THE NEW ENGLAND COTTON MANUFACTURERS' ASSOCIATION.

THIS organisation held its sixty-seventh meeting at Montreal in October last. By the change of going out of the country in which it was organised, a radical movement was made which has resulted in one of the most profitable meetings of this time-honoured Association.

The New England Cotton Manufacturers' Association is a unique organisation, being somewhat outside of the usual lines of technical societies, although it is strictly one of them. It was formed in April, 1865, from a nucleus of the managers of New England mills, and has ever since kept the position of manager of a mill as a qualification for active admission. Its growth of membership has far exceeded the original scheme, and it now includes members from the whole of the cotton-manufacturing districts of the United States, and also of the Dominion of Canada.

Members and guests to the number of 160 made a rendezvous at Boston, from which place they journeyed by a special train of Pullman cars to Montreal, where they were joined by others, increasing the number to about 200.

The meetings were held in the hall of the Windsor Hotel, where they were officially welcomed to the city by His Worship, Raymond Prefontaine, Q.C., M.P., Mayor of Montreal, who expressed himself most happy at the privilege of extending a welcome, on account of the large number of his fellow-countrymen, the French Canadians, who were in the United States, actively engaged in cotton manufactories. Mr. A. F. Gault, President of the Montreal Cotton Company, and also of the Canadian Coloured Cotton Mills Company, joined in a cordial greeting to the visitors; he was followed by Mr. A. A. Ayer, President of the Merchants' Cotton

Company, who expressed his gratification that the invitation to hold the meeting at the metropolis of the Dominion of Canada, had been accepted by the Association.

The address of the President, Mr. Frederick E. Clarke, of Boston, began by gracefully acknowledging the cordial hospitality which had been given to the Association which he represented, and whose bonds of propinquity and commercial interests were such that they had the privilege of coming as neighbours and friends, and not merely as guests. His address was devoted to the great range of the realms of science as tributary to the cotton manufacture, and the high line of intellectual work which had been applied to the improvements in machinery and the organisation of textile establishments, all of which have been followed by the light of the wisest and most prudent conservatism.

The papers of the session began with one on 'Export Trade," by Mr. D. A. Tompkins, President of the Atherton Mills, of Charlotte, N.C. The author began by stating that the textile production of the United States was sufficient in eight months for a year's consumption, and that during the other four months the mills must stop, or foreign markets receive the surplus; this shows a great difference in the conditions which prevailed a few years ago when the Southern States were agricultural, with far different conditions relative to the tariff than those which were best for the manufacturing States of the North; it was these differences of needs which underlay the sharp divergence of feeling a generation ago, but which did not exist a century earlier, when both North and South were virtually agricultural communities. Among the imperative duties of the United States, he dwelt upon the importance of the completion of the Nicaragua Canal, and the perfection of the United States Consular service, bringing it upon the same basis as that of England, and putting it under Civil Service rules, where it would be of use to the mercantile and manufacturing interests of the country, and not simply an aid to political ends. The development of the shipping and banking interests of the Oriental trade were also matters which should receive special attention.

Mr. W. S. Grainger, of Providence, R.I., who has paid a great deal of careful attention to the development of the export trade of the United States with China, expressed the opinion that the outlet of American goods manufactured in the United States, would in the future be to China, and that San Francisco would become the third, if not the second city in the United States.

The fact that the cotton mills of the New England States have felt that they were taxed unduly, and that there has been, on the other hand, a long-continued litigation between mill corporations and various municipalities on this subject, rendered the paper on "The Valuation of Manufacturing Property for Taxation," by Charles T. Main, C.E., of Boston, a very timely one.

In the development of new industries in the United States where manufactories have not

hitherto existed, it is generally the local custom to assess the property at a nominal rate, and sometimes by votes of towns or municipalities, property is exempted from taxation for a series of years, notwithstanding that such an exemption is considered without warrant of law, and imposes an undue burden upon a portion of the property owners.

The paper by Mr. Main dwelt upon the methods used in appraising the value of a mill building, and referred specially to the elements of depreciation, to a comparison between a new and an old mill, in the style of construction, the presence of available floor space, the increase in cost of operation due to inconvenient arrangement of rooms, and the increase in cost of insurance. The market value of machinery was determined on the basis of the comparative ability to turn out a product in quantity and quality equal to that of the most improved machines, and also its actual condition with respect to wear and tear. The summary of the methods used by the mills is as follows :

1. Determine amount of machinery required to produce the same results as the mill under consideration.
2. Determine floor space required for this machinery if arranged in rooms of proper size.
3. Determine savings which could be made by having well-arranged buildings and rooms.
4. Capitalise this saving at 10 per cent. and deduct same from cost of buildings of modern mill. The result is the value of present buildings, if new.
5. Depreciate buildings still further, if necessary, for poor style of construction, bad light, &c.
6. Depreciate still further for age. This final result is the present value of the existing buildings.
7. Determine savings which could be made by having modern and well-proportioned machinery.
8. Capitalise this saving at 10 per cent., and deduct the sum from the cost of proper amount of modern machinery to do same work as present machinery. This gives the value of present machinery, if new.
9. Depreciate this value, if new, for wear and tear, and this gives the value of the existing machinery.
10. To the 6th and 9th results add the value of shafting, belting, piping, and supplies, which are based on the cost of same for a modern mill, also the value of the land, water power, water-power plant, and other taxable property which the mill may own.

The summary of the methods used by a city, was made in the following manner :

1. Determine cost of reproducing existing buildings exactly as they are constructed. This is the value if new.
2. Depreciate value if new by an estimated amount determined by an external examination of the various parts which can be seen. This gives the present value of buildings.
3. Determine cost of replacing the machinery in the mill by similar machinery. This is the value if new.
4. Depreciate value new for wear and tear by an estimated amount determined by an examination of such parts as can be seen. This result gives the present value of the machinery.
5. Make a schedule of shafting, belting, piping, and supplies and estimate cost of installing same.
6. Depreciate first cost for any visible wear and tear to get present value.
7. Estimate value of land from value of adjacent land.
8. Estimate value of water power by capitalising yearly cost of steam power at a low rate of interest.
9. Estimate cost of reproducing water-power plant as it is, and depreciate for wear and tear as above.
10. To above present values add value of any other property belonging to mill.

This very able paper naturally gave rise to a long-continued discussion, which tended rather to the experience of individuals with the local assessors, than to actual criticism.

There is no subject brought before the meetings of the Association which develops more interest than that of the methods for computing costs of manufacture. It has received the attention of special committees, and numerous papers by members of experience have been read on it; all of these have elicited discussions not merely at the formal sessions, but in what is sometimes termed the "annex meeting," consisting of discussions in the hotels or on the excursions. The paper on the subject at this meeting, by Captain James G. Hill, of Lowell, Mass., was listened to with close attention. He referred to the rule governing the cost of yarns, varying as the square root of the third power, but this does not include expenses of variations in counts in the picking, carding, drawing, and the first process of roving, nor the expense of making the change in the gears of the machinery. Taking for example, No. 22 yarn, the prime cost of which is about 2 cents per pound ; by applying the above rule to No. 20, the cost would be about $1\frac{4}{5}$ cents per pound, whereas the actual cost is considerably more, or about $1\frac{9}{10}$ cents per pound. General rules of this nature are applicable only to plain cotton mills. The following Table was given by the author as showing the relative cost of the different departments in such a cotton mill :

Classes or Subdivisions.	Per Cent.
Overseering, &c.	15.87
Picking	1.45
Carding	4.46
Drawing	2.68
Roving and spinning	18.52
Ring cleaners	0.58
Back boys	1.65
Doffers	2.45
Spooling	3.86
Warping	1.18
Web drawing	1.51
Slashing	0.83
Weaving	44.96
	100.00

He gave the following formula for obtaining the average number of yarn :

$$N = \frac{P + T}{\frac{P}{F} + \frac{T}{W}}.$$

In this formula

Let N equal the average number of yarn
,, W ,, ,, ,, warp
,, F ,, ,, ,, filling
,, T ,, threads per inch of warp
,, P ,, picks ,, ,, filling.

The following six essential factors in finding the costs of cloth were suggested :

1. Accurate average numbers are required.
2. Reduce the pounds to hanks or skeins.
3. Divide the pay-roll of the preparatory processes by the total pounds.
4. Divide the remaining pay-roll by the total number of hanks for a constant.
5. Multiply the average number of each grade or description of cloth by this constant.
6. Add 3 and 5 together for your total cost.

For the general expense and repairs, the amount was divided by the total hanks for a constant, and this was multiplied by the average number of each style of goods.

For the cost of the cotton, some mills increase the item by adding to the cost per pound, the net waste, whereas the more conservative mills increase it by the gross waste.

This subject is to be taken up by the Association for general discussion at the Spring meeting.

Like other American technical societies, an irregular amount of each session is devoted to what are termed topical questions, which may be passed over in respectful silence, or which may form a nucleus around which a most interesting and active discussion will be formed. The attractions of the papers and the entertainments furnished by the local committee, occupied so much time on this occasion, that but few of the topical questions received any consideration.

That one asking whether a systematic method of costs can be determined for weaving, was discussed in a manner which criticised the question itself as being one of those interrogatories which none could answer; but the next question, asking whether it would be better to have one overseer in charge of each special operation in a large manufacturing plant, or to have a larger number of men in charge of smaller sections, developed a consensus of opinion from some of the most experienced members of the organisation, all of whom believed that there should be one person responsible in each department. The general American cotton mill, it should be noted, is organised on the very broad basis of carrying on the whole of the operations, converting the cotton into cloth, and in many instances finishing it for the market. The divided work on the English system is confined for the most part to the new mills; but the question of the elasticity of conditions was considered by many of the speakers.

This was followed by the important topical question inquiring, What class of machinery was required to obtain the most improvement in order to arrive at a minimum cost in manufacturing? to which one member only had the temerity to make a very sensible rejoinder, that good yarn was essential to good cloth.

"Textile Education by Mail," was the subject of a paper by Mr. Christopher P. Brooks, Director of the New Bedford Textile School. He stated that the method of good technical instruction by correspondence, was an American idea which had grown to such an extent that instruction has been given to over 100,000 pupils. The method is to send special printed instruction papers, which the student works out and sends back for correction. It is conceded that while this method of instruction has its limitations, yet it is, on the other hand, applicable to many who are engaged in constant employment under circumstances which would not permit them to follow instruction under the usual methods.

This Association has always given a great deal of attention to the important subject of textile schools, and the paper upon this phase of the improvement of employés received great interest. The discussion indicated that the demand for a higher class of employés, especially those fitted for positions of subordinate authority, was being developed by the correspondence schools, and also that it formed a means of development for more capable persons to whom circumstances would have otherwise denied opportunities of self-advancement.

The meeting gave consideration to the subject of uniform numbering of textile yarns, which is to be taken up at a conference during the Paris Exposition in 1900. The differences in the methods of numbering the sizes of yarns and also of different yarns of the same material in various goods, was presented to the Association, and referred to a committee who reported at a later session a resolution of endorsement.

Preliminary to the afternoon session, those in attendance at the meetings were taken in carriages around the city of Montreal, and thence through its large park to the summit of Mount Royal at the back of the city, from which eminence was afforded a view of the city and the fertile country for many miles around.

The afternoon session was opened by an historical paper on "Eli Whitney and His Cotton Gin," by Mr. M. F. Foster, who had collected various traditions from the vicinity of Augusta, where Eli Whitney, the Connecticut school teacher, made his first experiments on the saw gin for removing the cotton lint from the seed. In the paper, the author expressed a desire that the Association might erect a proper memorial tablet.

The question of cotton ginning took a more practical turn in a paper by Mr. J. E. Chessman, of New York City, who presented the facts of the pre-historic roller gin and its latest developments to the present day; the last of which was a modification of the roller gin invented by the speaker, in which the application of stripper blades to a roller gin has largely increased the capacity of the present machine, the improvements being the elliptical motion given to the stripper blades which handle the cotton so deftly, as to closely resemble the results of hand ginning.

The Association has been considering the various improvements in cotton bales at its meetings for many years past, and a paper on "The Round Bale," by Mr. Louis Simpson, of Valleyfield, Canada, was almost a matter of course. The author conceded the fact that the present system of baling was defective, but was inclined to question the improvements of the new cylindrical form of baling, largely on the commercial questions of differences in price. He referred to the two classes of ginneries at the South, one owned by responsible parties who treated their own crop, and the other, public ginneries, where cotton from any source was cleaned; it was to this latter class were due many of the difficulties in the commercial condition of the cotton fibre. The paper caused a very active discussion upon the subject, as many of the members expressed the opinion that the cylindrical bales were a step in advance. The discussion was interrupted by the President, in order to permit a paper on "The Dederick Bale," to be read by Mr. W. H. Perkins,

of Boston, Mass., who advocated a bale of small dimensions and great density which was packed from cotton in layers compressed by a square plunger and press which was lined with the bale covering and brought to convenient dimensions and of great density.

The evening session was held at the Temple Club in Montreal, and was begun by a paper on "What must be Done to Spin Fine Yarn on a Filling Frame," by Mr. Arthur H. Gulliver, of Ashton, R.I.

The requisites for this improvement the speaker held to be due to a superior class of help under efficient supervision, and also to the exercise of great care in the condition of the machinery, especially that of the bobbins. This last question was the subject in another direction of a paper on "Oiling Fly Frame Spindles," by Mr. Russell W. Eaton, of Brunswick, Me., who, on newly taking charge of a mill, had found a great amount of oil stains in the cloth, the cause of which was finally traced back to cracked bobbins on the fly frames. The oil in these cracks exuded on the stock, and developed into stains in the cloth. The first remedy was the condemnation of a large stock of bobbins, and this developed an improvement in the method of oiling these fly frame spindles, which prevents the oil from rising up on the spindle.

It is always useful to learn of the results of a paper read before a technical society, and the continuation of a paper upon the theoretical possibilities of drying fabrics at low temperatures and pressures below the atmosphere, which was presented by Mr. Charles H. Fish, of Dover, N.H., at a meeting a year ago, found its sequel in a paper by the same author, giving some practical results. The drying fans the author employed were enclosed in a case from which the air was partially exhausted, and this caused a very rapid volatilisation of the water in the fabrics.

In anticipation of the trip to Valleyfield on the next morning a paper on the "Description of the Electric Power Transmission Plant at Valleyfield," by Mr. J. J. Ashworth, general manager of the Canadian General Electric Company, Limited, was submitted, describing this highly successful installation. It is the first instance in which an electric drive is used in connection with waterwheels in any of the Canadian cotton mills. At this water power there is a fall of only 13 ft. head, but with practically unlimited quantity of water. After an investigation of the installations of electric power transmission at the mills in the United States, the company decided on the construction of a single generating plant, and a system of electric distribution by motors in different buildings which would drive several mill shafts.

The first power-house provides for four generating units of 500 horse-power, each driven by two McCormick vertical turbines, as it was not thought advisable to put horizontal turbines with the very low head.

This plant is to be extended by adding two units of 3250 horse-power. The generators are of the revolving Field type, and arranged to run together or separately. The current from this plant is also used to illuminate the mill, and will, when completed, have a total capacity of 5400 horse-power; as such it will be the largest electric plant now operating a textile factory in the United States or Canada.

A new example of the old problem was shown in a paper of admirable brevity on the "Economy of Using Turbines at Full Gate," by Mr. Frank P. Vogl, of Claremont, N.H., who gave the results of the difference in power required on a steam engine running in connection with two waterwheels, a better result being obtained when one wheel was operated at full gate than when two wheels were operated at half gate. The results of an example of this kind very naturally differ according to the type of turbine wheel used, as some of the turbines give results of excellent efficiency from full gate until less than half gate, while the efficiency of many turbines is impaired by the slightest closure of a gate below the maximum opening.

The recent generation of gas from the Nova Scotia coal in the vicinity of Boston, has put into that market a large quantity of coke possessing greater density than that produced by processes hitherto used, and this made the paper on "The Advantages of Coke over Coal as a Fuel for Generating Steam," by Mr. Arthur C. Freeman, of Waltham, Mass., a very timely production. The advantage of cleanliness from the absence of dust, smoke; the few ashes, the quickness of kindling, easy control of fires, and the freedom from clogging the boiler flues, were all set forth in the paper. The suggestions in regard to management comprised the following points:

The firing should be replenished lightly and often, and the bed of fuel should never be over 7 in. or 8 in. in thickness.

It is better to refrain from disturbing the top of a coke fire, and the level condition should be kept up in firing.

Shaking bars are recommended for furnaces burning coke, but if dead bars are used, a light poker is to be employed to detach pieces of clinker from the grates.

It is advisable to keep water in the ashpit or to introduce a jet of steam.

The comparative evaporative power of this coke was 89 per cent. of the best bituminous coals and about 6 per cent. greater than the Buckwheat sizes of anthracite coals, but the paper did not give the relative value for generating steam on the basis of the market cost of fuels.

The merits of mechanical stokers have been presented before this Association from time to time for many years, but it does not appear that these devices have been used in American mills until very lately, and even then not to the extent to which such devices are applied in English boiler plants.

Mr. Byron Eldred, of Boston, Mass., presented a paper on the subject of "Mechanical Stokers." In many of the later stokers, the thinness of the fuel at the rear of the grates reduces the efficiency of the furnace from the excessive amount of air which finds its way into the combustion chamber.

The author described the American under-feed stoker, which was designed for the purpose of obviating these difficulties by feeding the coal slowly by a screw under the middle of the grate, where it is slowly roasted or coked. An air blast of from 1 oz. to $1\frac{3}{4}$ oz. is used with this system, which, it is claimed, results in smokeless operation of the furnaces, and also high evaporative efficiency. Tables of comparative tests made under the supervision of Mr. George H. Barrus, consulting engineer, gave a result of 21 per cent. of increased evaporation per pound of coal. The evaporation per pound of dry coal from and at 212 deg. Fahr. gave 10.07 for hand-firing and 12.19 for stoker firing.

The absence of discussion that evening was undoubtedly due to the entertainment, largely musical in its character, which was furnished by local talent, and which made a very enjoyable termination to the evening session.

On the next morning a special train took the party to Valleyfield, a distance of 43 miles, where they saw the 2500 horse-power electric transmission plant installed by the Canadian General Electric Company, Limited, of Canada, in the mills at Valleyfield, by which the water power from the Rapids of the St. Lawrence River at this point was applied to operating the mills in such a successful manner that the electric power plant is to be increased.

The ladies of the party were entertained at the house of Mr. Louis Simpson, the manager, while the gentlemen took a hurried lunch at a club which the mill had established for the recreation of its workpeople; and thence back to Montreal, where they entered a special train which took them to Lachine, at the head of the celebrated Rapids, where they took a steamer and returned to Montreal by water.

This excursion trespassed so far on the day that the afternoon session was a short one, and was devoted to cordial resolutions of thanks to the Canadian hosts.

In the evening most of the members attended a theatre party as the guests of the Local Committee, while an informal dinner was given at the St. James' Club to the past and present officers, and the authors of papers at the meeting.

On Saturday morning the special train returned most of the visiting members to Boston, whence they radiated to their several homes, but a goodly number remained for a days' travel to some of the points of picturesque or historical interest in the Dominion, notably a visit to the walled city of Quebec, which still preserves a good deal of its mediæval appearance.