TECHNOLOGY DIVISION
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ASBESTOS

VOL. III. ROCHDALE, JULY, 1920. NO. 11.

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This allegorical drawing, by Bernard Partridge, is our "House Mark." It represents "Asbestos" standing between Civilization and the destructive elements.

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ASBESTOS

VOL. III. ROCHDALE, JULY, 1920. NO. 11.

Thoughts from the Editor's Fireside.

A Country in Bonds.

NOW that refugees of our own country—and Labour Leaders—have returned and told us the truth, we may ignore, or denounce as opportunity offers, the denials which have appeared in the British Bolshevik Press of the horrible atrocities still taking place in Russia. Coming so quickly after the return of Mr. George Lansbury from his "Cook's conducted" type of tour—when tramcars and motor-cars were marshalled, machinery removed from one factory to another, and all manner of similar comedy tricks played for his especial benefit, to give him an impression of a peaceful, well-ordered, industrious and prosperous State—the moral perhaps requires no pointing for the British worker.

However, one impression Mr. Lansbury received is important in the highest degree to the British worker, and that is, that in a Socialist State liberty of the subject is an impossibility. This is his way of putting it in the *Daily Herald*:—

"Discipline—iron, rigid discipline of the workers by the workers—is needed in Russia. *It will be needed here whenever the workers come to power. The Socialist State needs more self-discipline than any other.* . . . We have no love for coercion for its own sake, *but we cannot visualise a modern State without it.*"

This is what some of us have been saying until we have grown tired, but we have been called dolts and the tools of Capitalists. The British Bolshevik is now forced to attempt a justification of what can no longer be denied. Representatives of the Labour Party have at the same time felt obliged to declare in the House of Commons that they believe in forced labour. We in this country at least know now where *we* stand—so far. Let us see how the principle is working out in Russia.

"The self-constituted saviours of the revolution," says *The Daily Telegraph*, "have become their task-masters, imposing upon them a system of compulsory labour differing little from a state of slavery, without any of the ameliorations associated with the régime which the conscience of the world swept away many years ago.

"Lenin and Trotsky, apparently appalled by the consequences of their own acts, are now endeavouring by means of a system of conscript labour to set the

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wheels of industry going once more. The workers, who were to find full salvation in Bolshevism, are now being forced by their cruel task-masters to labour for long and weary hours for wages which barely keep body and soul together. Deserters from the Labour Army are liable to imprisonment from two weeks to six months, and more serious offences against labour duty are dealt with by the Revolutionary Labour Tribunal—which sentences to the death penalty without compunction. They have become the bond-slaves of the men who constituted themselves the lords of Anarchy. It is inconceivable in the light of the revelations which the returned refugees are making that the working-classes of this country can look to Soviet Russia for the example of a workers' paradise."

But lest these statements be suspect, let us quote Lenin himself:

"Without iron discipline, without compulsion, and without certain self-imposed limitations," he says, "we shall never be able to master the economic chaos.

"The principle of collectivism should give way to the system of government by individuals; the popular economic development has brought us to it. The collectivist direction of industry by all kinds of Soviets does not produce the rapid work which is now necessary.

"It is necessary to put an end to this crime [of not working hard enough] to make the non-workers responsible and to force them to make up for the working time of which the Republic has been robbed. It is essential to introduce martial law into the railway workshops and impose upon the guilty the full penalty of martial law.

"If we hesitate for a single moment as to the necessity of establishing labour conscription, and of militarising labour (in the beginning, at least, in the form of labour armies), of enlisting the experts, and of fighting against the formless and loose organisation of our collegiate economic organs, the cause of communist reconstruction will be gravely menaced."

And let the British shop stewards digest this:—

"The management of industrial undertakings should be reduced to the smallest number possible, the maximum being three persons. The workmen should be definitely told that we are gradually coming to the introduction of management by a single person with a workmen's commissary attached to the management, when the latter is in the hands of a non-communist. . . .

"In connection with the creation of labour armies, opinions are being voiced among the workers in the trade union movement which the general committee of the party cannot possibly endorse. The objections to militarisation of labour, the references to the principle of 'freedom of labour,' the vague opposition to the growing centralisation in the sphere of industrial management—all these are points which the party of the proletariat cannot recognise as valid."

Freedom of labour, it will be noted, is not to be allowed to exist. Russian workmen, in the Bolshevik Paradise, have to do the work allotted to them, for as long, and where, and how they are told.

And you dreadful people who love and cherish your children, and have hopes and ambitions which you dream of realising in them, mark this:—

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"It [the State] should show the parents that the care of society lavished upon children gives far better results than the private, individual, unscientific, and irrational care of particular parents, 'loving' but ignorant, lacking the resources, the means, the methods which society has at its disposal; this institution should thus break the parents of the habit of that narrow and unintelligent love for their children which finds its outward expression in the tendency to keep the children near themselves, not to let them leave the narrow circle of the family, to make their outlook narrow, and to bring them up not as members of the great society called humanity, but as beings as selfish as themselves, individualists, who put their personal interests in the foremost place, to the serious injury of the interests of society. Guardianship so instituted is revolutionary, for it breaks abruptly with the previous system, and it is Socialistic, for it prepares and facilitates the measures which must be taken in the socialist society."

We have written the foregoing for the benefit of those British workmen—the great majority—who are sound to the core, and who would not submit to be "regulated" by Revolutionaries lusting for power, for one moment—in order that they may have chapter and verse to refute those misguided fellow-workmen who are bemused by the statements of the agents of Revolution in the shops, backed up by the Red Flags of Journalism.

Empire.

"*The finest quality of a great tradition is the possibility it gives of continuous progress. The end has come when no one can turn his eyes away from the past, or when the greatness of our State is held to be a thing already achieved.*"

C. DELISLE BURNS,
Greek Ideals.

THIS quotation printed on the fly-leaf of that little book of prophetic vision *From War to Work*, occurs to us at this time because we are silently, rapidly, and inevitably approaching one of the greatest of the many great crises the entity we call the British Empire has ever been called upon to face.

It is rumoured the Colonial Office is to close its doors in the near future.* It has nothing to do except to keep an eye on a few small "Crown Colonies" which can be safely left to "the men on the spot." At the same time it is said that the "Colonial" Premiers are to be invited to another Imperial Conference with the object of establishing a permanent Imperial Council.

The importance of this movement to British Industry and all engaged therein —employer and workman alike—cannot be exaggerated. We hope and trust its consideration—and proceedings—may be kept free from the politics of Party, and that mere words will not cause anyone whose livelihood depends upon British Industry to see red.

The Great War has, we trust, taught us as a people many useful lessons, two of the not least important being that we

* In the meantime it is good news to learn of the formation of the Empire Development Parliamentary Committee, to urge upon the Government, Parliament and the country, vigorous action for the utilisation and extension of the productive power of the Empire.

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have within the Empire everything we need for life and trade, and that the interests of the several peoples and countries forming the component parts of the Empire are one.

In this Journal, from time to time, we have discussed the progress of the League of Nations, and we have felt constrained, while carefully avoiding any blanketting, to utter a note of warning, and to point out the grave difficulties and dangers which beset the League as viewed by an avowedly pro-Britisher.

But, someone will probably say: "You should not view the proposals as a Britisher." Well, perhaps we should not, but not being built on "International" lines, we feel the occasion calls for no apology.

We shall not serve the cause of the League of Nations less by serving that of the League of British Nations more—and first.

Some of the members of our House of Commons and other leading men seem to have a twisted idea of the functions of the League of Nations. We refer particularly to their demand that the League shall stop the 20 odd wars now raging. It cannot be too plainly emphasised that the authority of the League is purely moral. Unless a country accepts its authority, its writs will not run in that country, and any member of the League can flount its authority at will. As there is to be no international force to enforce its decrees, we take it there would be no thought of coercion in the shape of a blockade for instance—in itself an act of war.

The League of Nations is well launched, and we are glad of it as a new and tremendous moral force. The alternative, as has been said, is "too horrible to contemplate." Having said that, let us attend to our own business, or, shall we say, let us not neglect that business which is peculiarly ours.

To return, then. It is rarely given in the life of a man, or of a nation, that the Gods offer the same gift twice. One refusal only is the rule. As a nation first, and later as an Empire, we have been specially favoured on notable occasions throughout our long and glorious history. We are, however, mostly concerned with the history of Empire, as this period—from the days of Sir Walter Raleigh—connotes the history of British Imperial Trade.

We "bolted and barred" the door against our kinsmen once because we were obsessed by Party Political shibboleths. That, we believe, is not the danger to-day. The present danger is more insidious.

We have seen how that it has been possible for four eminent gentlemen to rule, parcel out and "settle" all Europe and half Asia. Perhaps this had to be—could not be avoided in the case of the Allied Council, but a transference of the idea and method to the case of the proposed Imperial Council would be fatal. The gravity of its mere possibility, as viewed from the interests of Empire Trade, cannot be over-emphasised.

The danger may be avoided if we remember that centralisation of policy and administration are two separate things. We hold the first to be a business necessity to the Empire's Trade; the second may easily ruin it.

Centralisation of administration, it should never be overlooked—(though it frequently is in business generally)—carries with it a very grave disability, viz., in the impossibility of transferring and centralising the experience and peculiar abilities of different peoples. Universality of knowledge is beyond the finite, and no good will come of pretending otherwise.

We must not attempt too much.

The number of heads and acres under the British flag signify nothing if we cannot agree to make use of the fact for increasing trade. In truth, the burden of

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Empire will become intolerable if we miss this our second opportunity to strike a business bargain with our friends and relations.

Let us, then, use the coming Imperial Conference "for strictly business purposes." Let us carry the modern business method of pooling interests, in order to effect economies and ensure maximum production, to its logical conclusion—a League of British Nations. The matter is urgent, our need is great, and our potentialities are vast.

Since the foregoing was written Mr. Balfour has made an important speech dealing with the League of Nations, and reporting progress as it were. None of our readers will place us under either of the three classifications of enemies of the League, which Mr. Balfour stated as (1) Candid friends, (2) Those who opposed, and (3) Fanatics, and we can agree that "to allow the League to become an instrument of Party warfare" would be to destroy "the most promising effort of a new civilisation." We are inclined to think the greatest danger is to be apprehended from the fanatics—in expecting too much and in ignoring the very real facts and sentiment surrounding Nationality. As Mr. Balfour said: "Fanatics are occasionally useful and necessary," but he "was not sure that any great movements have been best led by people who are red-hot enthusiasts." In this work the fanatic—who must be of International sentiment—though of an unimpeachable brand as Lord Robert Cecil's—is a calamity.

Editorial Notes.

WHAT SHALL IT PROFIT . . . ?

There is nothing fanciful in our cartoon. The Employer and the Workman are necessarily roped together. They cannot climb without one another's assistance, and should the one overcome the other both will fall together, bringing National Progress down with them. As we say elsewhere, the only hope in the present situation lies in enlightened employers and workmen coupling up by means of Joint Industrial Councils. The reactionary must be stamped or frozen out, be he on the Board of Directors or the Shop Committee.

* * *

"FINANCE AND INDUSTRY."

The second instalment of this series of articles by Mr. Hartley Withers, the Editor of *The Economist*, is heartily commended to the attention of readers generally. Its logic is irresistible, and so many Socialistic and Bolshevistic fallacies are laid to rest by it that we suggest employers among our readers might do a good service by obtaining reprints in inexpensive leaflet form for distribution among their workers. Our cartoon might have been prepared to illustrate the author's remarks; the coincidence is remarkable, and we shall be happy to loan the block for making an electro to illustrate reprints.

* * *

"A CHINESE ASBESTOS FACTORY."

Although there is no apparent connection between the writings of the Editor of *The Economist* and those of Lady Dorothea Hosie* a striking reference is, as it were, wrung out of the latter in explaining the causes of the disabilities under which the Asbestos Industry in China is carried on. An engineer accompanied the party on its visit to the factory, and he urges his advise thus:

"The engineer again said to Mr. Wu, 'You really must get foreign machinery,' and once more came the cry, 'Yes, I promise you we will when we get enough capital together.' The Chinese have no difficulty in providing the labour, but as that is only half the battle in any business the lack of capital is doing serious harm, not only to the shareholders but to the labour employed."

"'But,' said Mr. Wu, 'if we buy the foreign machinery we want to, *we will*

See *A Chinese Asbestos Factory, II.*, elsewhere in this issue.

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have to pay our workmen more, at least those who learn to use it. For that also we must wait, not only till we can accumulate enough capital for the machinery, but also *enough capital to pay the higher wages*, and I fear that will not be for some time, however much the business prospers.' "

And yet, we suppose, there are some who cannot see in Capital anything but The Enemy, though the lesson is plain—in England, in Russia—from China to Peru.

* * *

THE NEW TYRANNY.

The greatest lesson which can be preached to-day—the one we have been preaching with increasing insistence since our first issue—is the need of greater production. We have not urged that "everyone must work harder," as some do, because we think that the possibilities of organisation and better methods of production are far from exhausted.

There is a great world shortage of all essentials—sugar, wheat, houses, and cotton we know most about because they touch our stomachs, comfort, and pockets —but as a matter of bare fact there is a grave shortage of everything. How could it be otherwise? Under the best conditions—everybody doing his and her level best—this shortage will not be overtaken for a few years, and in the meantime demands will so increase that there is no shadow of a possibility (as we have said before) of anyone "working himself out of a job."

The attitude of certain Trades Unions in refusing to admit specially trained discharged soldiers is therefore particularly wicked.

There is plenty of evidence to indicate that a great number of Trades Unionists, including officials, are ashamed of this action, and while the members who disapprove keep silent, the officials are to be pitied to a certain extent. The machine (or parts of it) has fallen into the hands of extremists, who do not hesitate to threaten. Behind these extremists in the Trade Union movement are clever men who hope to use the "proletariat" *à la Lenin* to ride to power.

Certain it is that Trades Unionism stands in grave danger to-day, and the formation of Joint Industrial Councils, where employers and workers can band together to combat the common enemy, should be extended as rapidly as possible to include all industries.

Well might Mr. Thomas Richards, M.P., in addressing the South Wales Miners' Federation recently, utter some bitter words, seeing the life-work of himself among others in jeopardy:

"As long as God gives me breath," he said, "I will protest against these young men, who know nothing about sacrifice, attempting to pull down the work built up as the result of so many years of hard toil. They pose as the representatives of democracy, but democracy has become too dull, too slow, and too ignorant for them. They appoint themselves to positions in the hope of being able some day to wreck all that is constitutional in this country. Keep your eyes on them. You have the power in your own hands, and you must use it. It is the only way to defeat the extremists."

* * *

TRADE UNION BALLOT.

It is most unfortunate that the Trade Union Ballot Bill, which sought to secure the secrecy of the ballot as a means of lessening the number of frivolous and hot-headed strikes, should have been brought forward by a Coalition Unionist. The soundness of its proposals are beyond dispute—indeed they were not seriously disputed by the Labour Members, and the proposed constitution was eminently fair. Labour leaders themselves admit the evils of intimidation, coercion, and victimisation. It was to have been expected, however, that they would close their ranks against the imposition of regulations from outside. But will they now do the obviously required thing—introduce a Bill of their own drafting?

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Industry and Finance.—II.

By HARTLEY WITHERS,

Editor "The Economist."

IN the first article of this series the balance sheet of an industrial company was analysed, and it was shown how the capital contributed by shareholders and creditors was invested in the buildings and plant which have necessarily to be provided before the organisers, managers and skilled and unskilled workers can put their various forms of energy into the business of production. This, in fact, is the service which Finance renders to Industry. It gathers together the savings of saving people and puts them at the disposal of industrial managers who with their help are enabled to set up the buildings and plant which Industry requires, and get and keep together a body of workers to work with them in order to turn out goods which the rest of the community wants.

It is thus an essential and highly complicated service that Finance renders to Industry, and so to the community, the needs of which Industry supplies. Without the buildings, machinery and plant the energy and skill of the cleverest and most industrious manager and the most assiduous and capable workers could produce nothing. It is, of course, equally true that buildings and plant by themselves can produce nothing until they have been set going by the managers and workers. All the members of the partnership are essential to production, and if any of them do their work badly production becomes inefficient, more costly and less beneficial to the community. If the workers are less skilful and successful in output, less articles are produced for the benefit of the community; if the management makes mistakes, either the skill of the workers is misdirected and the methods of production are less efficient than they should be, or the article produced is not of a kind that the community wants, so not only are the needs of the public not supplied but the enterprise makes less profit than it should, and perhaps runs at a loss and comes to an end through failure; and if the saving people who save the capital fail to perform this social duty then capital is scarce and dear, the cost of production is made higher, and the community has to pay more for the goods that it wants.

It has been observed above that the saving of capital, which is carried out through the machinery of Finance, is a social duty; and it is important to bear this fact, as I believe it to be, in mind, because in these days a large number of very gifted and earnest people are telling us that the capitalist is a robber, who preys on the community, and that he works solely for his own profit and without any consideration for the benefit of the rest of us. It is certainly true that a large number of the people who supply Industry with capital do so without any thought except for their own profit; but at the same time it is not possible for them to earn any profit on the capital that they invest unless that capital is put into the production of some commodity or service which will find a market by satisfying some need of the general public which will pay for its satisfaction.

It certainly has to be admitted that the buying public sometimes makes curious

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mistakes about the kind of article that it wants or thinks that it wants to buy, and that when capital is devoted to the production of goods which the public whim may happen to demand in its most ill-advised moods, it is difficult at first sight to see that this capital is rendering a social service. But the fact that the public sometimes makes mistakes does not shake one's political faith in democracy or one's economic faith in the principle by which the general consumer is the ultimate Captain of Industry who decides by his purchases what articles are to be produced if Industry is to make a profit. For the difficulty that presents itself when one hears or reads the eloquence of those who challenge the present system is this: that any possible alternative to it seems to involve very serious difficulties and dangers. They tell us that the object of Industry should not be profit but social benefit. This is a very nice ideal, but how is it to be worked? Who is to decide what is socially beneficial, and consequently what is to be produced by Industry? The question can hardly be left to the managers and workers who carry Industry on, because that would involve the danger that their own taste and fancy, which would evidently be liable to error, would dictate the course of production. Still worse dangers would arise if the question were left, as is desired by many who wish to overturn the present system, to the judgment of officials specially appointed for the purpose. A bureaucratic hierarchy telling Industry what it is to produce and the public what it is to consume might be actuated by the highest possible motives, but its decisions would be so likely to be unpleasant both to Industry and the public that it is difficult to imagine such a system lasting many weeks. As things are at present the effort of Industry is in fact controlled by the democratic demand of the general body of consumers. Finance, unless it puts its money into turning out what the consumer wants, not only makes no profit but loses all that it invests, and so Industrial Finance serves the public; and if the public will only confine its demands to things that are socially good, then nothing but socially good articles will be produced.

PROGRESS—AND GROWTH.

A shallow commonplace of the day assures us that we live more quickly than our ancestors, and that a week now sees done what a year would not have achieved a century ago. Many things do indeed move quickly, and triumphant mechanism is sometimes said to have revolutionised our civilisation. But the inventor has his sharp, impassable limitations, and one gets tired of hearing the fact that a man can travel round the earth in thirty days —is it thirty days?—cited as proof of modern progress if at the end he comes back to where he was before. Mechanical invention has not appreciably quickened spiritual issues, such an intensely spiritual work, for instance, as the growth of national consciousness; neither does opinion mature noticeably more quickly than of old. In fact, in many cases we seem to have exchanged the slow ripening of thought in a small decisive circle for the confusion of many voices, whose loud dissonance now seems often to delay the issue; and our public debates and newspaper controversies usually resemble a bloodless but interminable siege-battle of assertion. Nor has mechanical invention succeeded in speeding up nature. One builds a transcontinental railway in ten years, the pioneer's hut may be run up in a week instead of a month, and a new township covers a mile of bare prairie in less than a year—but the crops take as long to ripen in modern Canada as in Egbert's England, and children require as much labour to produce and rear, and as many years to grow to manhood, as under the Heptarchy. Essential things are still the same, and it is precisely the essential things that matter in the building of nations.—*Production.*

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Commerce, Industry and the Nobler Pursuits.

POVERTY is hostile to the nobler pursuits. Prosperity favours them. Poor individuals and poor nations have to concentrate all their energy upon providing the daily necessaries. Wealth, therefore, if not exactly the creator, may be said to be the patron and preserver of scientific and artistic progress. Such progress is caused by the possessors of surplus wealth. And as wealth is possessed particularly by men engaged in commerce and industry, commerce and industry are the principal generators of scientific and artistic progress.

Wealth breeds luxury, and brings about the refinement of manners, of requirements, of tastes. Only in the lowest level of civilisation may one find the accumulation of wealth unaccompanied by progress in science and art.

Progress in art and science requires the bringing together of many different minds, requires international intercourse, for wealth without international intercourse can find the gratification of its desire for luxury only by the most elementary, by the coarsest enjoyments. Patriotism, or ignorance, has caused nations to assert that all, or nearly all, progress has sprung from them, that they owe little or nothing to other nations. The ancient Egyptians claimed for themselves all science and all wisdom, and the Greeks all art, exactly as many Germans do now. In reality all nations have contributed to the progress of the world, and progress has been most rapid among those nations where wealth has been greatest, and where foreign intercourse has been most intensive.

The most advanced nations of antiquity were the greatest trading nations, the Phœnicians, the Babylonians—the fable of the Tower of Babylon and of the confusion of the tongues refers probably to the fact that Babylon was a great international mart and meeting place which had some of the architectural and racial characteristics of New York and of Nijni Novgorod. The Egyptians were in many respects possibly the most advanced nation of antiquity, but we do not know enough about their international trade. As Egypt was situated on the greatest river of the ancient world, and as it was surrounded by the greatest nations, it ought to have been the meeting place of many nations, and a natural trade centre. Egyptian art stood highest four thousand years before Christ. Then it became ossified, became stereotyped. Possibly the oldest and highest civilisation of Egypt owed its perfection to international trade and the discontinuance of international trade, which possibly fell to the Phœnicians, may account for their standing still in art and science. During historic antiquity the most advanced nations were the Athenians and Carthagenians, and in the Middle Ages and modern times the Venetians, the Dutch, the English, and the Americans. Trade, wealth, and progress have always gone together.

Wealthy nations and wealthy individuals, especially individuals enriched by commerce and industry, have ever done most for the advancement of learning and art. Most of the great British and American schools and innumerable scientific and artistic institutions owe their existence to wealthy merchants and industrialists. While wealthy noblemen and landowners incline towards employing their wealth for the purchase of land, for ostentatious building, charity, etc.; wealthy business men, who keenly appreciate the advantages of learning and art, habitually spend vast sums of money for endowing learning and art. The Medicis in Italy, the Fuggers in Germany, Jacques Coeur in France, Thomas Gresham in England, Pierpont Morgan, Widener Rockfeller, and Carnegie in the United States, are typical examples which prove that commerce and industry favour the nobler pursuits.

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The oldest historic nation with the commerce of which we are acquainted are the Phœnicians. They were the greatest civilising force in the world from 850 to 550 B.C., when their place was taken by the Greeks. According to Strabo, the Greeks were taught astronomy and arithmetic by Sidon and Tyre. The Phœnicians were believed in antiquity to have discovered the use of weights and measures, and of money, and to have invented many arts, such as glass making, weaving, and purple dyeing, for which they were celebrated in the earliest times. Homer praises repeatedly the beautiful Phœnician manufactures. The Phœnicians are believed to have invented alphabetic writing and the art of keeping accounts. The art of shipbuilding also was ascribed to the Phœnicians, and so was the art of navigation. They were the very earliest colonisers of the world, and explorers. According to Herodotus the Phœnicions doubled the Cape of Good Hope 2,000 years before Vasco Da Dama. Modern science considers the account of Herodotus to be believable and probably correct.

Phœnician civilisation was destroyed by the great military nations around. After Phœnicia's downfall Athens and Carthage monopolised the trade of the ancient world and became the leaders of civilisation. It is noteworthy that among all the artistically and scientifically so greatly advanced Greek nations, the Athenians, who were the greatest merchants, were foremost in science, art, and all the nobler pursuits.

Throughout history we find that the great commercial and industrial nations have been the most civilised, and the great agricultural and military nations the least civilised. That will be seen from the records of the past, from Assyria, Palestine, and Sparta, down to modern Turkey and Bulgaria.

Commerce brings about not only the international exchange of goods, but also an international exchange of ideas. Progress in a nation closed to foreign intercourse is inconceivable. The scientific and artistic greatness of China and Japan arose during the long period when these two countries stood open to foreign intercourse and carried on a great international trade. Both China and Japan were closed to foreign intercourse only temporarily, and during a comparatively short time.

The civilisation of the great mercantile nations from the earliest times to the present day is due to foreign influence and foreign intercourse. If we were acquainted with the history before the year 500 B.C. we should probably find that the great inventions attributed to the Phœnicians were at least in part due to the nations with which they traded. We know that Greece's culture was drawn largely from Egypt, Phœnicia, Babylonia, Persia. Italy is the mother of modern art. She is the mother of the arts of France, England, Germany, etc. However, Italy drew her arts largely from other nations. The Italians of the Middle Ages were indebted for the high state of their arts and sciences very largely to the Arabs, with whom they traded very intensively. While the Italians were the great traders of the Mediterranean and of Europe—Lombard Street and the many Italian terms used in commerce remind us of the fact—the Arabs were the great artists and traders of the East. The Venetians formed the connecting link between Europe and Asia. They traded with the Arabs of Bagdad, etc. Hence Venice looks like an Arab town. The style of Venetian architecture (the word arabesque) reminds us that the Italians received much of their artistic and scientific knowledge from the Arabs.

The ancient Arabs were in the early Middle Ages the greatest nation of the world. They had conquered Palestine, Syria, Mesopotamia, Persia, Egypt, the Southern shore of the Mediterranean, and Spain. They were very eminent in science and trade. The enormous trade of the conquered districts fell into their hands. They built their capital at Bagdad, near Babylon, which has a most excellent position as a centre of trade. Arabian merchants traded from China to Central and even to Northern Europe. On the Islands in the Baltic and on the coast of Sweden vast numbers of Arab coins have been found. Arabian sciences and Arabian arts flourish, and the Arabs

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became the pioneers of civilisation owing to their discoveries in geography, astronomy, philosophy, medicine, chemistry, navigation, architecture, etc. The wonderful mosques at Delhi, Cairo, Constantinople, Seville, and Cordova attest that the Arabs were as great as artists as they were as conquerors and merchants. The Arabs were the only men of letters during the early Middle Ages, and the revival of learning was due chiefly to Arab influence, which acted in the first place upon the Italians. The Crusades brought together the Europeans and the Arabs. Both by the contact of the Crusades and by the trade between the Italians and Arabs, Arab civilisation spread all over Europe.

A cursory study of the dictionary will clearly show the vast influence that the Arabs had exercised upon European civilisation through the instrumentality of Italy, which acted as a channel. The extent of this influence is attested by the numerous words which are taken from the Arabic. The pre-eminence of the Arabs in shipping and navigation will be seen from the fact that the words "Admiral," "Arsenal," "Frigate," "Corvette," "Cable" come from the Arabic. The effect of their pre-eminence in trading may be seen from the words Magazine, Tariff, Bazaar, Tare, Douane, which have been taken over from the Arabs. Arabic pre-eminence in chemistry and astronomy is attested by the Arabic words Alcohol, Alkali, Alizarine, Borax, Amalgam, Alchemy, Almanac, Zenith, Nadir, Azimuth, Azure, etc. European elegance was introduced from the Arabs, as may be seen from the Arab words Sofa, Divan, Alcove, Mattress, Carafe, Valise, Lute, etc., and by the Arab words Ruby, Lapis lazuli, Talisman, Amulet, Jewel. In the early Middle Ages Arab doctors, chemists, law professors, philosophers, etc., had the greatest prestige in all countries. We owe to Arab doctors the words Syrup, Julep, Elixir, Senna, Camphor; to Arab mathematicians the words Algebra, Zero, Cipher; to Arab industrial and agricultural pre-eminence the words Cotton, Artichoke, Apricot, Alfalfa, Moiré, Taffetas, Chiffon, Saffron, Carmine, Damask (Damascus), Mousseline (Mossul), and the commodities which bear Arabic names.

(*To be continued.*)

Correspondence.

ASBESTOS PULLEYS.

To the Editor of "Asbestos."

Sir,—I thought the following rather novel use for asbestos-cement, or rather articles made from that base, might interest your readers. The articles referred to are pulleys running at extremely high speeds. One type is a 6″ × 1″ face pulley set-screwed on to a 1″ shaft, 12 pulleys on one shaft running at 2,400 R.P.M. The other type is a drum style pulley 4″ long, 4″ diameter, with ball journals each end on a fixed spindle (48 of these) running at nearly 5,000 R.P.M. Owing to the high cost of castings plus machinery all over it was decided to try this material, and after many months running I have found that it is quite satisfactory, and in not one single case have we had a burst pulley. The balance is good, and considering the vast difference between the cost of an aluminium pulley (machined all over) and these, it is certainly a distinct advantage, and the specific gravity of the asbestos-cement pulley is practically below the aluminium ones, although, of course, the latter can be made much thinner and are naturally actually lighter.

Trusting this rather novel use will interest you,

Yours faithfully,
H. L. Down
(of Messrs. Cousins Limited, Hampstead).

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Blessed Be Conflict.

By Rev. T. J. COX.

HOWEVER we may explain the fact, all real progressive living is set to Conflict. No Legislation by Lords or Commons; no association, whatever its form and speech, can deliver us from this stern reality. We are all, whatever our place or power, involved in this struggle. It is the demand that success makes upon the Pioneer, the Capitalist, the Speculator, and the man at the bench, wheel or desk. It is a law of life in all its forms; that each thing contends earnestly for what will sustain it.

It is the wonder of the scientific man how the conflict of life for its own pervades earth, air, and sea. The air around us is thick with the floating seeds and germs of life. The cliffs that engirdle Cornwall are but the compressed relics of an old ocean floor: every atom was once a living thing. The breaking of fossils tell of fish and bone and fern.

And in the social order " He gave to each man according to his ability." It is the ability of each man that is demanded now. All are not to do the same work. Men are differently constituted. If labour is to serve the infinitely complex state of the world there is work for every man.

The State is held together and progresses by that which every part and every form of craft supplieth. The social order must have its thinkers, its pioneers, its planners, its daring men of enterprise, or industrial life will revert to earlier forms. I do not say that thinkers and pioneers and planners are the whole of our industrial life, but we could not conceive of it without them. There is no compliment here, but a bare statement, the truth of which all may test for themselves.

Every advancing step makes its own demands, and every demand precipitates the conflict by which new work is done, and all the while men are growing in heart and head and soul. What a fascination is the study of great enterprises. Year after year the thought changes, the forms alter, and yet the progress comes. Generation after generation take up and carry on this thought of some simple thinker who thought in terms of cotton, wood, or iron, and with each new man, department after department, story after story, is added to the industrial outlook, and all in the interests of the whole.

While men are converting cotton and wool into clothing they are growing in character and power. It is only by this clash of interests that our energies are awakened, our wits sharpened, and our generation served.

From time to time the industrial structure may want cleansing, re-setting, or redemption, and the process sets in. We do not expect to wake up some morning in a perfect world; we are not fit for it. If we can only blow the dust away for the next man to see a little more clearly we shall have put in our living stone in the City of Industry, whose gates open outward.

We may be dissatisfied with the things as they are, but they are changing to great demands. The spurs and goads to progress are everywhere to seeing men. We are dislodged from errors by loss and impelled to new advances by the ideal hungers of life.

Industrial life is only strong so long as each seeks willingly to join and to compact that which is the working energy and value of the whole. We welcome the trade-finding instinct, the inventive impulse, the capacity for taking risks—these unseen things are the powers that open up new paths of service and literally cover the waste places of the moorlands with hives of industry.

Progress is by conflict—by the conflict which converts the less into more—the blood and the brain into service. Men differ in many ways, but the original point of variation is physical. When health goes the worker is " spiked." Good health is wealth. Wise employers are

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alive to this doctrine, and the provision for food and rest represents an insight into the human machine, which is worth more to " the Works " than discussions on art, literature, or philosophy. If health is wealth, success is knowing how. Success is not in things of iron, wood, and wool, but in the brain that organises them into marketable commodities. To know how to carry body and mind in the conflict of to-morrow, how to attain the ends of commerce and ambition by using men as instruments, and not degrading them as tools; how through intelligent men to advance both one's self and one's fellows, is a great task, but it is being learnt.

Let no one suppose that a new order will arise of itself. It must be prepared for now. Events do not precipitate themselves ready made in any establishment. They must be thought over and formulated upon broad lines before they take shape as industrial facts. Nothing is more needed at the present time than clear and accurate thinking—thinking that relates itself to the weal of the whole.

Fulness of life never comes to half-hearted men. Men do not stumble into promotion.

The great majority of men are led—or misled—by phrases which sound well enough, but are as the tinkling brass and clanging symbol. Such phrases as " wage slavery," " the curse of competition," " down with Capitalism," " the Nationalisation of all the means of production, distribution, and exchange," are the favourite catchwords of those who most loudly call for change in the industrial and social order. To remove one form of evil in order to put in its place another is not advancement. To substitute " State Control " for the " Control of the Works Committee," or Works Directors, is in the light of recent events a sad retrogression.

We may in some moments advocate the rooting out of the Individual Capitalist, but no industry can be run without capital, and the substitution of National Capitalism for a large number of Individual Capitalists might result in a form of tyranny impossible under old conditions.

Do we not, do not our wives and children feel the grip of the State just now? And in all conscience it is the grip of living death. Wage slavery would be none the less slavery if wages were abolished and a system of State coupons was set up in its place. There are many evils connected with our present system of social and industrial organisation; but the hope for the future does not lie in " ending " but in " mending."

It is being discovered on economic grounds that the " human machine " is worth looking after: that in the long-run health makes for wealth; that " recognition " is the soul of brotherhood. The first problem is how to live smoothly with each other; how to reduce the friction and increase the working power. As the " works " expand and the departments increase in size and complexity, the difficulty of management becomes apparent.

The second task is to make the atmosphere that shall open up fresh levels of courage and brotherhood. There must be won back the native greatness of the old industrial world of craft and comradeship. To catch this advancing spirit is to feel the solidarity of the whole. To tamely and grimly accept our daily task is to lose its tonic and its discipline.

My Industrial Gospel is: Blessed be the conflict that awakens thought; Blessed be the struggle which gives " buck "; Blessed be the right living which gives wealth; Blessed be the conscience that gives cash value to cashier, carpenter, weaver, and worker the world o'er.

INVALIDS AND GENIUS.

In the making of human history and in the development of literature and science so large a part has been played by " invalids " of one kind or another that physical weakness or degeneracy is held by some to be a co-efficient in the production of genius. The value of a human life cannot be measured solely by its material productiveness to the community.—*British Medical Journal.*

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The Asbestos Industry of the Province of Quebec, Canada.—II.

By THÉO. C. DENIS,

Superintendent of Mines of the Province of Quebec, Canada.

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GEOLOGY OF THE QUEBEC ASBESTOS DEPOSITS.

THE asbestos deposits of the Province of Quebec occur in a long development, or series, of basic intrusive rocks, which is usually referred to as "the Serpentine belt."

This belt, of which the important part is shown on the sketch map, Fig. 5, starts in the United States, and enters Canada at the boundary line between Vermont and the Province of Quebec, just East of Lake Memphramagog. From this point it can be followed in a direction roughly north-east, through that part of the province lying to the south of the St. Lawrence river, between the cities of Three Rivers, and usually designated as the "Eastern Townships."

From the international boundary line to within a short distance of the Chaudière river, a tributary of the St. Lawrence, this development of rocks is almost continuous (see sketch map), presenting a long narrow zone of over one hundred miles. The general trend of this serpentine belt can be traced in the same direction by disconnected outcrops for a further distance of seventy miles, as far as l'Islet county. Then occurs a gap of 130 miles, and more developments of serpentine rocks are found in the Gaspé peninsula, two large occurrences being found in the Shick-shock mountains, at Mount Albert, and in the township of Weir.

This belt is constituted by igneous and metamorphic rocks, which comprise peridotites (olivine rock), pyroxenites, diabases, granites, serpentines and talcose schists. It is true that the serpentines occupy a total area much smaller than the other members of the zone, but as they are the important economic rocks and, moreover, are more easily recognisable on account of their characteristics, it is from their presence that is derived the designation "Serpentine Belt."

The serpentine is the result of the alteration of the olivine, which is the main constituent of the peridotites. Olivine is a silicate of magnesia and iron, and serpentine is a hydrous silicate of magnesia; Chrysotile Asbestos may be considered as an incipient crystalline form of serpentine or an attempt of serpentine to crystallize.

All the rocks of the serpentine belt series, from the basic peridotite to the acid granites and aplites, owe their origin to a process of cooling of an immense igneous magma, or pasty mass of molten rock, from which the various elements solidified in succession, the basic rocks consolidating first, and the acid granites representing the last stage of the cooling. The injection of the granites certainly took place subsequently to the consolidation of the basic rocks, for they are found in dykes and sheets cutting the peridotites and allied serpentines, and it has been noticed that such injections have had an effect on the formation of asbestos, as the serpentine is richer in their immediate vicinity.

As mentioned before, with the olivine rocks and the serpentines are associated

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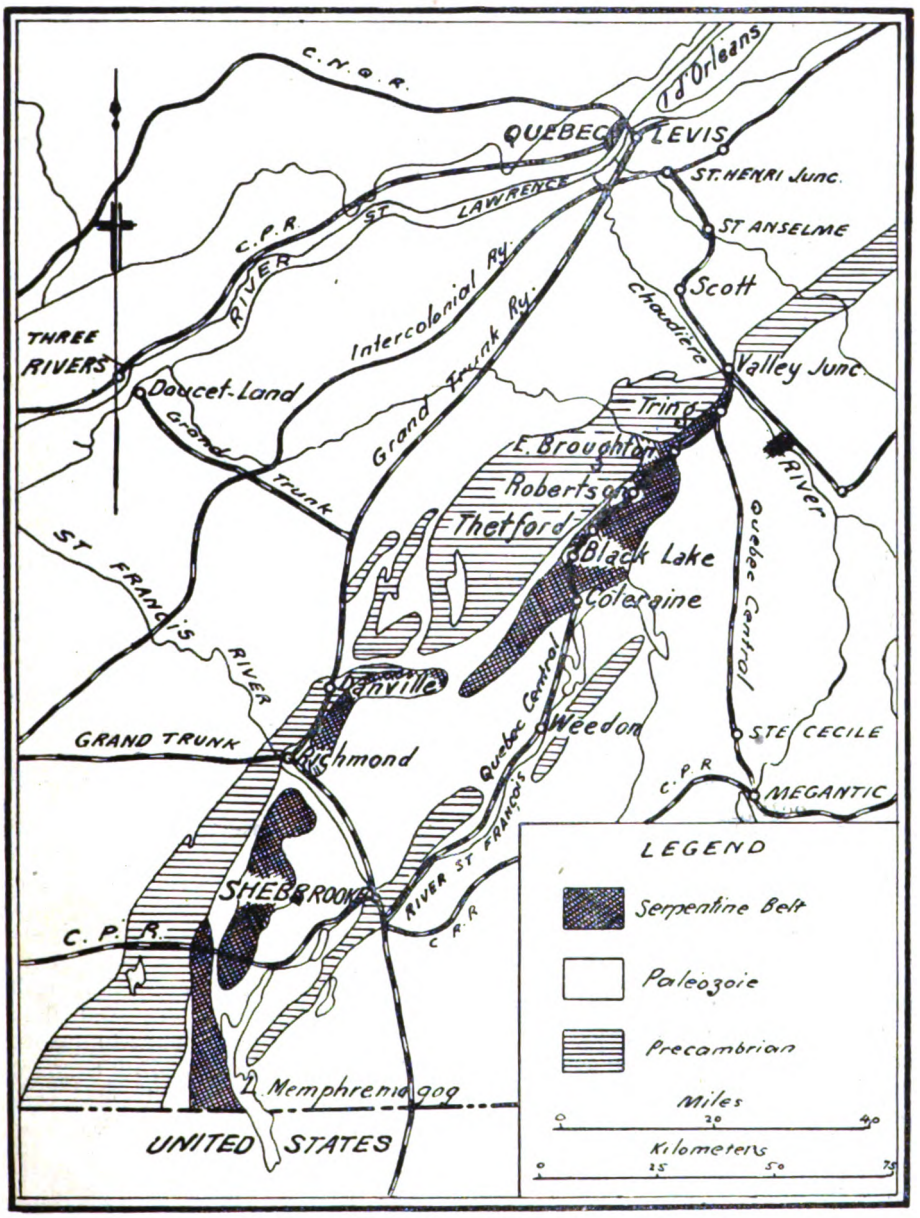


FIG. 5.—SKETCH MAP OF THE "SERPENTINE BELT" OF THE PROVINCE OF QUEBEC, IN WHICH OCCUR THE DEPOSITS OF ASBESTOS.

other igneous rocks, pyroxenites, gabbros, diabases, granites, aplites. These rocks of the "Serpentine Belt" are not geologically very old, for they cut and invade Paleozoic formations, the youngest of which are Silurian or even perhaps Devonian.

DISTRIBUTION OF ASBESTOS-BEARING SERPENTINES.

The Asbestos-bearing rocks of the Serpentine Belt may be roughly divided into five separate fields or areas, each one of which possesses distinctive features.

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They may be designated as follows, the enumeration being given in geographical succession from north-east to south-west: (1) Gaspé peninsula occurrences, which are not worked; (2) the Broughton township area, which is worked and yields mostly short fibre; (3) Thetford Black Lake field, which is the most important producer of asbestos in the world; (4) the Danville district, which produces short fibre, but also a small proportion of long material; (5) the Bolton area, West of Lake Memphramagog, which is still in the prospecting stage.

A gap of 120 miles occurs between the Gaspé occurrences and the East Broughton field, but the delineation of the belt can be followed by an occasional outcrop of serpentine, some of which contains short asbestos fibre. The four other areas are all within the limits of the small sketch map.

(1) In the Gaspé peninsula are found the most eastern outcrops of serpentine of the belt. The presence of this rock has been recognized in three places, and in each small veins of asbestos have been found, viz., at Mount Serpentine, ten miles up the Dartmouth river; at Mont Albert, in the interior of the peninsula; and in the township of Weir, county of Gaspé. In none of these places has any work been done, but as the region is practically unexplored, it is quite possible that prospecting may bring to light workable deposits.

(2) The working mines in the Broughton township field are situated along a narrow band of serpentine, enclosed in slatey schists, which can be followed along lots 13 ranges III. to XI. of the township of Broughton, and in some places deviates into the adjoining lots No. 14. This band extends towards the west, into the range V. of the adjoining township of Thetford, where at Robertson it is also worked on several outcrops. This band of serpentine attains its greatest width near the village of East Broughton, where several large mills have been erected. The total length of the band, which appears to be an intrusive sill intercalated in the schists, is over 12 miles, although there are interruptions in its continuity. Its width seldom exceeds 300 feet.

(3) The Thetford Black Lake field, which occupies parts of the townships of Thetford and Coleraine, and may be extended into the neighbouring townships of Ireland and Wolfestown, where asbestos deposits have been developed, is by far the most important asbestos-producing area in the world. Practically the whole of the Canadian long fibre, hand-cobbed asbestos designated as "Crude Asbestos," as well as 70% of the mill stock, come from these deposits. The belt of serpentinized rocks is here traceable over a distance of 12 miles, while its greatest width is about three miles. The Quebec Central Railway crosses the deposits, and most of the mines are located within a few hundred feet on either side of the track. This railway connects both the Broughton field and the Thetford Black Lake field with the city of Quebec at its northern terminus, where ocean transportation can be had for nearly eight months of the year, and with Sherbrooke at the southern terminus, where it connects with the system of American railways, by the Boston and Maine Railroad and the Main Central Railway.

(4) The Danville field as at present known is a small area which, in a straight line, is some thirty-five miles south-west of the Thetford Black Lake area. The outlines of its serpentine patches have not been very definitely fixed, for immediately south of the working mines on this occurrence the region is heavily bush-covered and the surficial deposits are heavy and general. The Danville field is an important producer as to quantity, but the fibre is shorter and its average value is much lower than that of Thetford. The Grand Trunk Railway, connecting Levis and Montreal, passes through Danville, but the mines are five miles from this town, and they are reached by a spur of the railway.

(5) The last area of serpentinized rock is situated to the west of Lake Memphramagog, in the valley of the Missisquoi river, and traverses the townships of Bolton and Potton. The serpentine apparently occurs here as a long continuous outcrop of a dyke, which is first observed south of Eastman, a small village on the Canadian Pacific Railway,

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twenty-five miles west of Sherbrooke. This serpentinized dyke is practically continuous, and can be followed by outcrops southwards, to the international boundary between Quebec and the State of Vermont, a distance of over twenty miles. Over the greater part of its development this serpentine is not more than 100 feet in width, but in places it widens to 500 feet. There are several asbestos prospects scattered along this dyke, but none yet have proved workable.

MODE OF OCCURRENCE OF ASBESTOS.

As previously stated, asbestos veins are found in Quebec exclusively in serpentine, which itself owes its origin to the alteration of rocks that are rich in olivine, such as peridotites and dunites. The difference between Chrysotile Asbestos and serpentine lies in the physical properties of the two substances, for the chemical composition of both is identically the same.

It is not therefore possible to ascertain by a chemical analysis what percentage of asbestos certain samples of serpentine contain. Physical tests (crushing, rolling, screening) alone can give such data, and these figures only represent proportions of recovery or extraction and not absolute contents. However, from the commercial standpoint, recovery figures are really the more important.

Asbestos occurs in two forms in the serpentine: (1) as veins having well defined walls, along which they part easily from the enclosing serpentine rock; (2) as disseminated fibre in the rock, without any definite arrangement.

Vein asbestos is sometimes called cross-fibre asbestos from the disposition of the threads, which lie transversely, or at right angles to the walls of the vein. Therefore the width of the vein determines the length of the fibre. This width varies from microscopic dimensions to three or four inches; some have been observed of five or even six inches, but they are very rare. These veins cut the serpentine in all directions in a very irregular network, although as a rule the wider veins follow the directions of the main jointage planes of the rock.

The agencies and processes to which these veins owe their origin are not thoroughly understood yet, but it is very likely that they are exogeneous, that is, they grow from the middle outward. The common conception of the origin of mineral veins is that of a growth inward, by the filling up of fractures in rock masses by deposition of mineral substances on the walls, successive films of incrustation, on both sides, gradually narrowing the open space of the fissure, and finally meeting in the centre, and completely filling the opening. But in the case of the asbestos veins, the hypothesis is that the alteration of the serpentine into asbestos began along very narrow, even microscopic, interstices in the rock, by the circulation of vapours emanating from the still pasty parts of the igneous intrusion, after the cooling, or solidification, of the more basic parts of the rock magma. These magmatic waters, or vapours, gradually converted the olivine rock into serpentine and its crystalline form asbestos, this alteration proceeding from the centre of the vein outwards.

It is observed that the enclosing rock in the immediate vicinity of asbestos veins is always completely changed into serpentine, and in receding from the walls

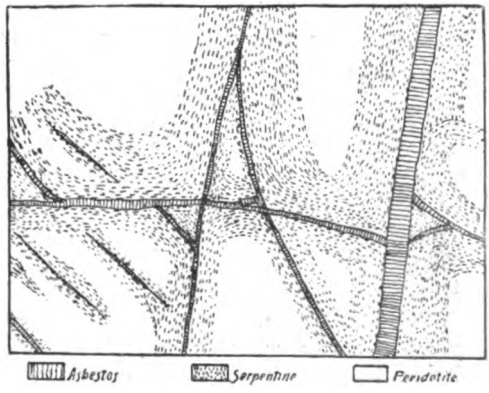


FIG. 6.—MODE OF OCCURRENCE OF ASBESTOS.—Diagram of Asbestos veins in serpentine rock. The width of the veins varies up to four and five inches.

the degree of alteration is not so advanced and the serpentine gradually passes into zones and cores of the original unaltered peridotite. The sketch (Fig 6)

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has been drawn from an actual exposure in one of the mines at Black Lake, and the photograph (Fig 7) was taken in a Thetford mine. Frequently the veins in the rock assume a parallel arrangement which gives it a banded or ribbon structure. (Fig 8).

Disseminated fibre, or " slip fibre," is found distributed unevenly throughout the serpentine, and does not occur in well defined veins. It often constitutes a

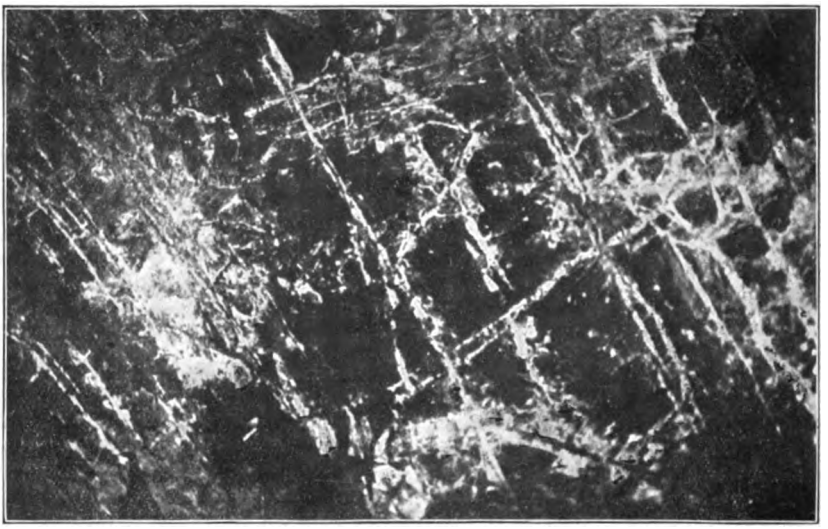


FIG. 7.—PHOTOGRAPH OF VEINS OF ASBESTOS IN FACE OF QUARRY.

large proportion of the rock. As a rule it is shorter than the cross-fibre, and its average value is lower than the vein material; but on the other hand the percentage of asbestos contents is greater. The rock of the deposits of slip-fibre contains eight to twelve per cent., or even more, of fibre which it recovered; whereas vein asbestos serpentine yields from four to seven per cent. of fibre.

The deposits of Thetford Black Lake yield vein asbestos, some of the fibre being two and three inches and selling as high as $1500 a ton. Slip or disseminated fibre deposits are worked at East Broughton, and with very few exceptions the highest value of the fibre which they yield is about $75.

DEPTH OF THE DEPOSITS.

As stated above, the alteration of the olivine rocks (peridotite and dunite) into serpentine and Chrysotile Asbestos is ascribed by Canadian geologists, such as Dresser, Barlow and Baker, to the action of magmatic waters or vapours, originating from the intrusions of granites, which cut the *massifs* of basic rocks, rather than to the action of meteoric waters. Under such conditions there are no reasons to doubt that the asbestos deposits continue in depth, without changes in their nature, to perhaps beyond the level of economic mining. At all events the work of exploitation and of development carried out in the mines of Thetford and Black Lake appears to fully bear this out, and there does not seem to be any cause of fear that the deposits will give out in a near future owing to an exhaustion of the serpentine.

At present the largest excavation in the asbestos field has reached the following dimensions: length, 900 feet; width, 600 feet; depth, 275 feet. At that depth there has been no change whatever in the nature of the ore, the percentage of asbestos, or in the quality, quantity, and length of the fibre. Moreover, in some of the pits much greater depth have been reached by diamond-drill holes, and it may be stated that the asbestos-bearing serpentine extends to depths of over 500 feet below the surface.

The operators have expressed their confidence in the permanency of the

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deposits, by the investment of several million dollars in the construction of mining plants and mills.

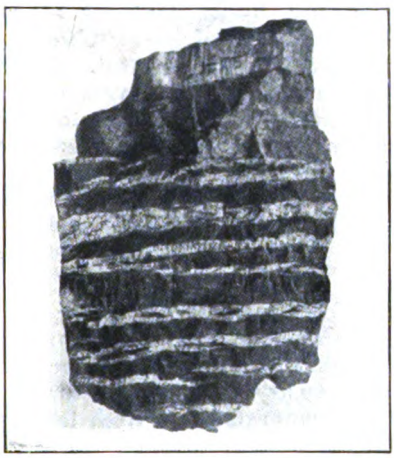


FIG. 8.—PARALLEL VEINS OF ASBESTOS, GIVING THE BANDED STRUCTURE, OR RIBBON ASBESTOS ROCK.

DISCOVERY OF THE DEPOSITS AND DEVELOPMENT OF THE INDUSTRY.

The presence of asbestos in the serpentine belt of the Province of Quebec appears to have first been observed in the Bolton-Potton area, west of Lake Memphramagog. In the report of progress of the Geological Survey of Canada for the year 1847-48, Sir W. E. Logan mentions "a belt of highly magnesian character, consisting of serpentine, soapstone, and other allied minerals . . . . having been traced at intervals across Potton and Bolton in the valley of the Missisquoi, a distance of nearly twenty miles . . . . The belt consists chiefly of a dark bottle or blackish-green serpentine, with a very uneven exterior, weathering to a decided reddish-brown, or a decided white colour; thin veins of a pea-green serpentine occur, much softer than the dark-green, and thin reticulating veins of asbestos intersect the rock in various directions. . . . Soapstone is frequently associated with the serpentine. . . . . Veins or beds of fine amianthus sometimes occur in the soapstone, of two or three inches thick, of a delicate greenish white, affording beautiful specimens."

According to Dr. R. W. Ells, attention was first attracted to Canadian asbestos by a specimen of the silky-fibred chrysotile exhibited at the London exhibition in 1862. This specimen came from a small occurrence of serpentine near the Chaudière river, to the north-east of the Broughton belt (see sketch map). But nothing was done towards working the deposit.

In 1877 asbestos was found in the serpentine hills of Coleraine and Thetford. The credit of this discovery is claimed by Mr. Robert Ward; but this is disputed by some, who state that a French Canadian named Fecteau had made a previous find. At the time attention was drawn to the district owing to the construction of the Quebec Central Railway, which had been opened from Sherbrooke to Garthby in 1876, was continued to Coleraine in 1879, and completed through to Levis in 1881. In Coleraine and Thetford townships the railway for some miles runs between high ridges of serpentine, and the mines are situated alongside the road.

Mining operations began in Thetford in 1878.

R. H. Jones, in his work on Asbestos, states that the first quarry was opened in 1878 on lot 27, range VI. of Thetford township, by Mr. Andrew Johnson (Johnson Asbestos Mining Company), who is still the general manager, forty-one years after the debut of the mine. It is now operated by the Johnson's Company. Mr. Obalski, the Government mining engineer, in his report for 1886 also calls this mine the pioneer mine of the district.

According to Dr. R. W. Ells, the first mine was opened that same year by Mr. Ward, on lot 27 range V., on the mining property immediately adjoining the Johnson mine. The property was soon after taken over by the Boston Asbestos Packing Company, who developed it under the management of Mr. Thomas Sheridan. It is now controlled by the United States firm—Keasby & Mattison Company, of Ambler, Pennsylvania.

In 1879 the Hampden mine was opened on lot 26 of range V., and operated by Messrs. King Bros. This is now [illegible] of the most valuable mines of th[illegible]

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Corporation of Canada, and the largest open-workings of the district, having attained a depth of 275 feet.

This was soon followed by the opening of the Jeffrey mine, in the Danville area, on lot 6, range III. of the township of Shipton, and in 1880 and 1881 the opening of several other mines in both Black Lake and Thetford.

According to Obalski, the first operations in the Broughton field were the opening of the Fraser mine, in 1882, by Dr. J. Reed. This is located on lots 14, ranges VI. and VII. of the township of Broughton. This was subsequently acquired by an American Company, and in 1886 it was bought by the Scottish-Canadian Asbestos Company. This was the only property opened in the Broughton area for many years.

During the early years of the Canadian asbestos industry only the vein fibre of a certain length was saved, and it was all recovered from the mined rock by the simple means of cobbing and picking. Three grades were produced, designated No. 1, No. 2, and No. 3 respectively. From the records available these designations do not seem to have meant anything very definite as to the respective length of the fibre, except that for a definite mine, No. 1 was of longer fibre than 2, and No. 3 was the shortest. Later on, when mechanical means were introduced to extract the short asbestos, which formerly was sent to the waste dumps with the rock, the hand-cobbed long fibre material was called No. 1 and No. 2 Crude, No. 3 was eliminated and the product of the separating mills was called " Mill Stock."

The following table gives the quantity and the value of the annual production of Canadian asbestos since the beginnings of the industry. The figures for the first twenty years are taken from the reports of the Geological Survey of Ottawa; from 1898 to date they are the figures compiled from returns received direct from the producers by the Bureau of Mines of the Province of Quebec. The table shows better than a lengthy description the progress of the industry.

TABLE OF ANNUAL PRODUCTION OF ASBESTOS OF THE PROVINCE OF QUEBEC SINCE THE BEGINNING OF THE INDUSTRY.

Year.	Production.		Value.**
1878.....	50	tons*	$.....
1879.....	300	,,	19,500
1880.....	380	,,	24,700
1881.....	540	,,	35,100
1882.....	810	,,	52,650
1883.....	955	,,	68,750
1884.....	1,141	,,	75,097
1885.....	2,440	,,	142,441
1886.....	3,458	,,	206,251
1887.....	4,619	,,	226,976
1888.....	4,404	,,	255,007
1889.....	6,113	,,	426,554
1890.....	9,860	,,	1,270,240
1891.....	9,279	,,	999,878
1892.....	6,082	,,	390,462
1893.....	6,331	,,	310,156
1894.....	7,630	,,	420,825
1895.....	8,756	,,	368,175
1896.....	10,892	,,	423,066
1897.....	13,202	,,	399,528
1898.....	15,893	,,	496,340
1899.....	15,571	tons*	$581,667
1900.....	21,408	,,	719,416
1901.....	33,466	,,	1,274,315
1902.....	30,634	,,	1,161,870
1903.....	29,261	,,	916,970
1904.....	35,479	,,	1,186,970
1905.....	48,960	,,	1,476,450
1906.....	61,675	,,	2,143,653
1907.....	61,985	,,	2,455,919
1908.....	65,157	,,	2,551,596
1909.....	63,965	,,	2,296,584
1910.....	80,605	,,	2,667,829
1911.....	102,224	,,	3,026,306
1912.....	111,175	,,	3,059,084
1913.....	136,609	,,	3,830,504
1914.....	107,401	,,	2,895,935
1915.....	113,115	,,	3,544,362
1916.....	133,339	,,	5,182,905
1917.....	137,242	,,	7,198,558
1918.....	142,375	,,	9,019,899

* Tons of 2,000 lbs. ** Values in dollars. Normally £1 = 4.86 dollars.

(*To be continued.*)

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WHAT SHALL IT PROFIT -------?

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Asbestos in Germany.

THE following extracts from an article which recently appeared in the *Gummi-Zeitung*, one of Germany's chief technical papers, provides interesting reading for those engaged in the Home Industry :—

"For more than five years Asbestos and products made out of it have been liable to seizure and control. This régime has now ended. At the outbreak of the war it was necessary to introduce control, for in 1914 the amount of raw Asbestos in Germany was small. Very extensive supplies were necessary to meet the demands made by the Navy. Imports from foreign countries entirely ceased, and if now and again a consignment from a neutral country or from Russia came in this did not noticeably affect the situation. With these prospects before her Germany began to look up existing stocks, and even to see if she could not produce the material at home. This German Asbestos was not, however, what we were looking for and requiring. Its use was very restricted, and it was only suitable, unfortunately, for the manufacture of Asbestos pulp or Asbestos substitute pulp. The introduction of this German Asbestos caused considerable disturbance and awakened hopes which were unfounded. The dealer and consumer were led to believe that through the discovery of German Asbestos henceforth all shortage of raw material was entirely removed. Nevertheless, there was still the shortage in Asbestos for spinning and fibre for packing, etc. Germany possesses nothing that can take the place of Canadian, African, or Russian Asbestos, and contrary assertions are a direct travesty of the facts.
direct travesty of the facts. . .

As one reads the technical papers one sees a great number of offers of all kinds of dealers of so many thousand kilos, "all English Asbestos sheet, 98% guaranteed"; Asbestos threads, packings, and so on, all "of English origin" or "guaranteed impregnated with 98% Asbestos content, promptly delivered in any quantity." Even if these Asbestos sheets are "guaranteed English origin," about which there is some doubt, then it is a sad sign for our trade to boast about it.
sign for our trade to boast about it. . .

Perhaps we shall go so far as to buy the finished goods from the Americans and English, and allow our own factories to close down. . .

Manufacturers should now resolve to supply only articles of good quality from all the works, stardardized in manufacture and quality. This would not prevent particular factories who have special facilities for producing their own specialties from continuing. Samples which are coming to hand at present consist of substitutes; a paper with a little kaloin and slag hair is called Asbestos substitute sheet. A match held a foot away will set light to it! If, on the other hand, a customer is offered good stuff in which there is no substitute used, he refuses, because the price is too high."

MILITARISM.

General Dragomiroff—the Russian Moltke, as he has been termed—about 20 years since, said: "We, or at any rate our children, will live to hear Bismarck execrated even by his own countrymen, and by all Europe as well, for the part he played in causing Continental nations to neglect peaceful pursuits and productive labour, and to live far beyond their income in order to maintain the insatiable Moloch of militarism, from which nothing good has come or can be hoped for. Defence of one's country is a good and sacred thing, but the turning of a nation into a vast barracks is tantamount to a work of pure destruction."

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Asbestos-Cement.—III.

By W. F. GIBSON.

BEFORE proceeding to describe the bonding action of cement with the asbestos fibres in the two-component mixture, it will serve some useful purpose to continue the consideration of these two components before combination, and further, the action of water upon them.

With the first of these components, viz., cement, it has already been mentioned in the earlier article that changes do occur, and new compounds are formed from the direct action of water upon the complex silicates and aluminates present. These compounds have interest in this connection only in virtue of their importance in providing the cementing bond or adhesiveness of the mass, for they provide the means whereby the utility value or strength of the two-component combination is attained. But in their formation a new compound is formed which is calcium hydroxide, usually represented by the formula $Ca(OH)_2$. Each particle of cement will be attacked by the water, and therefore each particle will produce proportionately an amount of calcium hydroxide. Here, however, is a curious action. The smallest particles are probably completely hydrolysed or decomposed, yielding fully the products of that decomposition, while the larger particles, due to an inhibitory action, are prevented from complete decomposition and only yield superficially their products of decomposition. This can be demonstrated in a simple manner.

A coarsely pulverised cement is mixed with the correct proportion of water, allowed to set and then harden in water over a period of weeks or months, to allow the superficial action to develop as much as possible. A tensile strength test made in the usual standard manner shows a fairly good result. The hardened mass is now re-pulverised, and this time extremely finely, in order to break up the originally unpulverised particles, and this new powder treated with water in the usual manner. It is noted that the setting time has been profoundly changed, but a considerable strength is obtained from the mass after hardening in water as before, indicating the latent possibilities of the mass if it had been finely pulverised in the first instance.

The coarse particles then are very similar to spheres coated with a layer of the resultant products of decomposition, and such surface action contributes to the mass some cohesive or adhesive properties.

As shown in the previous article, the number of particles for a given unit weight of cement is extremely large, and the superficial area exposed correspondingly large. There is, therefore, a very large surface containing calcium hydroxide exposed to contact with the asbestos fibres, when the mixture of cement and fibres is treated with water to bring about the setting and hardening of the mass.

In the article above it was mentioned that asbestos fibre had been subjected to microscopical examination and measurements had been made of the finest fibre, which was thought to closely approximate an ultimate fibre. It was found that an average thickness of .000034″ could be observed within a limit of reasonable accuracy in the measurement. Taking this figure as a basis of calculation, and assuming fibres to be $\frac{1}{4}$″ long, the superficial area by calculation will be approximately .000034 sq. ins., and 1 lb. of fibre will contain approximately 410 thousand million fibres of this size, with a superficial area of nearly 20,000 sq. ft. These figures are based upon data obtained from microscopical investigation on asbestos, and indicate the extremely fine nature of the fibre as revealed by such methods.

It must be clearly understood that all fibres are not exactly according to these dimensions, for the process of opening up of asbestos, highly advanced in technique

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as it is at present, has no guarantee that each piece of crude asbestos is completely fiberised, and the fibres separated the one from the other in a manner similar to that obtained with vegetable textile fibres; but these data are given to indicate the very valuable property of asbestos in yielding under ideal conditions such extremely fine fibres.

Some qualities of asbestos yield much longer fibres, but in this connection a large number of short fibres is an advantageous condition when our two-component mixture is considered. The value of such fineness is two-fold :—

(1) The fibres interlace the whole mass of the two-component mixture and form a felted mass, with the cement as a binding agent.

(2) The cement is correspondingly reinforced to a degree equal to the distribution of the fibrous mass, and these two properties are valuable in the production of thin sheets of material that will withstand the severity of transverse strain without exhibiting undue brittleness.

From the relative values of surface area of the cement particles and the asbestos fibres, it may be seen what large areas are exposed to the action of water, when in the process of intimate mixture the water is added to bring about the setting of the cement.

It has been shown elsewhere that asbestos is attacked by water in a remarkable manner. In certain forms asbestos is a very highly hydrated body, *i.e.*, water has entered into the composition of the molecule by a process of compression and probable crystallisation. It might be expected, therefore, that its behaviour to the action of water will be very similar to other highly hydrated rocks or rock *débris*.

ASBESTOS—A TALISMAN.

I wonder how many salesmen whose lines is Asbestos textiles, paper, etc., carry with them a small piece of crude Asbestos.

Like an Egyptian amulet, which was supposed to possess all sorts of miraculous powers, a little piece of Asbestos rock contains the power to arouse interest.

If you don't succeed in securing your prospect's interest at the start, the order is as good as lost.

There is a story told of a man selling a certain kind of lamp chimney which was especially strong. When this salesman called upon a prospect, he would stand in the doorway and roll one of the lamp chimneys across the floor until it hit a table, chair or the wall, and rebound. Naturally the prospect was amazed that the chimney did not break into a thousand pieces, and from that point on it was easy sailing.

Now when you show a busy prospect a sample of Asbestos paper, or millboard, it does not appear of very interesting character, nor is an Asbestos gasket or a piece of Asbestos cloth very beautiful to look at, but—hand a man a piece of crude Asbestos and he is interested enough to ask a dozen questions.

Crude Asbestos is always interesting, always attractive, always unique. At least 90% of the people on the globe never saw Asbestos and only about 50% ever heard of it.

They will not believe it when you tell them that you can pick it apart in threads, and if you let them finger it and pull a few fibres off, are as delighted as kids. By all previous experience, anything which can be pulled apart in threads like that ought to be soft to the touch, but it isn't—just as hard as any other rock.

It is only a step from the interest thus aroused to the telling of facts as to the fire-proof, resilient and binding qualities of Asbestos, and if you are in position to leave a small piece on the man's desk, he will treasure it, show it to all his friends, and it will act as a permanent reminder of you and YOUR GOODS.

Asbestos (Phil.)

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A Chinese Asbestos Factory.—II.

By LADY DOROTHEA HOSIE.

After we had sat awhile in what did duty for the office, and had been served with cups of Chinese green tea, in the old hospitable Chinese way, without milk or sugar of course, and offered (and refused) cigarettes in the new Chinese fashion, we started on our tour of inspection. The factory consists of rows of parallel one-storeyed buildings with small courtyards in between. Passing first through the front courtyard, where was stacked a pile of twenty or thirty bags of crude asbestos, we entered the shed where the first process of crushing the asbestos takes place. This is done exactly as corn was ground in Britain in the old days, and still is in the East. It is spread on the top of a great flat circular millstone, round which walks a blindfolded mule, harnessed to a heavy stone roller which passes over the asbestos, crushing it. When sufficiently crushed, a boy takes it and sifts it through flat wicker sieves, the finer asbestos being then given over to the women and children over the way, to be spun into yarn, the rest being sent to be made into millboard, the manufacture of which we saw later.

The engineer again said to Mr. Wu, "You really must get foreign machinery," and once more came the cry, "Yes, I promise you we will when we get enough capital together." The Chinese have no difficulty in providing the labour, but as that is only half the battle in any business the lack of capital is doing serious harm, not only to the shareholders but to the labour employed.

In the same shed was being carried on the process of mixing asbestos with a certain proportion of cotton-wool, this mixing being carried on by the quaint method of twanging a bow-string (Fig. 2). This may sound like musical comedy, but in spite of its primitiveness the method is very effective, the cotton-wool and the mineral being very thoroughly mixed. To soften the fibre of cotton-wool the Chinese for centuries have suspended a wooden bow-shaft over the cotton and twanged the bowstring into the heap, and they were now applying this same method to asbestos. When the boy had sifted the asbestos, after it had been crushed, a man came over and took away the finer qualities, weighing out cotton-wool to mix with it in the ratio of one ounce of cotton to one pound of asbestos. The man we watched had taken three pounds of asbestos and three ounces of cotton-wool. He went with this to his little stall, which was more or less protected by a screen of matting to prevent all the mixture flying away, and very neatly spread his asbestos and his cotton one on top of the other. From a rafter in the ceiling hung a rope over his stall, which was fastened

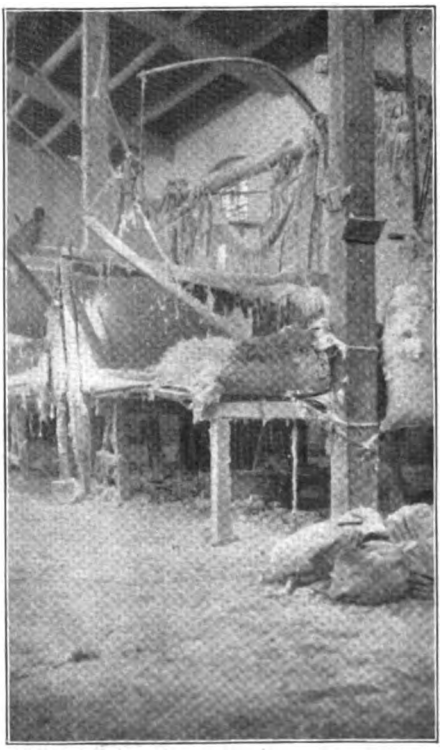


FIG. 2.—A STALL IN THE BUILDING WHERE THE ASBESTOS AND COTTON ARE MIXED.

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to a large wooden bow, exactly like an archer's bow, but without any arrows of course, and the string of which was something like catgut, probably deer's sinew. The workman pulled down this bow and bent it till the bow-string was plunged deep into the clean white heap of asbestos and cotton-wool. Then he twanged the bow-string, hitting it with a small wooden mallet. The white heap naturally rebounded, the asbestos and the cotton scattering up into the air, and mixing in their fall. The man we watched was an expert, and worked very efficiently and quickly, but even he would take an hour to mix that 3lb. of asbestos and 3oz. of cotton.

On our first visit to the factory I had forgotten my camera and was at first annoyed with myself. I had, however, occasion to return a few days later to the factory and had my camera with me. The workmen happened to be at their dinner—which they were taking together in the central court in the open air, squatting on their heels, rice-bowls in hand, and plying their chopsticks, with other little bowls of vegetables and bits of fish cooked in a sauce very like Yorkshire relish—and the manager very kindly allowed me to take some photographs. There seemed no regular dinner-hour for the women: they slipped out to prepare their meals and eat as they could, but were soon back again, for they are paid by the piece, and naturally wish to earn all they can. They were using the same primitive little wooden wheels which they and their mothers and their mothers' mothers have used during the centuries to spin cotton anod silk, and which are still in use in the country districts and many towns, though Shanghai boasts modern cotton mills run by machinery. Our engineer friend said again to Mr. Wu, "You send round for that foreign machinery as soon as you can and never mind how much your workmen grumble."

The second visit I paid the factory I tried for a long time to photograph this room, but was not successful. Moreover, the whole space of the floor was covered with the women and the children, squatting, twirling their bobbins and their yarn, feeding their three-foot high wheels marvellously quickly and deftly, never stopping for a moment (Fig. 3). I had

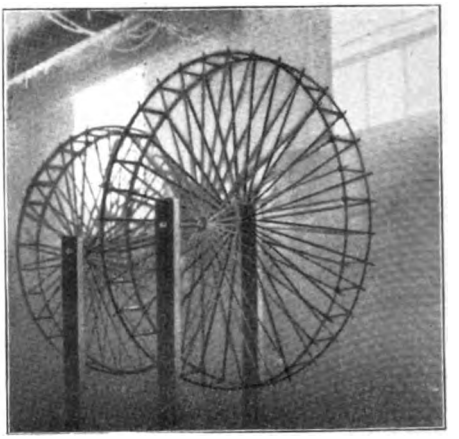


FIG. 3.—THE THREE-FOOT HIGH SPINNING WHEELS USED BY THE WOMEN AND CHILDREN FOR SPINNING ASBESTOS YARN.

to clear a space of five feet for myself and put my camera on the floor in order to be on a level with the wheel and the worker.

The constant babble of voices and laughter—for hard and exacting work never seems to make the Chinese discontented or less happy and ready to laugh—and the continuous turning and whirring of the spinning-wheels would have been pleasant to see and hear had it not been for the obvious discomfort under which they worked. Though the women of the leisured classes in China have now, for the most part, unbound their feet, at least in the big towns, the women of the working classes, who really are the most harmed, economically speaking, by the hideous practice, still persist in their foolish and obstinate fashion and bind not only their own but also their daughters' feet. It must always go to an English heart to look upon a room full of bound-footed women, and still more on bound-footed little girls of 10 or 11 years old. They were all squatting on the floor, for it is agony to them to sit on chairs as we do, the blood circulating through the feet when they hang down being very painful. Yet they were all quite happy enough in themselves, though dirty and unwashed, both as to person and clothing; for they were earning good money, being paid well according to Chinese ideas, and at a much higher rate than they would have been ten years ago. A woman could earn as

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asbestos feels comparatively soft, and the Chinese do not like a pillow to be " too soft," as they call ours, so this pillow may fill a long-needed want. I hardly think so, however, for the manager admitted to me that he had no great sale of these pillows, and I think myself he had better stick to his yarn and his millboard. A Chinese, urged to new ideas by his foreign friends, often surprises them by the extraordinary forms those new ideas take.

We very heartily wished the management and Mr. Wu good luck and all prosperity to the business when we finally said good-bye, and especially hoped that they would soon so prosper that they would be able to send for our engineer friend and instal that longed-for foreign machinery. We wished them that prosperity, not only for the sake of the workmen and their health, but also for the management, who certainly had treated us with great frankness, kindness and courtesy, and who have been very plucky in starting this new venture.

The Effects of Music.

By ROWLAND R. CLEAVER.

IT is not always necessary for one to be able to play any particular instrument to be able to understand and appreciate music. The average man and woman can never aspire to anything approaching the great Masters of Music; firstly, because it is utterly impossible to devote the requisite amount of time to study and practice; and secondly, the gift, or perhaps I should be more correct in saying *the soul* for real music has not been awakened from its lethargy.

Let it be distinctly understood that I do not wish to discourage the valuable efforts of those who are so willingly coming forward to join the various orchestras and choirs that T.B.A.'s have formed; rather would I enjoin everyone who has any musical ability, however little, to strive after that great ideal, mental betterment, and to devote their hearts and souls to the acquirement of musical knowledge.

Music is rightly described as the link between the material and the spiritual. One's imagination is brought into play by it: sorrow, anguish, pleasure, pain, all the passions and motions that the human body is capable of are brought out by the various phrases and passages of music. Who is there that is not moved by the messages the great Masters gave us? Yes, *messages:* every note, every combination of sound, every discord tells its message. The wailing of the lost soul crying out in its misery, the wind and the rain, the very fury of Hell itself and the joy of Heaven are all expressed in music. Can it be that the sounds that make such an impression are meaningless? Surely not! Rather would I think that we are permitted to listen to the voices of our dead, voices that are appealing to us to do our best, imploring us to " Do unto others," than that our beautiful music is meaningless.

We are all so prone to be materialistic; to feed our bodies and starve our souls. The soul needs feeding equally as much as the body; its needs are greater, to my mind, and I know, as a great many more do, that nothing can satisfy the mind so much as music. Get it into your hearts, make it part of your lives, and forget, if you can, that there is such a thing as dissatisfaction from one end of England to the other, and let us show the way to happiness. It can be done, and why should it not be done by us? If every man and every woman realised that it is within his or her power to make this England of ours the brightest spot on earth; if we would sink our own little grievances in the sea of sorrow that is around us and hold out the helping hand to those who need it, we should have done for ever with the social suicide that is gradually getting the upper hand, and feed our souls, feed them back to health with music and poetry, and in time we should forget we had ever been wholly materialistic, and in the new world we should create for ourselves the music of life and love.

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On Taking the Long View and the Broad View.

By K. N. HARRIS.

AMONGST human characteristics the combined ability to take the long view and the broad view is at the same time one of the most valuable and one of the most rarely found.

Human nature is so constituted that in the majority of cases we are prone to judge the issues of any controversy solely in the light of its obvious and immediate effect upon ourselves. We fail to look into its future influence, and either ignore altogether or shirk full consideration of its effect upon other people.

Although this is natural, it is wrong, and even from the purely selfish point of view does not pay in the long run, for when all is said and done society as constituted to-day is inter-dependent one section upon another, and one section cannot permanently benefit at the expense of another.

This incapacity for considering things apart from their immediate effect upon ourselves alone is a legacy from pre-historic man, and very early pre-historic man at that, when every man was for himself alone, and to himself all sufficient.

Few things could have such an influence upon our national welfare and prosperity as the development by the nation at large of the habit of considering things in the light of their ultimate results and their effect upon the community in general.

Such a habit does not even necessitate looking at things in an unselfish or altruistic manner, but only a capacity for seeing well beyond the end of one's own nose and some distance on each side of it.

No particular class has a monopoly of mental short-sightedness; it exists amongst the professional classes, employers of labour, and what are usually dubbed the labouring class. Naturally, education tends to broaden a man's view, but it is not sufficient in itself; it is easy to find narrow-minded persons of splendid education and broad-minded persons with practically no education at all.

To develop this length and breadth of mental vision requires a deliberate and sustained exercise of will power.

To attain to it we must get away from considering immediate effects upon ourselves alone.

When something comes along which we must decide to do or to lend our support to, one way or another, we must deliberately cultivate the habit of trying to visualise the future results which will accrue from the settlement. Not only must we consider the future results to ourselves, but we must do what so many of us find so desperately difficult, and get ourselves out of the picture.

This inability to eliminate purely personal considerations has been the downfall of many a man otherwise qualified for position and authority. The higher the man gets on the ladder of progress, the more should he consider the effect of his actions upon other people.

When he is low down on the ladder others will consider this for him whether he does it himself or not, but as he rises there will be fewer and fewer to call him to order, and there is danger of his adopting a Kaiser-like attitude which in the end will surely bring about its own retribution. The man who lets himself fill too much of the picture, no matter what his abilities may be in other directions, will never succeed in attracting and retaining the best kind of assistance, for no man who is worth his salt will continually knuckle under to this sort of thing.

We must consider effects, first upon those more immediately concerned, and then upon the community as a whole.

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Society to-day is such a complicated thing that the mere consideration of just how many people an action or policy is going to effect will provide food for a good deal of reflection.

Not only must we consider both immediate and ultimate effects on others, but we must also endeavour to visualise what the reflex of these will be upon ourselves, for a reflex there will surely be.

If we can only begin to consider things in this manner it will be found to have a marked effect upon our conduct, for this taking the long view and the broad view will eventually come to influence every action of our daily lives.

At first it will undoubtedly require much exercise of will power, but if assiduously cultivated will become a habit of mind.

Once attained, it is bound to be of almost incalculable benefit to the individual, and, as it spreads, to the nation.

Whether you are a labourer, a charge hand, a foreman, a divisional manager, no matter how low or how high in the industrial scale, try it on the next problem you have to settle. It may be the question of supporting or opposing some policy in your Union, or it may be a question of settling conditions of labour on some job, whichever or whatever it is, approach it with a determination to consider it in its ultimate effects and reflexes not only upon yourself but upon the community as a whole.

In the long run it will amply repay you, not only in this world's goods, but in the esteem and affection of your fellowmen.

OVER-ALL VIEW OF THE ASBESTOS SITUATION.

Asbestos is a queer animal.

No more peculiar, however, than was Mother Nature when, millions of years ago, she picked out the spots on this earth where man was, after eons of time, to discover Asbestos.

True, fibrous material, properly called Asbestos, is found pretty generally all over the world, but it is now well known that a very small strip of otherwise desolate country, just over the Vermont State line in Quebec, produces the finest quality of Asbestos yet discovered on the Globe.

Spinners of Asbestos yarns require this grade, and except for such spinning grades as are being produced in Arizona, depend entirely upon Canada for supply.

The Arizona fibres are well adapted to spinning, but mining conditions are severe and the deposits are full forty miles from rail transportation, hence the Arizona claims are not yet keen competitors to the mines of Canada.

Throughout the war, Canadian producers were hard put to it to care for the needs of English and American manufacturers, and now that peace is here, or hereabouts, it is quite evident that the demand for high-grade spinning stocks has not, and will not for a long time, abate, but, on the contrary, will increase.

European spinners will be heavy buyers of the higher grades and, since the automobile industry uses great quantities of yarns, tapes and cloth, the market for yarn and finished articles made therefrom must be expected to remain firm.

Miners, generally, realizing the favorable conditions, are holding raw material at relatively high prices, so that the American manufacturer has no option as to his finished goods prices.

As a matter of fact, Asbestos textiles, including yarn, cloth, brake lining, steam packing, etc., are selling to-day at a *relatively* lower price than before the war, and manufacturers will be compelled to increase prices or suspend operations.

Asbestos (Phil.)

Men ought to be mighty good to women, for Nature gave them the big end of the log to lift and mighty little strength to do it with.—*Lincoln.*

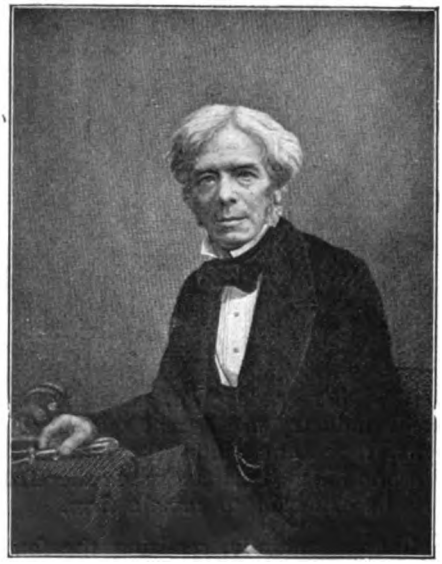
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The Romance of Electricity.

By F. CLEGG.

TO most people the word dynamo has an awe-inspiring sound. Its pronunciation is closely allied to dynamite, and it is equally capable of going off with a bang—perhaps this accounts for the apprehension. The birth of the dynamo is nothing short of a romance. It was the result of the inventive genius of Michael Faraday, an account of whose life and work is stranger than fiction.



MICHAEL FARADAY.

He was born on September 22nd, 1791, at Newington Butts, an outlying Surrey village long since swallowed up within the area of Greater London. His father, James Faraday, was a working blacksmith. After Michael's birth, his parents moved to the north side of the Thames to rooms over a coach house at Jacob's Well Mews, Charles Street. They lived here 13 years, and in 1809 they moved to 18, Weymouth Street. The following year his father, who had long been an invalid, died. To maintain herself and family it became necessary for Michael's mother to take in lodgers, and under these conditions we are not surprised to find that little Michael received very little schooling. In fact, he was quite uneducated. In the year 1804 he went on trial for 12 months to a bookseller and stationer, Mr. G. Riebau, No. 2, Blandford Street, where his first duty was to carry round the morning papers.

He has been graphically described as a bright-eyed errand boy who slid along the London pavement with a load of brown curls upon his head and a bundle of newspapers under his arm. On Sunday mornings, he was very particular to take his papers round early to enable him to go with his mother to their place of worship. They belonged to a sect known as Sandemenians, a small body which separated from the Presbyterian Church of Scotland about the middle of the eighteenth century. Their views, which were very primitive, were held with intense earnestness and sincerity of purpose. They were exceedingly devout and exclusive in the Faith. Doubtless the rigorous moral influence pervading the family circle played a great part in moulding the character of young Michael.

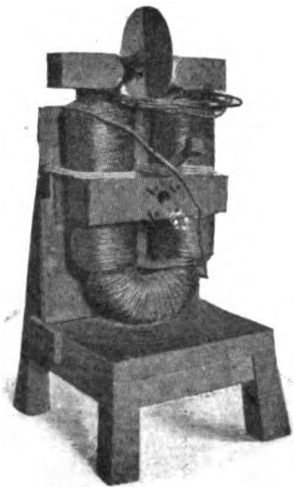
After his trial year at the bookseller's shop, Michael was finally apprenticed to learn the art of bookbinding and stationery. During his seven years of apprenticeship, he had unexpected opportunities for self-improvement. He saw in the few scientific books which came under his hand a mine of knowledge, and he resolved to explore it.

He came in contact with many interesting personalities at his master's shop. One of these, who lodged with his master, was a French political refugee named Masquerier, and he took a great liking to the apprentice boy who used to black his boots and dust his room. He lent him several books, and also taught him how to draw.

Another frequenter of his master's shop was a Mr. Dance (this gentleman was a member of the Royal Institution), whose interest in the industry and intelligence of the apprentice, led to an act which changed the whole destiny of young Faraday's life. He invited him to attend four lectures given by Sir Humphrey Davy, at the Royal

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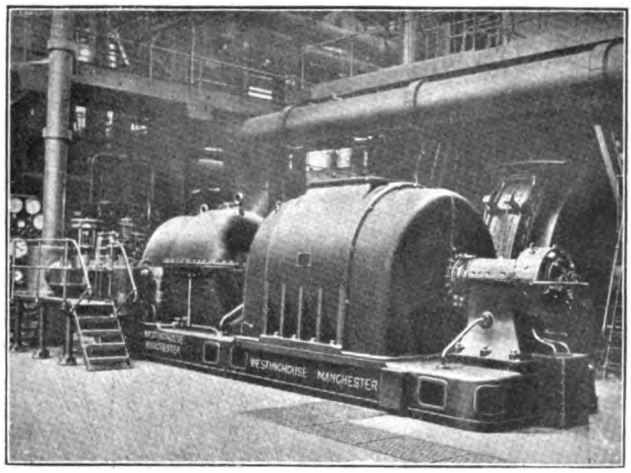


FARADAY'S FIRST DYNAMO.

Institution (Sir Humphrey was the Professor of Chemistry and Director of the Laboratory). This gave him a tremendous mental impetus, and he decided to be engaged in scientific occupation. This induced him to write an application for employment, and take it to the then President of the Royal Society, Sir Joseph Banks. Naturally enough, "No answer" was the reply given by the porter, but undaunted by this rebuff, Faraday still continued his humble scientific studies.

On one occasion, whilst Sir Humphrey Davy was experimenting with chloride of nitrogen, an explosion occurred which injured one of his eyes. Whilst temporarily disabled he wanted someone to write notes for him, and through the influence of Mr. Dance, Faraday got the situation. This situation was of a temporary character, and when his services were no longer required, Sir Humphrey advised him to stick to his bookbinding, stating that those who devoted themselves to scientific matters met with poor financial reward. Some time later, Sir Humphrey, being in want of an assistant in his laboratory, sent for Faraday and offered him the situation. His ability and enthusiasm so impressed Sir Humphrey that he made him his secretary, and in this capacity he travelled all over Europe with his master. He met many eminent scientists, and this experience naturally gave him great opportunities of which he made the most. Upon his return to England, Faraday was appointed Assistant Laboratory Lecturer, and shortly afterwards he became superintendent of the Laboratory.

With the year 1831, Faraday began the period of his celebrated "Experimental Research in Electricity and Magnetism." He worked under most trying circumstances, his tools and materials being the essence of crudeness. His failures were many, but in spite of all this, in a lecture given before the Royal Society on November 24th, 1831, he exhibited his first dynamo—which you here



A 6,250 KW. WESTINGHOUSE RATEAU TURBO ALTERNATOR SET INSTALLED AT THE STEWART STREET POWER STATION OF THE MANCHESTER CORPORATION.

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see bolted on the chair back—and he announced his greatest discovery "Magnetic Induction." (A description of this involves technical knowledge and is not desirable in this article). This is the basic principle of all dynamos and motors the world has ever seen. Thus for the first time in human history, mankind beheld a dynamo.

When we consider that the whirling monsters in our modern power stations, distributing thousands of horse power through their arterial systems, are but a glorified enlargement of this apparently crude piece of mechanism, words fail to express our admiration. The dynamo is but one of his many achievements, and a list of his scientific works would fill many pages.

He was a most unassuming man. For honours he had no use. He refused the Presidency of the Royal Society, Presidency of the Royal Institution, a knighthood and many others. He told Professor Tyndall that he preferred to remain plain Michael Faraday to the end. He died on the 26th August, 1867, and his remains were quietly laid to rest in Highgate Cemetery. A simple unadorned tomb-stone marks the resting place of England's greatest scientist in his day and generation. He rose from the depths of humble obscurity to the dazzling heights of scientific fame.

This article is written in the hope that some of our junior members will be stimulated to earnest endeavour, remembering that humble origin is no bar to human achievement. The keynote is integrity of purpose.

There is plenty of room for inventive genius in our own industry. It is only in its infancy, and there is every reason to suppose we have amongst our boys a Michael Faraday in the making. To such I would say "Put forth your best and there is no reason why you should not suceed." The next time you see a dynamo or a motor, think of the little curly headed printer's boy taking his morning papers through the streets of London, and pay a silent tribute to the immortal memory of the illustrious dead.

"For ships sail East and ships sail West
By the very same winds that blow.
The set o' the sails and not the gales
Determine which way they shall go."

BOYS! SET THE SAILS!

DOES THE INDUSTRY INDULGE?

In these days when profiteering is so firmly (and righteously) denounced by the U. S. government and the public, and when the Federal Trade Commission has its finger, apparently, on the pulse of all industrial enterprises, it behoves all industries to make an examination of their operations and see that their houses are in order.

What does such an inspection of the Asbestos and Magnesia industries show?

After reconnaissance, we find quite an interesting situation, viz.: present prices on many of the Asbestos lines are yielding the manufacturer a less proportion of profit than he procured when he was selling the same goods at about one-quarter the present price.

A glance at the tremendous advances in cost of raw Asbestos during the past three years will be sufficient to convince anyone of this fact; will even cause him to wonder that the manufacturer could afford to take so small a profit when his raw material costs are so high.

Crude No. 1 Asbestos in pre-war days could be purchased at about $300 per ton. It is now difficult to obtain at $1500, and every indication points to a still higher cost. Crude No. 2 Asbestos in pre-war days could be bought at about $200 per ton, and is now held at $850.

This is only one item of manufacture; consider also the enormous rise in cost of labor, and in all indirect costs, such as oil, repair parts, etc.

Asbestos yarns, which in pre-war days sold at 80 cents per pound, are now selling at $1.75 to $2.00. Is it not perfectly evident that the American manufacturers of these products have taken no advantage of the consuming trade?

Asbestos (Phil.)

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Nature Talks.—III.

By B. R. WALMSLEY.

WHO of us did not hear the strong clear note of the Missel Thrush during the last days of February and during the month of March, as he warbled forth his Matin Song every morning for about two hours? As soon as daylight dawned he began his Hymn of Praise, whilst his mate was sitting on her eggs not far off.

This bird hatches her young in March, and is known as the March Throstle, or Storm Cock. It is a larger, stronger bird than the ordinary Thrush, whose young are hatched in May. The latter's note is the mellower and of greater range.

Who amongst us, also, could fail to notice the happy activity of almost all kinds of birds during the month of May? The continuous "cawing" of the Rooks, their restlessness, forced itself upon one's attention, and as one looked up the cause was obvious. Nest building was going on; objects appearing in the trees like an inverted bowler hat without brim; every rook over two years old engaged. Other birds were also occupied in the same way, quite as happy, but not so noisy about it: Thrushes, Blackbirds, Chaffinches, Wrens, Sparrows, Starlings, Robins, and Linnets—all busy nest-building. The happiest month in the whole year for birds.

What a variety of nests one finds, differing in shape, in texture, in method of construction, in places chosen for their building. One can easily surmise the characteristic disposition of a bird by its nest. Birds of prey like the Merlin of our moors (treated in the January issue) make a rude nest of just a few twigs. The Eagle does the same. Birds possessing a raucous, unmusical voice, coarse in their habits, are slovenly in their nest-building. The Starling's nest is very slovenly made and unfinished. Contrast their nests with the neat, well-shaped and well-finished nest of the Blackbird, or the Chaffinch, or the Garden Warbler, or that queen of singers, the Black Cap. Many ornithologists claim the Black Cap to be superior to the Nightingale, notwithstanding the latter's reputation.

The nest of a bird is not its home all the year round as many people seem to imagine; it is simply a cradle in which to rear young ones. When the young ones are old enough to fly the nest is no longer required. Each year a fresh one is built. Sometimes old nests are renovated by other birds and used. The Cuckoo,

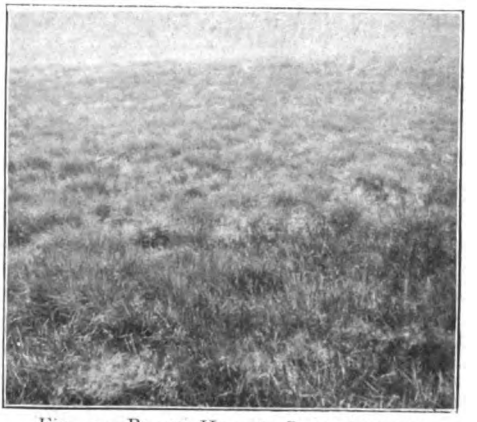


Fig. 1.—BLACK HEATH, SADDLEWORTH.
A typical grass moor (purple heath grass, or molinia caerulea).

whose voice we heard last week, does not build a nest, neither does it lay its egg in another bird's nest as is generally supposed. We find its egg in nests mu[illegible]

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too small for it to sit upon. We find its egg, too, in nests the approach to which



Fig. 2.—STANEDGE.
Molinia among the cowberry.

its large body must disarrange if the nest is sat upon by it. Some approaches would not admit of its body at all!

How then comes the egg of the Cuckoo to be there? It lays its egg and carries it in its bill seeking a nest that the parent bird has temporarily left, and in the parent's absence drops in the egg and flies away.

Foreign birds have some strangely shaped nests. Some look to us to be upside down like an inverted egg cup; some with long tunnel-like entrances—but of these we cannot now speak.

Last week I saw a Blackbird's nest containing four young ones, neatly situated in between the stems of a Delphinium Larkspur which was in full bloom. No one would expect to find a nest there, it was so well hidden.

I also saw a mother Starling bringing food to her young, but I was afraid to go to her nest because the cat was on the lawn. She kept up her cries and kept flying around until I took the cat away, and then she waited some time before venturing to her nest.

As one watches Nature ever unfolding herself, never resting, never for one moment stopping her onward march, one is reminded of the Poet Longfellow's "Keramos" (The Potter)—

Turn, turn, my wheel! All life is brief,
What now is bud will soon be leaf,
What now is leaf will soon decay;
The wind blows East, the wind blows West,
The blue eggs in the robin's nest
Will soon have wings and beak and breast,
And flutter and fly away.

Perhaps it would be well to leave our feathered friends for the present and turn our attentions to the vegetable kingdom—the kingdom of grasses, trees, and flowers.

What is there so needful as grass? Wheat, oats, barley, rye, and all such foods are grasses and classified as such.

What should we do without these? What would cows, sheep, and goats do without the grasses of our meadows?

We should be denied beef, mutton, lamb, veal, milk, bread, porridge, puddings, and so on, if we had no grasses.

Nebuchadnezzar, we are told, when deposed of his throne, ate grass in the field like an ox (Daniel iv. 33). What is beef and mutton but grass which the cows and sheep have eaten and turned into flesh? It is quite true that "All flesh is grass."

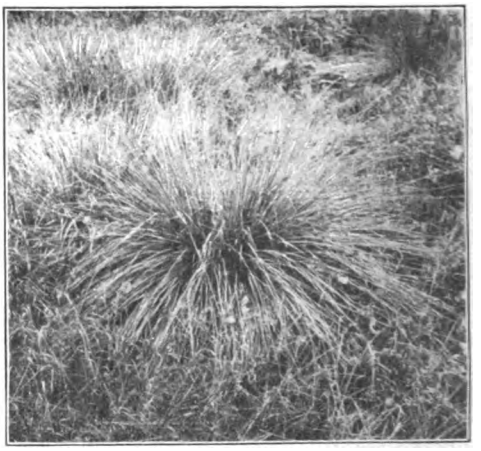


Fig. 3.—TUSSOCK OF PURPLE HEATH.

Let us look at the grasses of our moors. They differ very considerably from the grasses which the farmer cultivates for his cattle.

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The grasses of our moors have a blade that is round like a narrow tube; the grasses of the valley have a blade that is flat like a narrow ribbon.



Fig. 4.—MOLINIA unsuccessfully invading a sphagnum bog.

There is a great variety of grasses on the moors. We have the coarse mat grass (*Nardus Stricta*), with roots very tough and stringy, leaves channelled, sheath smooth. Then we have the purple heath grass (*Molinia Caerulea*), which likes a wet situation, growing in tufts.

The photograph of Black Heath, Saddleworth (Fig. 1), is a typical grass moor, showing the purple heath grass very plainly. The soil of the moors is composed mainly of black peat (in some districts brown peat), and it is interesting to watch the interplay of the grasses, mosses, sedges, and rushes to gain vantage ground for growth.

Fig. 2 is a photograph of the Molinia among the Cowberry taken at Stanedge.

Fig. 3 shows a fine tussock of purple heath grass with narrow leaves; this is common in woods.

In all the brooks of the moor we find the well-known Sphagnum moss, or bog moss. This moss was much asked for by our Red Cross Society for the wounds and sores of the soldiers on account of the absorbent qualities it possesses. Many of us went over the moors with sacks gathering it for the hospitals.

Its absorbent quality is caused by its having an empty cell alternately with a chorophyl cell. When growing in the brook this cell is filled with water. When all the water is dried out of it, it forms a thirsty cavity which sucks up the "matter" or "pus" from wounds.

In Fig. 4 we see the Molinia or purple heath grass unsuccessfully invading a bog. The picture shows sphagnum, pennywort, purple heath grass, and Lancashire asphodel (top right hand).

One cannot go on the moors in July or August without seeing the white silky looking cotton sedge, commonly called cotton grass, but it is not a grass, neither is it a rush. It is a kind of go-between known as sedges (*Erisphorum Vaginatum*).

Fig. 5 illustrates the single headed variety in fruit, its tussocky habit well shown.

A district like Rochdale and adjoining moors is known as a Calluna District; that is, a district where the Ling or Calluna (commonly known as heather) grows. It is the material which Besom Ben used for his brooms when he lived at Lobden Moor Side, according to Edwin Waugh's stories.

Ling is a kind of heather, but there are so very many kinds of heather that it would be well to distinguish them. Australia is the only place in the world where heather will not grow.

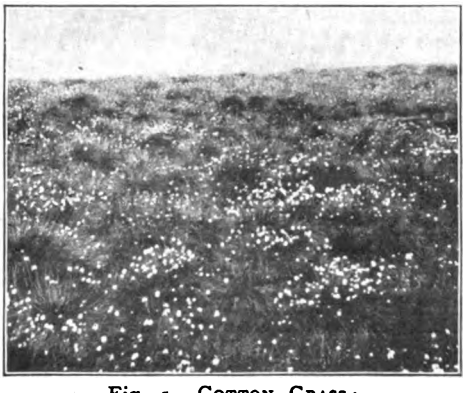


Fig. 5.—COTTON GRASS: The single-headed variety in fruit.

I am indebted to the Rev. T. A. Jefferies, F.L.S., for the loan of the photographs of grasses reproduced in this instalment, who took them when stationed at Littleborough.

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Home Notes.

JOINT INDUSTRIAL COUNCIL.

The chief business before the Joint Industrial Council, at its meeting on May 5th, was the application for an advance in wages.

It will be remembered that at a previous meeting an arrangement was made whereby the wages fluctuated by ½d. per hour for each 10 per cent. that cost of living fluctuated over the pre-war level, but this method has not worked quite satisfactorily, so a new basis was agreed to as follows: Males 21 years of age and over, pre-war wages 6d. per hour plus 25 per cent. for improved status of worker, then plus whatever figure is shown in the *Labour Gazette* as increase in cost of living. Males 18 years of age to 21, to remain on old method, except for an increase of ½d. per hour in basic wages. This, however, is only a temporary measure, and at the September meeting of the J.I.C. it is the intention to fix a scale of pay to apply from the time a boy enters the industry until he reaches 21 years of age.

Females 18 years and over, pre-war wage 4d. per hour plus 25 per cent. improved status, then plus whatever figure is shown in the *Labour Gazette* as increased cost of living.

COUNCIL OF EMPLOYEES.

As a result of the suggestion thrown out at the last meeting, reported in the April issue of *Asbestos*, the first annual gathering of a social character was held at the Provident Hall on April 22nd, and proved a great success. It will be recalled that the main object of the proposal was to make the work of the Council better known, and to induce certain of the workers to evince more interest in the aims of the Council and in the election of representatives on the Workers' Committee.

The programme consisted of various vocal and instrumental items, dancing and refreshments, and the attendance—approximating 400—was particularly encouraging.

During the evening Mr. H. B. Spiller (Employment Manager) addressed the gathering. He said he was very pleased to see so many present, especially as such gatherings were too often looked upon with suspicion by employees. In fact, this one had been to a certain extent until it was realised that the Council (and not the Firm) were responsible for the gathering—though their thanks were due to the Firm for kindly defraying expenses.

The face of Industry, however, was changing, and thoughtful men and women were rapidly realising that Capital and Labour were not natural enemies, but brothers, depending one upon the other, and who must live in harmony and goodwill.

It was over two years since Mr. Samuel Turner issued the invitation of the Firm to the Workers to co-operate with the Management with the object of securing "a permanent improvement in the relations between the workpeople and the Firm, and the promotion of the progress and well-being of the Organisation as a whole."

The Employees' Council was formed a little over twelve months since, by the appointment of representatives from every section in the office and works to the two Committees—Officers' and Workers.' Certain sections in the works had shown an apathy in the election of representatives, which he hoped would now be dissipated. They had everything to gain and nothing to lose by a just appreciation of the Employees' Council.

RUBBER MAKING DIVISION. BENEVOLENT SOCIETY.

This Society arranged a char-a-banc trip to Chester on Saturday, May 8th.

Assembling at the Town Centre at noon, the party filled five cars. The day was fairly fine after leaving the Rochdale

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district. Chester was reached at 4-30, and an excellent tea was partaken of at the Holborn Café.

After tea a sail by steamer up the the River Dee was enjoyed by several of the party, whilst others preferred rowing boats and a walk round the old City Walls. The return journey was commenced at 8-30, Rochdale being reached at 12-30 a.m. The trip was voted a huge success, and the general wish is that another be arranged during the Summer.

THE ALLOTMENTS EXHIBITION.

In view of the deplorable tendency throughout the greater part of the world toward a reduction of the areas under cultivation for the production of foodstuffs during the war period, it is pleasing to find the allotment movement in this country yet pursuing its way with undiminished vigour. This is as it should be, and every worker so engaged has the satisfaction of knowing that every vegetable he grows weighs in the balance which will bring the high prices for food on the downward run. You raise your wages and pull down prices by growing vegetables.

A record exhibition is expected as a result of the labours of the Turners' Allotment workers, on the Hollows Farm Estate, on Saturday, August 28th, when 25 each 1st and 2nd and 12 3rd prizes have to be won, as well as a special prize for the Blue Riband champion. The Committee have been working hard to ensure success, and intending exhibitors may enter for the show with either of the four stewards: Mr. W. Brierley, 57, Rooley Moor Road; Mr. C. Dewhirst, 134, Rooley Moor Road; Mr. T. Eastough, 8, Woodstock Street; Mr. H. Sharp, 58, Rooley Street; or the Secretary, Mr. R. B. Bentley, 121, Drake Street, Rochdale.

DRAMATIC SOCIETY.

The Dramatic Society gave an invitation social evening on the 14th May, which was well attended. Some excellent music was rendered by a member's friends, who came over specially for this occasion, and whose efforts were very much enjoyed. Apart from the social aspect of re-union of the members, for whom the long interval of inactivity appears to have left much to be desired, the real object of the function was to thank Mrs. Errock for the indefatigable labours of past sessions. A small but tangible token of appreciation was offered in two pieces of selected Wedgwood pottery, and presented by Mr. J. Brierley on behalf of the Society to Mrs. Errock on the occasion of her leaving Rochdale for London. Members with one accord have realised the thankless and arduous task Mrs. Errock has had in aiding them to develop latent dramatic faculties, but the foundation of good work has been laid, and it is hoped the future will not neglect its development. Mrs. Errock, after reciting several favourites by request, paid great tribute to members' work, the pleasure derived from seeing some results of working together, and expressed a keen sense of appreciation of the beautiful gift the members had made to her. The Society's good wishes go with Mr. and Mrs. Errock in their transfer to London.

"What," asks Mr. Casson in *The Efficiency Magazine*, "makes actors and actresses successful? Not genius. Not opportunity. Both of these help, but the main reason is hard work.

"As George Robey said recently: 'The reason why some actresses are so successful can be given in two words—THEY REHEARSE.'"

FOOTBALL.

Mr. H. B. Spiller, the secretary, reports: "The Football Team has had a strenuous fight—in fact, many such—in the three Workshops Competitions for which we entered, and we have every reason to feel elated at the successes achieved.

In the Castleton Comrades' Competition we were beaten 2—0 in the semi-final

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by Tweedale and Smalley's, whom we had previously succeeded in beating in another competition.

At Rochdale we were beaten in the final by Bridge's of Castleton by 2 goals to 1. Many and bitter have been the comments on the result of that game.

In the All Saints' Competition we beat Buckley Mill in decisive fashion by 4 goals to nil in the final round, thus securing the Silver Cup, which we hold for 12 months, and the winners' medals.

For our efforts in the Rochdale A.F.C. Competition we were presented with a splendid set of gold-faced silver medals.

These results are very gratifying to those who, throughout a difficult season, have laboured hard to keep the club going. What could we not accomplish next year?"

The Chairman of the Committee, Mr. S. Barker, writes: "We have been playing in three separate Medal Competitions at Castleton, Rochdale, and All Saints'. We reached the semi-final at Castleton, but met with a reverse there by 2 goals to 0. At Rochdale we reached the final, but suffered another reverse through not being able to place our best team in the field. These reverses made us the more determined to win the All Saints' Competition, which we did. We have got two sets of Medals and a Cup."

We agree with Mr. Barker that it is not a bad performance for a workshop team, having played 16 matches, scoring 25 goals to 7 against. "We have," he adds, "called upon 18 players to carry us through the competitions, so when we distribute the medals we shall be one or two short. It will make a big hole in our exchequer—far from full at present." A gentle hint. The deficit, we understand, amounts to somewhat between £3 and £5.

FIRE BRIGADE.

The Fire Brigade of Messrs. S. Turner & Co. Ltd. and Turner Brothers Asbestos Co. Ltd. had an enjoyable outing to Matlock on Sunday, June 6th. Leaving Spotland at 8 a.m., and travelling via Oldham, Ashton, Glossop, over the Snake to Bamford and Castleton, Derbyshire, a substantial dinner was served at the latter town. Leaving Castleton at 1-40, the party travelled via Baslow, Grindleford, through the Duke of Devonshire's Estate, Chatsworth, to Matlock, returning via Haddon Hall to Bakewell, where tea was partaken of. Leaving Bakewell at 7 p.m., the party motored through Buxton, Chapel-en-le-Frith, Whalley Bridge, Stockport, and Manchester, arriving at Rochdale at 11-15 p.m.

From the Workshops come the World's Thinkers.

BUNYAN was a tinker. Cardinal Wolsey and De Foe were the sons of butchers. Huntington the preacher was originally a coal heaver. From the class of day laborers come Burns the poet, Cook the navigator and Opie the painter. Dr. Lord translated "Lucretius" while going the rounds of his patients. Darwin composed nearly all his works while driving about in his sulky. Kirke White learned Greek while on his errands. Burritt attributed his first success, not to genius, but simply to the careful employment of those invaluable fragments of time called "Odd Moments." Sir Walter Scott never wasted an hour. One of the greatest chancellors of France wrote an able volume in the successive intervals of waiting for dinner.

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IDEALS.

IDEALS are the salt of life. Yours is a flat existence if you have none; and if you have, don't be soured by your failure to realise them. The chance of the realisation of an ideal is in inverse ratio to the height of the thought contained therein.—*A.G.A.*

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