USE OF SHORTER WOOLS IN THE WORSTED TRADE

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conditions of comfort and health in their daily lives in the business, and also to bring to bear their knowledge, experience, and power, on the industry in which they are engaged. From reports I keep getting from places where this system is in operation there is undeniable evidence that valuable constructive ideas, gradually widening, are coming from the establishment of these committees.

Women, if willing and pleased to take their share in this work, ought to have their representatives on the works committee, and in the other councils, also, in cases where they are a considerable factor in the industry.

There are hopeful signs at the present time. Not the least hopeful is the interest taken in these proposals in the army. I have had requests for copies of reports from both officers and men—so many that I have had to try to get a wholesale supply sent out to the Front. It is a great mistake to think that our men spend all their time in shooting, or in sleeping in dug-outs and rest camps. There is much thinking going on among both officers and men, and I believe we shall find, when they come home, very great stimulus and help from them to the best working of schemes of this kind. In Parliament, during the last twelve months, we have improved the basis of democracy in this country. We have doubled the franchise. It illustrates the mind of the country. I think the proposals of this Report represent a call to the men and women engaged in industry to pass a "Reform Act" of their own. Let it be their own work, to build up something elastic and capable of meeting new needs as they arise. Then, with the liberty that our brave soldiers will have gained—nay, even whilst they have been gaining it—we shall have been building an edifice worthy of their sacrifice. I commend the proposals to you for your consideration in your various circles, not with the idea that they are something to be imposed without question on men in any sphere, but with the plea that they are worthy of your serious and practical consideration, and that if you find in them something worth having for the future of industry and the country as a whole you will not delay but will take steps that you may have a share in bringing them into operation.

The MAYOR OF HALIFAX (Ald. Howard Clay) proposed a vote of thanks to Mr. Whitley, and said that most ideas put forward nowadays seemed to be conceived in terms of the engineering trade. Mr. Whitley could hardly fall into that error, knowing that he was addressing most cautious and conservative people. One reason for conservatism in the textile trade was the extraordinary complexity and intractable character of the material it had to deal with. By comparison, the iron and steel trades were simplicity itself. (Laughter). He would like to convince the chairman on that point. The raw material of any trade was to be viewed with a good deal of suspicion, but the cotton fibre and, more particularly, the wool fibre ought to be regarded with distrust to the *nth* degree. The subject dealt with by Mr. Whitley was both vast and complex, and merited the closest consideration.

Mr. JOHN F. WHITE (Bradford) seconded, and said that those who had read the Whitley Report and who had been fortunate enough to get into touch with firms who had already got the works committee in operation must be convinced that the problem was one for the most earnest study. He ventured to suggest that even those who were to some extent against the Report would alter their opinions if they really knew the benefits already derived by both employer and employed in cases where the works committee was in operation. In one case he knew of, suggestions of employees had not only led to increased production, but had also led to advanced earnings on the part of the employees. If such results could be obtained even in one instance, the inference was that they should be obtainable in others, to the benefit of all concerned, including the nation.

The vote was heartily accorded, and, in reply, Mr. Whitley referred in highly appreciative terms of the great assistance he had received from Mr. D. R. H. Williams, of Huddersfield, a member of the Institute.

USE OF SHORTER WOOLS IN THE WORSTED TRADE.

By H. L. HOLDER.

At a meeting of the Yorkshire Section Committee at Bradford on the 11th April, Mr. GEO. GARNETT (Chairman) presiding, a short paper on the above subject was read.

The author stated that this was not a new question. Previously, it had been taken up by the Bradford Chamber of Commerce and the Textile Institute, but none of the efforts yet made had resulted in anything practical on a large scale. His hope was that means might be arrived at to overcome the obstacles which, hitherto, had prevented the development of the trade in yarns and fabrics made from the shorter classes of wools used increasingly on the Continent during past years. It seemed highly probable that conditions likely to prevail in the not far distant future in the textile trades made the present time opportune for bringing up this question.

After reviewing the positions of France and Germany in relation to the industry in question, Mr. Holder said: Over and over again, Bradford manufacturers have been asked—"Why cannot you give us the goods which France and Germany sell to us; goods which we like and which cost less than your own." Always, the answer has been that the Continental goods are made from cheaper wools, and that the plant to deal with these wools does not exist in the West Riding. In the past, the Bradford spinning trade has developed along certain natural lines. Beginning, many years ago, with long-stapled, English wools, it has always selected the longest wools it could get. In every class of wool, Bradford spinners take the pick and leave the rest. Preparing and spinning machinery has been perfected, through many years, to produce certain results. There is a great demand for the yarns produced, and there is no reason why that demand should not continue to grow. Bradford yarns are the

best in the world for the purposes for which they are designed and adapted, and they are the only yarns which can be used with success for many purposes, but, all the same, by using cheaper wools, the Continental manufacturers can make many classes of goods better, at the same price, and often at a lower price. A good deal of the Continental trade developed later than our own, and, by the taking up of the wools which Bradford rejected, a great Continental industry has been built up. The French have made softer and lighter fabrics than we have made. This may have been due to temperament, or climate, or to the classes of wools most accessible. Whatever the cause, the result has been that their textile industries have tended to develop in one direction and our own in another. I venture to say—though open to correction—that the former direction is the one that will ultimately lead to the larger trade. Whether this be so or not, the shorter wools possess inherent qualities and characteristics by virtue of which the fabrics made, or partly made, from them are calculated to hold their own in competition and, for many purposes, to defy the competition of Bradford's typical productions. Apart from the production of single yarns for warp, in which, of course, wools of a certain length and strength must be used, the basis of the Continental yarn is the shorter and softer wool that exists in every fleece, particularly in certain classes of wool which the Bradford spinner rejects. It is combed or carded, and drawn and spun by methods different from our own; it not only gives a fuller handle in the piece but, owing to freedom from oil, the yarns and pieces may be the better dyed in light shades and bright colours.

In 1915, under the auspices of the Textile Institute the Bradford Technical College staff prepared a collection of Continental cloths, and the results of their investigations were embodied in a leaflet prepared at the time.*

From 1900 to 1913, we imported annually about 5½ millions worth of stuffs and 2½ millions worth of yarn. To acquire even a part of this trade is a very large proposition. Can we find the necessary labour to deal with it? Bradford spinners have been more or less short of labour during recent years, and extension into new branches of trade has been quite impracticable. The end of the war, however, may throw much labour on to the market, and may offer opportunity for development of practically a new industry. The question is a very big one. It might mean the putting down of large plants of machinery totally different from that which Bradford spinners now possess. Quite possibly, part of the new industry might not find its home in the West Riding. It might be found that Lancashire people could deal better with the short-stapled fine wools; they are used to manipulating short fibres, whilst Bradford spinners like a long staple and a good spin above everything. But the weaving and dyeing could be done better in the Bradford districts, and little change in weaving machinery would be required. In regard to labour, Bradford's

looms were not kept running anything like so continuously as its spindles during the pre-war years, and if the earnings of weavers and the profits of manufacturers are to be kept up to meet the high cost of living and high taxation, new developments in trade must arise.

As regards dyeing, much progress has been made in Bradford since 1903–1906 when the question of Continental competition was taken in hand by the Chamber of Commerce, and when the question of English versus French dyeing was very fully discussed. There can be little doubt that the dyers of the Bradford district would welcome a new development in trade and could deal with it, successfully.

DISCUSSION.

The CHAIRMAN said the question of finishes was most important. In the matter of machinery applicable to the finishing of worsteds and woollens, we had been too dependent on Continental machine makers. He encouraged the idea that whatever might be attempted should tend towards employment all the year round. Their trade had been too spasmodic or seasonal, and that condition could be relieved if not obviated.

Mr. JOHN F. WHITE (Bradford) said the short fibres had not only been used in France but, mainly, in Germany. Though described as French, the machinery, too, had been constructed in Germany. It was not merely a question of using up short wools, but of leaving the shorter fibres of these wools in the top. There were two points to start upon, if anything were to be done in this matter. The first referred to washing. The softness in the material must be left in so that the cards and combs could carry it forward to the later process. The next point was as to the combing machine. He believed we could and did now build spinning machines equal to anything built on the Continent. Good machines were running here for producing mule-spun yarn. That was the opinion of one of the best French spinners who started a mill in this country. But this spinner found that he could not produce satisfactory yarn from the top produced here, and he had his tops combed in Roubaix. He commenced a mill at Bolton, where climatic conditions were favourable and the work-people were used to fine counts and high-speed, delicate machinery. Undoubtedly, climatic conditions had a great deal to do with the production of top or yarn from short fibres. As to machinery, our makers needed at least a moderate guarantee of support if they were to make it; they could not put down new plant and then educate the manufacturer up to the business. It was for the Textile Institute to emphasise any need for the manufacturer to adapt himself to certain lines of manufacture. In 1910, he organised a meeting at Bradford and obtained a number of lantern slides from Roubaix and district, illustrating the production of tops and the handling of the materials up to the loom. The feeling then seemed to be that it was suggested that manufacturers should discard an existing trade and start a new business. He took it, however, that this was no more Mr. Holder's idea now than it was his

*See re-printed leaflet in the *Journal of the Textile Institute*, Vol. VI., No. 2, pp. 214–215.

own idea then. The idea was to produce goods employing machinery using the whole of the raw material. In Germany and France, he had seen not only short wools used, but an Australian wool capable of producing a 60's top put into the Noble comb which threw off a large noil. That noil had been taken into what they called the French department, blended with a short wool—a Cape wool after scouring—passed into the French comb, and a great portion of the noil from the Noble comb had been passed forward as top from the French comb—a by-product turned into a main product. This was not done entirely for the purpose of obtaining a cheap top. The aim was to produce softer goods. By putting noil in with the shorter wool, softer and finer fibres than were contained in the wool in the average, were introduced. To comb short wools for French yarn was to retain in the top all the short fibres, and that not merely from consideration as to cost. He would be pleased to do anything he could to support the object Mr. Holder had in view.

Professor A. F. BARKER (Leeds) said he thought they might be certain that the goods required after the war would be those to which Mr. Holder had referred. It was probable that there would be a large demand for wools specially suitable for the types of yarn and fabric in question. This meant careful consideration of rationing from the colonies, which he hoped our wool controllers had in view. The French were replacing machinery destroyed and would expect to receive wools to enable them to produce their special fabrics; but, above all, German competition in these goods must be prepared for. He agreed, substantially, with what had just been stated. The efficient study of the production of the fine-wool goods in question might be brought under five headings:—(1) The colloid nature of the wool fibre; (2) the physical nature of the fibre as exemplified in the curl, &c.; (3) fibre arrangement or thread structure; (4) cloth structure; and (5) finishing. From the fact that, in backwashing, the hot-cylinder process had had to give way to the hot-air process, it was evident that the wool fibre must be regarded much more from the colloid standpoint. The wool fibre would have to be considered much more carefully with reference to the preliminary and the finishing processes. As illustrating the importance of the "curl" in the wool fibre, it was probably true to say that if ten persons were asked whether woollen or worsted cloths would shrink the more, nine would select the former and only one would give the correct answer. If a yarn were composed of fibres which, say, by yarn scouring had been allowed to go back to their original state, a different effect would be obtained in the cloth in comparison with a cloth made from yarn in which the fibres were retained in the altered state incident upon drawing and spinning; and these two conditions could be made splendid use of in the finishing. Then there was the question of mule as compared with frame spinning. He was not able to explain why the fibre arrangement of worsted spun thread in which no spindle-draft was employed should be so very different from the fibre arrangement of frame spun thread. Germany had used ring spinning more than

this country, and the possibilities of ring spinning should be most carefully considered. Considerations arose, too, in the matter of open-shedding and centre-shedding. His own experiments with centre-shedding had tended to show that atmospheric conditions were most important. As to finishing, the cloth structure as well as the thread structure had a marked effect. But perhaps the most important matter in finishing was the balancing or unbalancing of the strains in fibre, thread, and fabric. If in one case the cloth was set before finishing and in another case this was not done, absolutely different handles and appearances of fabric resulted. Experiments had fully confirmed what Mr. White had said about the leaving in of the short fibres. The effect on handle was astonishing. The whole problem was much more difficult than appeared on the surface. He was not disposed to be contented with going along as at present in manufacturing, and every encouragement should be given to anyone who would devote attention to the subject. There were, of course, economic difficulties, and manufacturers would need to back up the spinners. The Institute should endeavour to interest all sections of the trade concerned.

Professor E. MIDGLEY (Bradford) said we seemed to specialise on processes whereas, on the Continent, they appeared to specialise on products. His experience in investigation showed that short fibre in the yarn appeared to be essential in the production of full-handling cloth—even clear-finished cloth. Investigation proceeding at Bradford Technical College, under the auspices of the Research Council, related largely to this subject. The investigation was supervised by four representatives of the combing industry. After discussion, it was decided to use a Cape merino wool of nine months' growth. Noble-combed and backwashed, this gave a yield of 3·38 of top to 1 of noil; Continental combed, the yield was 4·8 to 1. It was evident that the Continental-combed possessed a greater amount of shorter fibre.

Mr. WHITE said the figures given would not stand the test of French conditions. If the result was 3·38 on the Noble, then he had to say that, within the last fortnight, he had seen very similar wool going through a commercial establishment in the ordinary way and the result was 3·10 on the Noble, with 1 inch diameter rollers, and just under 6 to 1 on the French. This raised an important question. In the Bradford College, there was only one card and the clothing of that card was not suitable for French combing; yet to get the highest efficiency from French combing special carding was needed. The Noble comb was adaptable, but the French comb was a particular comb for a particular purpose.

Mr. ELLIS FOSTER (Keighley) said that work done in a college was quite different to work done in a place regularly going and specially equipped. He would like to ask Mr. White if the wool he had spoken of corresponded to the wool selected for the investigation.

Mr. WHITE said he could not say further than that it was of similar character.

Professor MIDGLEY said he had a correction to make. He should have read 4·8 to 1 for the back-washed

Continental combed and 2·8 to 1 for the backwashed Noble combed.

Mr. FOSTER said that more than half of the French combs were used for or depended on re-combing.

Mr. WHITE said the matter was largely in the hands of spinners combing their own wools for making their own yarns.

Professor BARKER: And these yarns are almost wholly going into the hosiery trade?

Mr. WHITE: I should say so.

The CHAIRMAN: Have the people who engage in re-combing adopted the French comb?

Mr. FOSTER: It is in the hands of few people—perhaps half-a-dozen. There are only 79 or 80 of the combs in the country and one firm has about 50 of the number.

The CHAIRMAN said the difficulty really appeared to be one of new machinery.

Mr. FOSTER said the question would again arise as to whether the entering upon this suggested new trade would mean sacrifice in existing trade.

Mr. R. W. GODDARD said if the business paid there would be more going on to single warps.

The CHAIRMAN said it was evident that if anything was done they should begin with the wool itself.

Mr. GODDARD said there was no question that it could be done. In fine, single-warp yarn we could produce better than the Continent.

Professor BARKER: What about wefts?

Mr. GODDARD: I do not know.

Mr. WHITE said if they did not move fairly rapidly the trade would be a Lancashire trade. Cotton mills were using more wool to-day than they had used since the cotton industry started. They were investigating as to how to further use their machinery. The question was: Was it possible to get a top that would work better with cotton? If Lancashire went much further in that direction they would find an answer—the typical Continental top. Two large spinners in Lancashire had already come to a decision in the matter. It might happen they would not have to wait long before the combing was done in Lancashire. It was a question for Bradford to consider seriously.

Professor MIDGLEY said chemical finishes required complete investigation. We were limited to mechanical finishing.

Mr. FRANK HOPKINSON (Bradford Dyers' Association) said the view that our finishing was wholly mechanical was erroneous. They had gone to the extent of employing French finishers and some of their men had worked in Germany. It was a question of raw material being available before big business would be built up. Thirty manufacturers were now developing the work for the dress trade. The Bradford Dyers' Association would be pleased to show results.

Professor MIDGLEY said he was aware the Bradford Dyers' Association had conducted extensive research and had dealt with chemical finishes, but his observation was intended to apply, generally, to the dyers and finishers of medium-weight and heavy goods.

Mr. WHITE said every assistance should be given to the Bradford College so that the best possible results

might accrue. Machinery equipment should be quite complete.

Mr. J. DUMVILLE (Bradford Technical College) said the suggestion of Mr. White was most important. They had been attempting to attain certain results on their own Bradford machinery, and so long as they confined themselves to that they would be liable to fail to some extent. If certain additional machines of Continental type could be provided, it would be better for all concerned. In many processes their equipment was complete, but improvement might be made for dealing with short wools.

On the motion of the CHAIRMAN, seconded by Mr. WHITE, it was decided to communicate with the Wool Research Association as to the subject discussed and the investigation required.

LANCASHIRE SECTION.

THE COAL-TAR COLOUR INDUSTRY.

By R. E. OLDROYD, F.I.C.

In this paper, the author offered his views as to how this country lost the coal-tar colour industry. He said:—

In trying to understand how we lost it, one of the most difficult factors to reckon up fully, is the state of advancement in chemical knowledge at the various periods in the history of the industry. The industry, depending, as it has shown itself to do, on the science basis of organic chemistry, was indeed out ahead of the science, from the discovery of the first colour in 1856 down to nearly 1870, from which period the science has guided and led the industry fully, and made of it a branch in the science of organic chemistry—perhaps at once the most fertile, the most interesting, almost, I might add, fascinating and useful branch to be found attached to any parent tree of science.

The year 1856 found us pre-eminent amongst nations as manufacturers of textiles—a position we had achieved by practice, and gradual improvement of certain fundamental inventions originating here, and backed also by an expert knowledge which our dyers had acquired in the application of the natural dyestuffs. It also found us with new gasworks in our large towns—gasworks developed during the preceding 30 to 40 years—gradually becoming choked in development by the vast accumulations of the useless waste product, tar. No use could be found the tar, and, consequently, it had no value; indeed, it had less than no value, it was a nuisance. Who would then have predicted that, ultimately, this so-called nuisance was to have a value exceeding that of the gas itself? Such, however, was to be the case, for in the year in question came the great discovery which was to give a new importance and value to the tar, and consequent cheapening and further development of the gas industry, and also to start forward the now gigantic industry in the manufacture of colours from coal-tar products. Perkin's mauve, discovered in the year named, must and will for all time stand out as the landmark from which the coal-tar colour industry sprung.