful and peculiar way, and that the product is something beyond the art of man to imitate. On that old headland the grass and herbage have grown up and died year after year; the rains and dews, the frost aud snow, the chemistry of the atmosphere, have all worked their slow but unceasing and powerful agencies; the poor earth-worms have gone up and down, day after day, chewing up the vegetable fibres and even the sand, and casting this comminuted food upon the surface of the sod; thousands of insects and larvæ, some of them encased in phosphorated shells, have died and decayed in the grass and soil; the very sand itself, and the rocks in the subsoil, have decomposed, and yielded up their precious elements of fertility; chemical changes, as varied as the seasons and the changes of the moon, have taken place in sod and blade of grass, and fibre of root, and in the particles of soil and rock, until at last this precious bit of turfy loam, which the gardener prizes so highly, has been elaborated, possessing a sweet and occult power to revive the exhausted garden or the perverted soil, just as pure air, sun-light, pure water, and the sweet influences of nature always have power to restore diseased and perverted organisms in man or plants the world over.

### Pure Brick Clay.

Pure clay, such as is used for making bricks—the most solid, pure white or colored clays (I do not mean clayey loam)—is an article whose value in the compost heap is but little known. In my opinion it is more valuable than that much coveted material, leaf mould, or fresh wood's earth, for many purposes, and but little short of old sod as a fertilizing agent. As an absorbent of manure, it excels loam, charcoal, land plaster, or any other substance that I know of; but to obtain its best effects in this last respect, it should be mixed with old, well rotted stable manure or leaf mould. Pure brick clay is a compound of alumina, lime, potash, silica, magnesia and iron. It may be called the strongest element of all strong, rich, loamy clay soils. It is not only in itself very rich in the elements of fertility, but it possesses the power of seizing and holding ammonia, and the acids and salts which promote fertility, with a tenacity possessed by no other constituent of soils. When dug out of the clay bank, and exposed to the action of fermenting manures or of frost, pure brick clay crumbles into an almost impalpable powder, and, when mixed with rich composts, absorbs with great avidity the valuable gasses and soluble mineral substances, yielding them up again only when attacked by the roots of living plants. As an absorbent material for compost heaps, I repeat, I think it has no equal; and when saturated with the essence of manures and of guano, I think it has no superior for almost any purpose, especially on light or sandy soils. Applied as a top-dressing to grass, after having passed through the compost heap, its effects will be found truly remarkable. I formerly thought that leaf mould, wood's earth and old sod were the most valuable materials, after stable manure, that could be employed in the compost heap; but since I have discovered the virtues of pure brick clay, I care but little for those substances, except as a useful addition to the clay. Give me plenty of pure clay and rich manure, and I can easily dispense with leaf mould and hotbed material.

### Tan Bark.

I do not hold this substance in much esteem for any purpose. The market gardeners, who have tried it to some extent, all declare that it renders the soil sour and full of grubs. I know that many persons have recommended fresh tan bark as an excellent mulching for strawberries, thinking it not only kept the beds clean, but also acts as a fertilizer, by furnishing tannic acid and carbonic acid. But the usefulness of tan bark for this purpose has been stoutly denied by others, and I must say that I favor this latter opinion. Many practical gardeners assert most positively that when largely used it "ruins the soil." Lime would correct much of its injurious effects, but still it is of little value. Bark is not rich in chemical elements, its ashes, when it is burned, being small in quantity; and as a source of carbonaceous matter, it is hardly worth handling.

### Refuse Charcoal.

The refuse charcoal, obtained from the rectifiers of spirits, from the railroads where wood is burned in locomotives, from old charcoal beds, &c., is a very useful material in the garden. As a mulching about fruit trees, I consider it very valuable. It keeps out frost in winter, it keeps the soil loose and moist in summer, and it does not afford a harbor for mice or insects. In the soil it assists to promote moisture in a dry season, and by its slow decay (for it does decay more rapidly than is generally supposed) it yields carbonic acid gas to plants, and greatly assists in the decomposition of vegetable and mineral matter. It is an excellent mulching for strawberries, in winter or summer.

### Road Sand.

The sand obtained from turnpikes or roads macadamized with any sort of stones like granite, hard blue stones, very difficult to break and pulverize, has a peculiar value. The grinding of such rocks or stones under the iron-rimmed wheels of wagons, the wear of horse-shoes, and the mixture of this ground rock with the manure scattered along the roads, produces a compound which is found to be highly acceptable to trees and plants. The granite rocks, we know, are rich in potash and silica; but it is not these elements alone which give this road sand its peculiar value. By the process of grinding and triturating inert substances, such as oyster shells, charcoal, quicksilver, we develope medicinal and other virtues, which these substances do not possess in their crude form. And so it is supposed to be with road sand. By the constant grinding and triturating of the iron-bound wheels and horse-shoes, the comminuted granite becomes prepared for the use of plants; and when this road sand is mixed with the compost heap and saturated with liquid manure, it is found to help the efficacy of the compost in a remarkable manner. Under the influence of road sand of this kind alone, it is said that when applied to lawns, white clover is sure to spring up in the greatest abundance and luxuriance where it had never been seen before.

### Malt Dust.

In the preparation of malt for the use of brewers, at what are called malt houses, there is produced an article called malt dust, consisting of minute fibres or roots, which start out from the barley when it is partially germinated in the lofts. This material is much employed in England to absorb liquid manure, and to form a mulching for potted plants, in the green-house and in the orchard house. It is a very neat material for this purpose. It does not readily ferment; it is a good absorbent of liquid manure, and, when decayed or decomposed, is somewhat more valuable than common leaf mould. In this city it is much fed to cattle, and the price is too high for ordinary use in the gardeu. It sells for about $20 per ton, and I am told it requires more than one hundred bushels to weigh a ton.

### Cocoa Nut Fibre or Refuse.

In England, cocoa nut fibre is much employed in green-houses, especially in striking cuttings. It is said to be valuable, because it never generates fungus. I am not aware that it can be obtained in any quantity in America.

### Wool Waste.

The waste and sweepings of woollen mills, when free from dye-stuffs, may be considered a valuable manure, though rather unpleasant to handle. The waste is generally bulky, but rich in fertilizing properties when well rotted. As a mulching for fruit trees and grape vines in pots, I have found it very useful, as it decays very slowly.

### Sulphated Marble Dust.

In the manufacture of what is known as mineral water and sarsaparilla, sulphuric acid is poured over ground marble, in order to liberate from the marble the gas with which the bottles are charged, and the result is a semi-fluid mass of sulphate of lime, having all the essential qualities of plaster-of-paris, or land plaster. In the making of the so-called ærated bread, the same process is performed, and sulphate of lime of the same character is produced. This sulphated marble dust has generally been treated by the manufacturers as a waste or worthless substance, and hundreds of tons have been thrown out upon the public commons. Manufacturers of artificial manures have of late years used some of this waste, and other persons who knew its value have collected it. Its precise manurial value I cannot state, but it is evidently worth handling when it can be had for a small sum per ton. The real action of plaster-of-paris, which it closely resembles, is not fully understood by even the most intelligent farmers and chemists. As an absorbent of ammonia, it is not now held in so much estimation as formerly. Still it is a very useful addition to the compost heap. The usual rate of applying plaster, say one or two bushels per acre, is too small to be of any perceptible effect, one way or the other. A ton per acre would not prove injurious to clover or any other crop.

### Iron Filings.

Iron filings and iron turnings, from the machine shops and blacksmith shops, are probably useful, in very small quantities, applied to grass lands, gardens and orchards. They may also be introduced into the compost heap with advantage.

### Old Chip Rubbish.

I mention this to warn gardeners against it. Many persons think decayed chips and decayed wood or sticks useful as an application to the garden and to the orchard. This is probably a great mistake. Even if well decomposed, this material would be too poor in fertilizing qualities to be worthy of any consideration; but in the half-rotted state, in which it is usually seen, it is a prolific source of the most dangerous fungus growths, which assail the roots of nearly all plants, but especially bushes, shrubs and trees. Old chip rubbish should never be admitted into the orchard or garden. Even brush drains, which are sometimes made in gardens and orchards, I look upon as exceedingly dangerous. Thousands of shade and fruit trees have been destroyed by the fungus generated by decaying chips, brush and old roots.

### Glue Waste, Wood Ashes, Animal Charcoal from the Sugar Refiners, Bones, &c.,

Are now so well known, and so much economized, that they can scarcely be considered as waste or refuse substances; nor can they be obtained, as a general thing at reasonable prices.

To the eye of the scientific gardener there is no object of greater or more varied interest than the well managed *compost heap.* Stockhardt, in his Chemical Field Lectures, very elegantly and forcibly says—"From the disgusting substances of decay spring again the living wonders of the Vegetable World."

But it is not as a mere mass of decaying substances of an offensive character, that the scientific gardener views his manurial compost. He sees, in the compost heap, not decay, but chemical change. He sees, within that heap, not vile garbage and offensive waste, but sweet and animating ammonia, pure lime, potash, soda, phosphoric acid, the rare and useful elements of vegetable life and vegetable fibre.

He looks beyond the immediate decay into the very heart of Nature, and sees the genial gases, and the indestructible mineral agents now, by the act of decomposition, being set free from the organic forms which they have assisted to create, and stand marshalled, as it were, on the verge of a new creation, which it is his noble office to inaugurate. In the presence of the compost heap the olfactory nerves of the scientific gardener may be exposed as much as other men's, but "their sense is shut." The influence of habit, in this respect, is wonderful. I have read of a band of distinguished Esquimaux who, upon being shown all the delights and splendours of Paris, its gay streets and gardens and brilliant saloons, begged to be permitted to retire, for a time, into a darkened room, in order to enjoy in their peculiar way, a good feed of train oil and tallow. The scientific gardener does not belong to this low order of mankind; but still he is not disturbed by disagreeable emotions, as many other persons are, by the sight of decaying organic matter.

An eminent writer on the Philosophy of Pleasure says:—

"Some of the most delicious perfumes and flavours, as those of the Pine Apple, can be made from the most noisome substances, with the slightest chemical changes. A few years ago there were sweetmeats held in great regard by the palates of the young. They were called Fruit Drops. Among them was a ball of sugar, shaped like a pear, and it had the perfect flavor of the old French Jargonelle. Suddenly these fruit drops went out of repute; nobody would buy them: hardly would one venture to speak of them; the confectioners, who had invested in these wonderful sweetmeats, found that their stock was useless. In a single night they had been blighted. A chemist had been heard to say, in a popular lecture, that he could go into any stable and take from its drains a product which, by the veriest fraction, he could convert into these delicious fruit juices. Intelligence of this fact speedily spread far and wide, and all the little boys in the land resolved that, henceforth, for them there should be no more pear drops."

Now the delicious juices of fruits, the brilliant colors of flowers and the delightful aroma of grapes, all find their elements in the compost heap. Resulting from decay, they are purified by chemical change, and often are converted into brilliant crystals before they enter the substance of plants, which possess a wonderful power of selecting what is suited to their nature, and rejecting what is injurious and offensive. So that the plant, or flower, or fruit, which is produced by these agencies, is as pure as sunlight itself.

But the compost heap need not be an offensive object. Put into it all the waste substances, such as I have enumerated, that you can find—recollecting that the heap does not absolutely *create*, and, therefore, cannot make much out of little,—and do not forget constantly to add fresh lime, or lime and salt,—and upon each layer of six inches or one foot of waste material, place two or three inches of old sod or good clay loam, and you will have no offensive odors arising from the chemical changes. Good strong loam or, better still, pure brick clay, will be found the most powerful and valuable deodorizers that can be employed; and even the most fastidious in such matters will then cease to complain of your compost heap.

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London has a society for the saving of life from fire, by means of which 89 persons were rescued during the last year, from 610 fires. The force is 100 strong, with 85 escape stations.

The curious fact has been observed by means of the microscope that perforations made by the electric spark are uniformly pentagonal in form

Why do honest ducks dip their heads under water? To liquidate their little bills.

# Machinery and Manufactures.

## How Cast Iron is made.

Under the head of "Familiar Science," the *Scientific American* says:—Many of our readers probably suppose that what we commonly call iron is an elementary natural substance, and would be surprised to learn that like steel it is an artifical article of a complex character, answering to nothing found in nature. At the same time it is remarkable how imperfectly both the character and the formation of an artificial product may be understood by those who make it. It is not many years since real iron was first refined from the chemical compound of that name, and found to be a white soft metal, looking like silver and easily pared with a knife. Even now, no one can tell us precisely what is done in the interior of those great, glowing piles where "ironstone" is melted up with limestone and comes out in the hard, brittle, granular, gray substance known as cast iron. It is a process that has come down to us from antiquity, where it was developed by experiment with little aid from science. Important as the improved and extended iron industry is to modern life, it is impossible for us to conceive of the hungry need that pricked on the primitive men in their search for the precious material of tools and above all of weapons. Nothing else could account for the success with which they felt their way to processes and results in manufacture, of the chemical nature of which they had not the slightest conception, and which we but imperfectly understand. Mr. Wm. Crossley, manager of the Ormesby Iron Works, England, in a series of papers lately published in the *Chemical News*, confesses this singular ignorance, and gives his theory of the process, and what it ought to be, from which we have already quoted as interesting to our more expert as well as youthful readers.

A blast furnace, we should first explain, is not a mere melting furnace, but a chemical retort for separating oxygen from the oxide of iron, by means of the superior affinity of the former for carbon. It is substantially an upright tube, varying from fifty to a hundred feet in height; not to afford a chimney draft, for that is superseded by a mechanical blast, but to afford room for the chemical process demanded. By this process the iron is set free from the oxygen to which it had been subjected in the state of nature; but it exchanges that master for another—carbon—making it a carbide of iron, impure with other foreign matters, such as sulphur and phosphorus, which it derives from nature or the fuel or minerals in which it is smelted.

The smelting retort, as we will contiue to call it, is made of various diameters, according to the height, and the weight of ore intended to be reduced at a charge. Some lately built are as much as 102½ feet in height and 29 feet inside diameter. First, a hot fire of coke or charcoal is made on the hearth at the bottom, fed from the top and gently urged by a pressure of air through two tweers or inlet tubes, 2 to 4 inches in diameter, placed near the bottom and connected with blowing engines which will be made to drive a blast of great power through the retort, as soon as it is charged with ore. On the top of the fuel, which extends in the first place well up the shaft, the ore is fed in, mixed with limestone, both previously calcined by roasting in the open air, to drive off moisture and organic matter. The ore consists of iron in combination with oxygen, and this oxide (the same thing as "rust") is also mixed with various proportions of earthy matter which is chiefly silicic acid. To disengage this earthy matter from the ore, and to prevent the ore when melted forming with the silicic acid a silicate of iron (glass) and thus being lost, limestone is mixed with it, and the first effect of the hot gases passing upward is to decompose this as in a lime kiln, yielding lime. The lime, and the silicic acid or earthy matter mingled with the oxide of iron, now begin to act upon each other and form a crude silicate or glass, which will soon be easily melted and is then called slag. It is probable that at about the same time the carbonic oxide (carbon imperfectly oxidized, having only half the oxygen it will take) finds the iron oxide sufficiently heated and freed to deliver up its oxygen, which the carbon seizes, becoming carbonic acid, and leaving the iron free from oxygen and ready to melt as soon as it has settled a little further down into the intense heat. Here the slag or impure silicate melts, and a little later and lower the freed iron also melts, and at the same time probably combines with a portion of carbon from the fuel and thus subjects itself to what we have called its new master, becoming a carbide as it was before an oxide of iron. The carbide of iron (which we will call iron for shortness, and because we used to think it so) falls by its gravity to the bottom or hearth, the slag swims on its surface, and the chemical work is done. The workmen open a door just at the level of the surface of the iron, and haul off the slag from it, after which a small hole at the bottom of the hearth is opened, and the iron runs out into molds.

This operation has occupied from 24 to 48 hours, according to the height of the retort, and meanwhile alternate charges of fuel and minerals are fed in in at the top until the whole retort is filled and kept full by continued charging as fast as the contents descend and make room.

Entering (mentally) with the blast at the bottom of the retort, let us trace the operations of the fuel and air ascending the shaft, as we have traced the descending materials, ore and limestone.

For many ores such a degree of heat is required —and for most it is advantageous—that the air blast must be heated before it enters. The blast has lately been brought to a temperature as high as 1,100°, and a great advantage in the heat from a given fuel is obtained by feeding it with hot air —Mr. Crossley thinks four fold, up to the point where the blast shall be as hot as the fire itself. The first operation is probably the formation of carbonic acid by the union of two parts oxygen with one of carbon, and this evolves heat enough at this point to enable another portion of the carbon to recover an equivalent of oxygen from the carbonic acid, reducing the latter to carbonic oxide, which ascends until it meets the iron oxide and regains from it one equivalent of oxygen, becoming again carbonic acid and leaving the iron free, as we have before seen. In the improved modern furnaces, the carbonic acid, escaping carbonic oxide, free carbon or smoke, and other gases, are caught at the top of the shaft in contrivances for the purpose and taken off in pipes to reservoirs, whence they are fed into independent furnaces and burned with other fuel and air blast, to heat the blast for the smelting furnace and raise steam for the engines.

## Aluminium in Dentistry.

Dr. J. B. Bean announces in the *Dental Cosmos* that he has succeeded in discovering a process for fine casting in aluminium, which will enable the profession to make plates for artificial dentures preferable in all respects to those of any other material, from gold to vulcanite. In strength and rigidity he affirms that the aluminium plate, when properly cast with very slight and suitable alloy, is far superior to gold and platinum of the same condition and thickness, while its extreme lightness is one of the most desirable of qualities. In cleanliness nothing can be better: it has no more taste than porcelain, its brilliancy is much more lasting than that of silver, plates worn for weeks without cleaning exhibit no change, and sulphur and sulphuretted hydrogen, which attack silver and gold, have no effect whatever on aluminium. Its lightness is the great difficulty in casting it in fine molds, and a peculiar process had to be originated, which the inventor generously declines to patent, although he thinks the apparatus used should be covered by a patent, as an article of manufacture. Eminent dentists are said to have pronounced it "the great desideratum attained."

## The Past and Future of the Steam Engine.

What have we done in steam engine improvement since the time of Watt? Absolutely nothing, except in the employment of such better workmanship and materials as have resulted from the extension of manufacture and efflux of time. We use more malleable iron in the working parts; the nicety of our workmanship is greater; and the superior strength of our boilers and the diminished prejudices of the public enable us to employ a somewhat higher pressure of steam. But expansion, steam-jackets, surface-condensation were all used by Watt, and are only considered innovations by some persons because they were first abandoned and then resumed. Super-heating was at one time expected to do a great deal for us; but, after all, it is found that an amount of super-heating, such as was obtained in the old flue-boilers with the root of the chimney passing through the steam-chest, is most advisable. In smoke-burning we have done no better than Watt did, and after more than half a century of effort we are forced to come to the humiliating conclusion that in the steam engine we have made no tangible improvement at all. High-pressure steam was as well known in the time of Watt as it is now; but at that time the prejudices against it were greater than they are now, and the manufacture of boilers was in a ruder state. But up to the present time the use of high-pressure steam worked very expansively, though known to be productive of economy of fuel, has been little adopted in steam vessels, where such economy is most important; the prejudices against its use being still such as to hinder its employment. The largest field into which the condensing steam engine has been introduced is that of steam navigation, and at the present moment the most improved modern marine engine acts with little, if any, more efficacy than one of Watt's old engines using the same pressure of steam. This being its present state, let us now see what improvements are available.

And, first, there is no longer any reason why some such pressures of steam as 100 lbs. on the inch should not be introduced. Of what avail is surface-condensation if advantage is not taken of its presence to introduce high pressure? But the boilers! There, no doubt, lies the difficulty, and how is it to be surmounted? We answer, by the employment of square haystack boilers of large dimensions, with the external and internal shells stayed together, like the fire-box of a locomotive, and terminating in a pyramidal dome, with sufficient room within to permit the withdrawal of the upright tubes in which the water circulates. The external water space should be sufficiently large to return rapidly any water carried upwards through the tubes by the ascending steam. and the tubes should not be very long or large in diameter, but each tube should have a short loose piece of tube inserted in its mouth below the water, so as to increase the length of the ascending column, and consequently the ascensional force. In both the surface-condensers and the boilers the arrangements should be such as to insure the rapid circulation of the water, that condition being of the last importance to produce efficiency in the heating or cooling surface. Then *all the furnaces should be gas furnaces.* In firing the furnaces of steam vessels as at present constructed the labour is enormous, and the work is ill and dearly done. It is difficult, especially in a sea-way, to throw in the coals so as to cover the grate evenly, and so that there shall be no holes through which the cold air may enter to cool the furnace without promoting the combustion. Besides, once every watch, while the vessel is on her voyage, a certain number of furnaces has to be entirely emptied and lighted anew, so as to clear them of the clinker, which would otherwise choke up the bars of the grate. If, however, the coal were raised by an endless screw into the gas-generator, in the lower part of which a rapid combustion should be maintained, the clinker could be run out like the slag in an iron furnace. To increase the efficacy of the heating surface and diminish the size of the boiler, the air by which the combustion of the gas is maintained should be heated to 1,200°, or more, by the smoke or vapors escaping from the furnace. The feed-water should be used as injection to condense the educted steam, so that it might be heated to the highest possible point before being sent into the boiler. It would not be difficult to introduce an arrangement like Sterling's regenerator to heat the entering air by the escaping smoke, or rather vapors, as there would be no smoke under the proposed arrangement.—*Engineering*

## Imitations of Gold.

Oreide, the beautiful alloy resembling gold, manufactured in Waterbury, Conn., is a French discovery, and consists of pure copper 100 parts; zinc, or (preferably) tin, 17 parts; magnesia, 6 parts; sal ammoniac, 3.6 parts; quicklime, 1.8 parts; tartar of commerce, 9 parts. The copper is first melted, then the magnesia, sal ammoniac, lime, and tartar in powder, are added little by little, briskly stirring for about half an hour, so as to mix thoroughly; after which zinc is thrown on the surface in small grains, stirring it until entirely fused; the crucible is then covered and the fusion maintained for about thirty-five minutes, when the dross is skimmed off, and the alloy is ready for use. It can be cast, rolled, drawn, stamped, chased, beaten into a powder or leaves, and none but excellent judges can distinguish it from gold. Another beautiful alloy rivalling the color of gold, is obtained with 90 per cent copper and ten per cent aluminum, which must be perfectly pure, of the best quality, and in exact proportion. It is little affected by the atmosphere, and is strong, malleable, and homogeneous in structure.

## Pneumatic Despatch Tube in Paris.

The tube connects the telegraph stations at the Bourse and the Grand Hotel, and is the first installment of a complete system throughout Paris. The method adopted is the reverse of our own, namely, the elasticity of compressed air in place of a partial vacuum, so that neither an air-pump nor a steam engine is required. The power used is water from the reservoirs of the city of Paris, which gives an ascension of rather more than fifty feet. There are three vessels, made of iron plate, and measuring each about 1,200 gallons; the first of these receives the water and effects the compression, the two others are the compressed air. As the water arrives the air within the first vessel is of course forced into the other two, which are connected with it by a valve opening inwards. When the first vessel is filled with water, another cock is opened, the liquid is allowed to run off and the air to enter by means of a valve provided for the purpose; the operation is then repeated and the effect is the production in the two condensers of a pressure equal to about two atmospheres. The tube that connects the two stations is of cast-iron, about 3,500 feet long and 2½ inches in diameter, having its termini in two chambers with tightly-fitting doors, which allow the piston dispatch-box to be placed or withdrawn from the tube without difficulty. This carrier is a small brass cylinder, four or five inches long, closed at one end, and with a moveable cover at the other. It will contain about forty dispatches in envelopes. Five minutes are found to be sufficient in practice for the piston to make the double journey. The time occupied in the passage of the dispatch-box in one direction is sufficient to produce the necessary pressure for the return.—*The Engineer.*

## Cracking of Upper-leather and Calf-skins.

The principal cause of the cracking and rottenness of upper leather and calfskins is a want of care in cleaning the lime from the hide or skin. Every leather manufacturer knows that lime left in the hide or skin is extremely injurious, that it tends to make the leather hard and brittle, and that the processes of tanning and currying will not entirely eradicate it, although the leather may be thoroughly scoured. Another cause is the use of too hot and too strong liqours in tanning, both of which tend to burn the leather and destroy its elasticity, and being aware of this fact also, the manufacturer attempts to counteract the ill effects already apparent by stuffing the hide or skin with grease or oils, with which he mixes a large portion of petroleum. When the leather is put into the market, it will perhaps have a plump, soft, and elastic, and at the same time a firm, feeling. The boot manufacturer, in his examination of the leather by its general appearance, is induced to purchase, but soon maledictions are cast upon his head by his customers, and he, void of all patience, exclaims, "Where can I buy some *good* leather?"

These remarks do not apply to all manufacturers, nor do they go to show that there has been no improvement in leather, but the trade of those who manufacture a good article is injured by the negligence and bad practices of others. A reform is needed; let us have it, and become better Christians, for the swearing that is done over rotten and leaky boots is fearful to think of.—*Shoe and Leather Reporter.*

### Band Saw-blades.

M. Perin, of Paris, (France), manufactured band saw-blades from one-sixteenth of an inch to eight inches in width and up to fifty feet in length.

### Tanning with Chesnut Wood.

Tanning with Chesnut Wood has been introduced to the notice of "La Halle aux Cuirs" of Paris, by J. Algetiere, jr., a tanner at Lyons. He claims that the tannin obtained from this source instead of the bark, makes leather of peculiar fineness, uniformity and excellence of color, and superior quality in all respects as compared with the best oak tanned.

## Useful Receipts.

### Liquid Blacking.

I. Take ivory black 5 oz., molasses 4 oz., sweet oil ¾ oz., triturate until the oil is perfectly killed, then stir in gradually vinegar and beer bottom of each ½ of a pint and continue the agitation until the mixture is complete.

II. Take ivory black 1 lb., molasses ¾ lb., sperm oil 2 oz., beer and vinegar each 1 pint; proceed as before.

### Durable Wash for Out-buildings.

Having received several letters propounding divers questions relative to a substitute for paint for out-buildings, to which I alluded at the last session of the Board of Agriculture, will you permit a space in your columns to say the ingredients are unslacked lime, white vitriol and salt—the proportions one bushel of lime (slacked with hot water), two and a half pounds of white vitriol and four pounds of salt—to give a drab color add half a pound of French blue and two pounds of Indian red—whole cost $1.10 for wash enough to give 7000 square feet two coats of paint that will wear like iron.—*Maine Farmer.*

### Gutta-percha Cement.

Gutta-percha cement is made by dissolving that body in chloroform, so as to produce a honey-like fluid. This is spread upon the articles to be secured and allowed to dry. The pieces are then warmed until the coating softens, and are pressed together. Patches of leather may be thus put upon boots in a manner which defies equally detection and dampness.

### Rubber Cement.

Caoutchouc 3 parts, naptha 34—heated and stirred to a solution—then add finely powdered shellac 64 parts.

### Hard Hydraulic Cement.

A cement which is said to have been used with great success in covering terraces, lining basins, soldering stones, etc., resisting the filtration of water, and so hard that it scratches iron, is formed of sixty-three parts of a well-burned brick and seven parts litharge, pulverised and moistened with linseed oil. Moisten the surfaces to which it is to be applied.

### Iron and Stone Cement.

A German chemist prescribe six parts of Portland cement, one part nicely powdered lime, burnt but not slacked, two parts of sand, and one part of slacked lime, mixed with the necessary quantity of water, used as filling between stone and iron, both being previously damped. After forty-eight hours the cement will be nearly as hard and durable as stone.

### Glue for Metals.

Melted glue 16 parts, in which mix gum ammoniac 1 part and then add 1 part saltpetre acid.

### Glyconine.

Four parts weight of yolk of eggs, with five parts of glycerin, make an unctuous compound of the consistency of honey, unalterable by the atmosphere, and forming an inoffensive covering for sore and injured parts, impervious to air, yet easily removed by water.

### Paraffine Water-proof.

Dr. Stenhouse, says *Chambers' Journal*, announces that leather may be made water-proof and its durability doubled at the same time, by applying repeated coatings of paraffine and oil, the absorption being assisted by warmth.

### Putting up Flowers for Winter.

Some of our fair friends, when about canning fresh fruits for winter store, may perhaps like to put up a few fresh flowers. We give them a newspaper method for trial. Cut choice buds just ready to open, with a good stem, say three inches long, the end of which is to be immediately covered with sealing wax. Dry the buds partially in the air, and wrap each in a piece of soft paper, clean and dry, and fasten them up in a tight dry box. When wanted, take them at night, out of the sealed end of the stem and put them into water containing a little nitre or salt. The next day or thereabout, the buds may be expected to expand.

## Hydrophobia.

Crystals of nitrate of silver rubbed into the wound, are perscribed by Youatt, who has been bitten eight or ten times by rabid animals. It is a disease to which the susceptibility of individuals seems to vary so remarkably that no remedy has yet been found generally applicable.

## Improvement in Matches.

To avoid the use of phosphorus in matches, the third edition of Knapp's Technology proposes the introduction of nitromannite (8 parts) with 3 of sulphide of antimony, 16 chlorate of potash, 1 bichromate or potash, 10 red lead, 4 powdered glass, and 5 gum. Nitro-mannite is prepared by treating mannite with nitric acid or a mixture of nitric and sulphuric acid, in the same way as cotton for the manufacture of gun cotton.

## Water-proof Composition for Leather.

Melt together 1 lb. tallow, ½ oz. neatsfoot oil, 1 oz. of rosin, ½ oz. lamp-black and a tablespoon full of boiled linseed oil. Should be rubbed in repeatedly, the boots or other articles to be warmed. It is said to be perfectly water-proof and not injurious to the leather.

## How to make Super-phosphate.

To one hundred pounds of water in a half hogshead tub, add slowly forty-three pounds sulphuric acid (oil of vitrol.) To this add one hundred pounds of broken bones. To be stirred occasionally and the bones will be dissolved in three weeks. Then add four times its bulk in muck, (dry if you have it.) The tub should be kept covered. If the material is kept hot, three days will do it as well as three weeks, if cold.

To dissolve bones without acid. To a flour barrel full, put one-half bushel hard wood ashes, then alternately a layer of bones and ashes, ending with ashes; add water sufficient to wet, but not to drip, (brine is much better.) In time these bones will dissolve. This mixture is a cheap and powerful fertilizer.

## Bleaching Process of Mothay and Rousseau.

The article to be bleached is immersed in a solution of permanganate of soda, which has been rendered slightly acid, and is stirred about for a few minutes, with a glass rod. It is then plunged into a solution of sulphurous acid, which removes the violet brown oxide of manganese deposited upon it in the first bath. After the successive immersions in the two fluids have been repeated two or three times it is found to be beautifully white, without its fibres being the least impaired in strength. In this, as in all the processes which have been used for bleaching, oxygen is the agent which destroys the coloring matters; but is here applied in the form of ozone, which is disengaged from the permanganate by the organic matters.

## Straw and Clothes Bleaching.

Bolley states that the hypo-chlorite of magnesia bleaches much more quickly than that of lime, with the further advantage in the case of straw goods, that it bleaches directly as well as quickly, without first coloring the straw brown as does the hypochlorite of lime. Magnesia being a much weaker base than lime, parts with the chlorine much more quickly.—The great bleacher is oxygen, and in the form of ozone, nothing oxidable can withstand it. Ozone is said to be rapidly formed when turpentine is exposed to the air, and the writer who mentions this (in a German periodical) recommends laundresses to add to their rinsing water a little pure rectified oil of turpentine mixed (which can be done only by distillation) with twice as much strong alcohol. No smell will remain in the fabric after drying.

# Practical Memoranda.

## Fruit Essences.

*Dingler's Polytechnic Journal* gives the following table of the composition of artificial fruit essences, showing the number of parts of each ingredient to be added to 100 parts of alcohol—all chemically pure. Glycerine is found in all—it appears to blend the different odors, and to harmonize them :—

| | Glycerine | Chloroform | Nitric Ether | Aldehyde | Acetate of Ethyl | Formiate of Ethyl | Butyrate of Ethyl | Valerianate of Ethyl | Benzoate of Ethyl | Œnanthylate of Ethyl | Sebacic Ether | Salicylate of Methyl | Acetate of Amyl | Butyrate of Amyl | Valerianate of Amyl | Essence of Orange | Alcoholic solutions saturated in the cold of Tartaric Acid | Oxalic Acid | Succinic Acid | Benzoic Acid |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Peach. | 5 | | | 2 | 5 | 5 | 5 | 5 | | 5 | 1 | 2 | | | | | | | | |
| Apricot. | 4 | 1 | | | | | 10 | 5 | | 1 | | 2 | | 1 | | | | 1 | | |
| Plum. | 8 | | | 5 | 5 | 1 | 2 | | | 4 | | | | | | | | | | |
| Cherry. | 3 | | | | 5 | | | | 5 | 1 | | | | | | | | | | 1 |
| Black Cherry | | | | | 10 | | | | 5 | 2 | | | | | | | | 1 | | 2 |
| Lemon. | 5 | 1 | 1 | 2 | 10 | | | | | | | | | | 10 | | 10 | | 1 | |
| Pear. | 10 | | | | 5 | | | | | | | | 10 | | | | | | | |
| Orange. | 10 | 2 | | 2 | 5 | 1 | 1 | | 1 | | | 1 | 10 | | | 10 | 1 | | | |
| Apple. | 4 | 1 | 1 | 2 | 1 | | | | | | | | | | 10 | | | 1 | | |
| Grape. | 10 | 2 | | 2 | | 2 | | | | 10 | | 1 | | | | | 5 | | 3 | |
| Gooseberry. | | | | 1 | 5 | | | | 1 | 1 | | | | | | | 5 | | 1 | 1 |
| Raspberry. | 4 | | 1 | 1 | 5 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | | | 5 | | 1 | |
| Strawberry. | 2 | | 1 | | 5 | 1 | 5 | | | | | 1 | 3 | 2 | | | | | | |
| Melon. | 3 | | | 2 | | 1 | 4 | 5 | | | 10 | | | | | | | | | |
| Pineapple. | 3 | 1 | | 1 | | | 5 | | | | | | | 10 | | | | | | |

## Capacity of Cisterns.

The Iowa *Homestead* has an illustrated article on cisterns showing the several forms in which they are made. The capacity of those of cylindrical form is thus given:—A cistern five feet in diameter will hold a fraction over five barrels to each foot in depth.

6 feet a fraction over 6 barrels to each foot
7 " " 9 " "
8 " " 11 " "
9 " " 15 " "
10 " " 18 " "

## Ozone as a Disinfectant.

Get a wide-necked bottle and put in half a pint of water, with a cork floating at the top; on this cork fix a bit of phosphorus; cover the bottle with another bit of cork very loosely. This apparatus may be moved from room to room, remaining till the characteristic smell of ozone is perceived.

## Sharpening Files.

J. S. C. of New York City, says that when files become clogged and dulled they should be bathed in strong potash water to remove all grease, and then immersed endwise in a jar of one gallon soft water, two ounces tartaric acid and half a pint of sulphuric acid. Let them remain a few hours, remove them and after washing in clear water put a little oil on the teeth. A second immersion in the acid before oiling and after washing is sometimes an advantage. The acid etches the teeth, or rather the interstices, and sharpens the file. We have heard of this before, but have never tried it. —*Scientific American.*

## Alloys of Steel with Platinum.

Are said to be very perfect in every proportion that has been tried. The best proportion for edge instruments is about 1·5 per cent of the latter metal. Equal parts by weight form a beautiful alloy which takes a fine polish and does not tarnish; the color is the finest imaginable for a mirror.

## Golden Color Alloy.

An alloy which exhibits a yellow golden color, is readily forged like iron, and easily worked by the file, consists of 4·06 parts iron, 55·33 parts copper, and 41·8 parts zinc.

## Hard Cast Iron.

Extremely Hard Cast Iron has been made by M. Gaudin by introducing a small quantity of boron, and lately, by combining the fused iron with phosphate of iron and peroxide of manganese.

## To Remove the Taste from New Wood.

A new keg, churn, bucket, or other wooden vessel will generally communicate a disagreeable odor to anything that is put into it. To prevent this inconvenience, first scald the vessel with boiling water, letting the water remain in it till cold. Then dissolve some pearlash or soda in lukewarm water, adding a little bit of lime to it, and wash the inside of the vessel well with the solution. Afterwards scald it well with plain hot water, and rinse it with cold water before you use it.

## Worm Eaten Wood.

Worm eaten wood may be saved from further ravages by fumigating it with benzine, whereby the worm is destroyed. Another way is to saturate the wood with a strong solution of corrosive sublimate—a process which may be advantageously employed to protect carvings in wood. But as sublimate destroys its color, it will be necessary to restore the latter by ammonia, and then by a very dilute solution of hydro-chloric acid. The holes made by the worm may then be ejected with gum and gelatine; and a varnish of resin, dissolved by spirits of wine, should afterwards be applied to the surface.

## The Engineer's Alphabet.

First obtain a fair familiarity with the mode of working out all ordinary arithmetical questions, and also a knowledge of algebra as far as simple equations. Learn also the elementary problems in mensuration, and how to measure heights and distances, and how to level and survey land.

Next gain some general knowledge of the principles of chemistry and of geology, and of the qualities of stones and cements, the action of the tides, the force of the winds, and the amount of rainfall.

Next obtain a thorough familiarity with the strength of materials, and acquire a distinct apprehension of the laws of virtual velocities and of the conservation of force.

The law of virtual velocities enables the strain placed upon any part of a machine or structure to be immediately computed when we know the weight or force applied to any other part, and by this expedient, joined to a previous knowledge of the strength of materials, it can easily be determined whether any machine or structure is strong enough. Thus in a crane, if the interposed gearing is such that the travel of the handle through 100 in. will cause a tooth of a certain wheel to move through 1 in. then we know that the strain upon that tooth will be 100 times greater than the force applied to the handle, and so in all other proportions. So, also, in a beam or girder of iron of which the top flange is imcompressible, if we wish to determine the breaking strain acting upon the bottom flange when the beam is loaded in the middle, we have only to suppose that the beam has been broken, and if we find that the broken edges separate only 1 in. while the weight falls through 6 in., then the strain at the edge of the beam seeking to sever it is six times greater than the weight.

The law of the conservation of force teaches that a force once existing cannot disappear except in the creation of some equivalent force, and one corollary of this law is that no form of mechanism can create power. Hence in a steam engine, if the steam were to be condensed by a jet of cold water immediately as it issued from the boiler a certain volume of hot water would be produced. But if the same steam be allowed to flow through the engine, and be finally condensed in the condenser, the resulting volume of hot water will be less in proportion of the power exerted by the engine. Heat being a form of power, it follows that if a certain portion of it goes to generate mechanical power in the engine, there is less to expend in raising the temperature of the water by which the steam is condensed.—*Engineering*

## Fireman's Protector.

A fireman's protector, recently tested in Quebec, consists of a finely perforated brass ball attached to the nozzle about where it joins the hose, so as to present itself toward the fireman, when playing upon the fire, and to throw over him a heavy spray of water as a protector from the heat.

# Miscellaneous.

## Value of Bones.

The following, from the pen of S. Edwards Todd, agricultural editor of the New York *Times*, carries a "big hint" to the mind of every agriculturist in the country. If it will pay to collect bones for transportation and consider them a commercial article of much value from a country where all labour and material is as high as it is in the United States at present, or export them some thousands of miles to countries where all labour and products are far cheaper than where these same refuse fragments are gathered, then it certainly *will pay* to employ them at home; and if once used, we feel assured that their value will soon be known. It is certainly time that some attention should be called to this subject in all parts of the country. Exceptions there are in many places where the value of bones is well known, but this value ought to be more generally and universally appreciated:—

"If there is any one practice among American farmers for which they deserve sharp rebuke, it is for permitting such immense quantities of bones to be exported for the improvement of the agriculture of foreign nations. Thousands of tons of bones are collected annually in Chicago, Buffalo, New York, and other populous cities, and shipped to European countries to fertilize the land for raising turnips, wheat, fat cattle, and sheep. And yet American farmers in stupid quietude look on and say, 'It don't pay to collect bones and apply them to the soil.'

"It *will* pay. They have not tested the application of ground bone. There is not a meadow nor a pasture in the land—with very few exceptions—that will not be greatly benefited by a dressing of ground raw bone. Thousands of acres of the best farming land in New England is in a low state of impoverishment for the want of a liberal dressing of ground raw bone. Such fertilizing matter is the very life of the soil. European farmers understand and appreciate this fact. They know it pays to ship bones from America to enrich their farms. Every shipload of bones that is picked from our land injures the agriculture of our country. England delights in the excellence of choice cheese of American dairies, while we mutter and grumble over a pot of the whey. Europeans rejoice over the rich, sweet American butter while we are so unaccountably stupid as to be satisfied with the buttermilk. Our farmers dig, and delve, and rake, and scrape their grain-fields, meadows and pastures, to get phosphatic fertilizers to send to Europe to produce big crops of turnips; and then grumble and denounce their own land as good for nothing, because their turnips refuse to grow as they do in eastern countries.

"The truth on this point is, American farmers must save and apply more manure to their impoverished land; especially must they save bones for growing a crop of turnips. As soon as we can produce a bountiful crop of turnips on a wheat soil, we can grow wheat. Wheat and turnips in England go hand in hand.

"There is a volume of truth in the old maxim:—

"'No bonedust, no turnips; no turnips, no wheat;
No wheat and no turnips, no cattle, no meat;
No turnips, no cattle, nor manure in the yard,
Make bills for the doctors, and farming go hard.'"

—*American Artizan.*

## Acetylene.

A colorless gas, consisting of two equivalents each of carbon and hydrogen, is contained in small quantities in coal gas, and is supposed to have been the cause of certain mysterious and hitherto unaccountable gas explosions. It may be separated from the coal gas by passing the latter through a solution of ammonia-sulphate of copper, precipitating a reddish brown deposit of acetylide of copper. This being very explosive, igniting with slight friction, is supposed to have been the cause of several explosions which have occurred in moving copper gas pipes and in altering meters where the brass work had been much in contact with the gas, and a deposit of acetylide of copper might naturally have been formed. It is a curious fact that if chlorine gas is turned into a jar of acetylene gas even in darkess, an explosion will ensue, but not so if the acetylene be turned into the chloride, unless a moderate degree of light be present. In the latter case, the chlorine unites with the hydrogen, setting the carbon free, so that the vessel, which previously held a mixture of colorless gases is instantly filled with a mass of inky black smoke, giving the jar the appearance of patent leather. These observations, says the *Scientific American*, are derived from a late lecture by Prof. Frankland.

## Drainage.

The Metropolitan Sanitary Commission of London compute that for every inch depth of water drained off, and which would otherwise pass into the air as vapor, as much heat is saved per acre as would raise eleven thousand cubic feet of air one degree in temperature. A farmer was asked the effect of some new draining, when he replied, "All that I know is that before it was done I could never get out at night without an overcoat, but now I never put one on." A physician took one of the Sanitary Commissioners to a hill overlooking his district. "There," said he, "wherever you see those patches of white mist I have frequent illness, and if there is a cess-pool, or other nuisance as well, I can reckon on typhus every now and then. Outside these mists I am rarely wanted."

## Snow Animalcules.

A distinction is observable between the taste of snow water and that of rain water, and the use of the former in parts of Switzerland is thought to be the cause of peculiar affections of the throat, including *goitre*. The discovery of numerous shrimp-like animalcules in snow water, by a distinguished chemist, has suggested a possible connexion between them and the unwholesomeness of snow water. They prove at least that life is not restricted to the conditions of temperature with which we usually associate it. The fluids which give mobility within these organisms must be such as, unlike those of animals, and alcohol, resist extremes of cold.