

ENGINEERING AND SCIENCE.

Inter-Relationship of the Two Departments.

The Fuel Problem Power Storage—Sudbury Nickel Ores and Other Topics of Interest Dealt With by Prof. Bowman.

Following is the text of Prof. Bowman's inaugural address delivered before the Society of Engineers and Applied Science, Prof. Bowman is president of the above society, which held its first meeting on the 8th inst., when The Advertiser gave a brief notice of the address:

It would probably be the natural thing for a president in an inaugural to outline his conception of what the objects and aims of an organization should be, and to dwell upon some policy to be pursued during the season. Now, while this might seem advisable, yet in this instance the outlining will be left to the competent executive, which is well able to take charge of it. This society is formed of elements, which I have never before known to be associated together, and if they have been so associated, it is not a matter of ordinary occurrence. We naturally seek the common ground which will form the basis of our work and interest. That there is such ground is undoubted. Has it existed heretofore? Or are the changes that are coming over everything in this country and century of change also affecting us? We think both of these questions must have an affirmative answer. We have each had need of the other, do need him now, and will have increased need of him in the future.

INTER-RELATIONSHIP OF ENGINEERING AND SCIENCES.

About a year ago I read an address delivered before the Chemical Society of Great Britain, in which the speaker dwelt upon the coming necessity of the future industrial chemist being an engineer. The developments in electrical chemistry calls for him to be an electrician as well. The advances in chemical manufacture during the last 25 years have not been any more by new processes than they have been by new methods, and these based on engineering knowledge.

We have been living, as we have already said, in an age of change. When we first studied chemistry, the subject of electricity was thought to be most remote from it, but today we have many of our most important chemical processes dependent upon its use. I remember reading some years ago an enthusiast's lecture on the influence of chemistry. He said, "It is not all fields, help every other, but is dependent upon none." There has come a change over the landscape, for now the other fields have invaded chemistry, which in turn leans upon them. So now, as we consider our various callings, we find that they very largely complement each other, that each is finding it more and more necessary to have the knowledge of the other. The engineer must be a chemist as well, so also the electrician, etc., and it must needs be that one must be all, or that all must be one, in a community of interests. The chemist, the engineer, the electrician, the physicist, the biologist, we have illustrations on every hand. Consider the great plants at Lachine and Niagara Falls. The engineer, by his skill, draws the power from Niagara, through the wonderful modern turbine, with probably a loss of not more than 10 per cent of the power of water used. Some of the force thus generated is handed to the electrician, who in his turn diverts it into the way of the chemist, by whom it is made to produce carbide of calcium, caustic soda, aluminum, carborundum, etc. Some is given to engineers, and is again developed as a more perfect light, at some distant point. This illustrates the present bond that binds together such elements as we have here.

FUEL PROBLEM. As we think of what is, we are tempted to further illustrate by what must be. We have got most of our power from coal through the medium of the steam boiler, which, as we all must admit, is attended with a great waste of energy—estimated at about 50 per cent. The chemist and the engineer must produce better conditions of combustion and a more perfect utilization of the heat. We have but to look at the clouds of dense smoke that issue from so many of our chimneys to know that something is wrong. But worse than this, the chemist has found that by our method of using coal we get the heat only, and very little of that, while we are wasting products many times more valuable. Take a ton of coal; if we convert it, we get gas for fuel or for illuminating purposes; we get ammonia, so essential to cold storage development; we get coal tar, pitch, carbolic acid, and endless tar derivatives, to be used in medicine and the arts. We get cyanide and sulphocyanides now becoming so essential to the new gold mining processes, and we shall still have the greater part of our fuel left for steam or other purposes. A process, combining these features, can and will be worked out by just the elements we have here.

As Armour of Chicago utilized the different parts of the hog so as to make the meat the waste product, so shall we

see coal so manipulated by engineers and chemist, as to make its heat its waste product. When we think of England's coal output being over two millions of tons per year, we are amazed at the magnitude of the loss the public is sustaining.

BY-PRODUCTS. In chemistry this is the era of by-products. When a rifle is discharged at a target the chemical reaction of the powder produces the force which carries the ball. The ball is stopped by the target; the force, however, is not destroyed; the flattened bullet, if picked up, will be hot; the force which propelled the ball has been changed into heat, and perhaps partly into electricity, and is soon conveyed away. This is an illustration of the conservation of energy—nothing being lost. Heat, light, electricity, are mere forms of the same energy, and each changeable into the other. As the force which carries the bullet is but the by-product of the chemical reaction in the powder, and the heat of the bullet the by-product of the propelling force, so may our chemist manufacture his product, hand his force by-product to the engineer, the electrician, etc., to be used by them.

SUDBURY NICKEL ORES.

A plant is now being erected near Sudbury for the working of nickel ores, which is a departure in metallurgical science. The principle of the process is based on a simple laboratory experiment. If roasted nickel ore, or matte, has carbon monoxide gas passed through it at a temperature of 100 Centigrade, the gas forms a volatile compound with the nickel. If this nickel carbon monoxide gas is heated to nearly 200 Centigrade, the nickel will be dropped out and the gas (carbon monoxide) may be returned to react again. This process, simplicity itself in the laboratory, is beset with great mechanical difficulties when placed on a manufacturer's scale. Dr. Mond, the English inventor of the process, has solved in this a problem that would tax the best engineering talent of our age.

All this brings us back to the fact that we have arrived at a time in the development of our manufactures when we must have combinations of skill as well as of capital. We have referred to power produced from fuel, but would also speak of our great source of power—viz., gravity, as seen in the force produced from our water powers. Great advances have been made in the methods of utilizing these powers. With the best up-to-date turbines and electrical transmission, very little is lost.

Before the Royal Society of Great Britain, two years ago, a paper was read predicting the falling of the world's coal fields. It seems as if a sub-consciousness in man had already foreshadowed something of this sort, for we are turning to natural power very rapidly. When there is competition between steam and natural power, other things being equal, natural power must win.

CANADA'S CENTURY.

My eye caught a sentence in one of our daily papers. It was, "This is Canada's century." The one just gone witnessed the phenomenal development of our southern neighbor; but now is our time. Surely it is quickly coming, and the members of such organizations will in some degree direct the induction of our country's greatness.

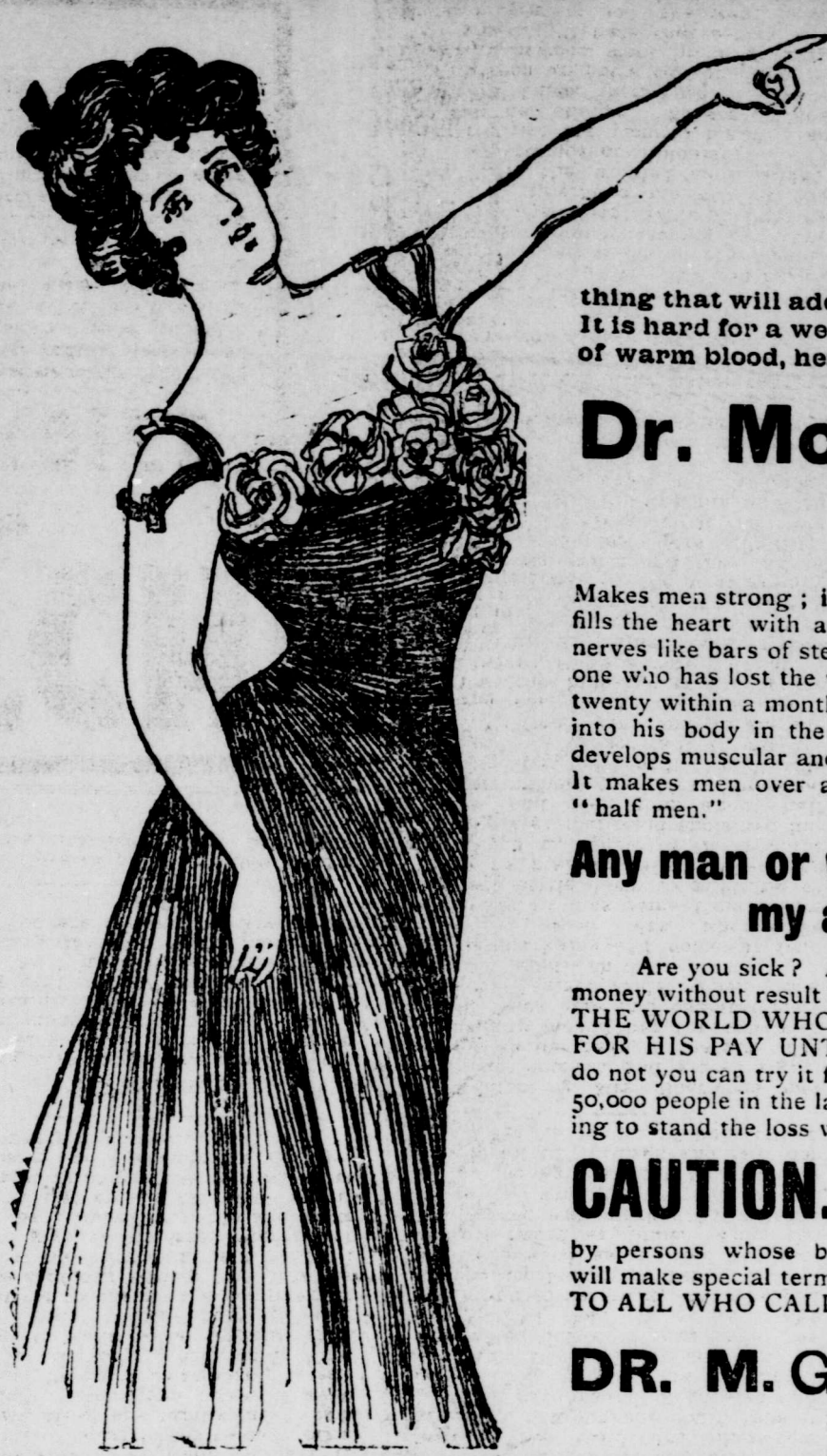
I cannot but call your attention to our vast water powers, on the St. Lawrence, at Niagara, at St. Lawrence, augmented by the thousand others between Lake Huron and James' Bay. What astonishing chemical productions are these capable of! What tons of electricity! What quantities of heat, and what innumerable arts can these minister to! Canada, in its physical geography, is inimitably laid out for the development of a great nation. On, or near, our two ocean coasts, we have large coal fields. The central tract is divided into agricultural and mineral and wood producing lands, with a great waterway from the center of the country to the seaboard. As I think over these conditions we shall more and more recognize how such an arrangement must bring prosperity, if only our people are possessed of the brawn and brawn for the occasion. We believe they are.

POWER STORAGE.

We have often dwelt upon the desirability of storing power as we would a commercial commodity, such, for instance, as wheat, to be drawn for use as required. In some degree this problem is being solved every day, but our methods are thus far very crude and unsatisfactory. We can, for instance, by using a pump, lift water to an elevated tank, and then by regulation of its fall or flow, perfectly control the power thus given; we can use it in a day or we can keep it for a year. A simple illustration of our meaning is in a steel spring, such as a watch-spring. We wind it in a few seconds, and by its escapement can control the letting out of the power we put into the winding, so that for 24 hours or more, the force from our effort keeps the wheels moving.

Many illustrations of this kind come to our minds, but the most real came under our observation in Hamilton some two months ago. At the street railway power house the electric current of some 25,000 volts comes Meriton. Some of this is transformed to 2,000 volts for street lighting, and the remainder to 500 volts for railway purposes. As the supply of electricity is

MAKES MEN STRONG.



The weak man does not live who cannot be made a better man by wearing my Electric Belt.

None of us are perfect, and anything that will add more to such vitality as we may have will make us better. It is hard for a weak man to have noble sentiments. Such things are born of warm blood, healthy nerves and a strong heart.

Dr. McLAUGHLIN'S ELECTRIC BELT

Makes men strong; it causes the nerves to tingle with the joyful exhilaration of youth; it fills the heart with a feeling of gladness, makes everything look bright, and makes the nerves like bars of steel. Give me a man broken down from indiscretions or excesses—one who has lost the very essence of manhood—and I will make him feel like a youth of twenty within a month. How? you ask. Simply by pumping a vital stream of electricity into his body in the right way while he sleeps. It arouses all the dormant energies, develops muscular and nerve life and restores the feeling of youth, courage and manhood. It makes men over again. It makes perfect men of the puniest, weakest specimens of "half men."

Any man or woman who will secure me can have my appliance and pay when cured.

Are you sick? Are you a Weak Man? Are you tired of doctoring and paying out money without result? Then come to me or write to me. I AM THE ONLY MAN IN THE WORLD WHO HAS CONFIDENCE ENOUGH IN HIS REMEDY TO WAIT FOR HIS PAY UNTIL YOU ARE CURED. I know what my Belt will do, and as you do not you can try it first, and I will wait for my pay until you are cured. I have cured 50,000 people in the last twenty years, and though my Belt can't cure every case I am willing to stand the loss where it fails. So come and try it now. You have nothing to lose.

CAUTION.

Beware of the old-style, burning electrode belts, which are using an imitation of my cushion electrodes. My office contains hundreds of these old belts, discarded as useless and dangerous by persons whose bodies have been seared and scarred by the bare metal electrodes. I will make special terms to anyone having one of these old back-burners. A FREE TEST TO ALL WHO CALL. Send for descriptive book to-day.

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WHEN THEY MET!

How Two Young Married Women in New York Became Acquainted With Each Other.

It began to look as though not on this earthly sphere was it intended that Mrs. Sherwood and Mrs. Phillips should meet.

Mr. Sherwood had remarked to his wife that he wished she would call on the wife of a young lawyer friend of his who had just come to Chicago. "They live right near us," he explained, "just three blocks east."

As Mrs. Sherwood was still in the transcendental state of bridehood she hastened to do her husband's bidding. Mrs. Phillips was not at home.

Inside of a month Mrs. Phillips returned the call. Mrs. Sherwood chanced not to be at home.

"Dear! Dear!" murmured Mrs. Sherwood, regretfully, as she picked up the cards on her return. She still missed over the awkwardness of the situation as she went to do her marketing the next morning. All such thoughts were banished, however, by her experience at the supply store.

After Mrs. Sherwood had carefully picked out the only decent bunch of lettuce in the box and laid it aside as taken another woman pounced upon it in a decided but ladylike way.

"Pardon me," said Mrs. Sherwood, with what hauteur she could muster against a background of pickled and canned tomatoes, "but that is mine!"

"Oh, really?" said her opponent in finely veiled scorn, "I was under the impression I had it." And she marched off to her clerk, who wrapped up the green leaves for her.

Mrs. Sherwood, as she told her husband afterward at dinner, when the salad course was marked by a large nothingness, simply boiled with wrath. She was so agitated she bought nutmegs instead of nutmegs and laid her purse down in the jar of bulk olives.

Next morning Mrs. Sherwood met the lettuce woman and glared right-cously with her head in the air. The lettuce lady looked her through with her big black eyes and ostentatiously swept her skirts aside when Mrs. Sherwood approached.

This remarkable and voiceless feud so worked upon Mrs. Sherwood's nerves that it was some time before she could settle down to anything so prosaic as making calls. When she again tried to penetrate the Phillips household the regretful maid explained her mistress had been gone about half an hour. Thereupon Mrs. Sherwood pencilled upon her card: "Isn't this provoking? I do so want to get acquainted. Can't you come to see me next Thursday?" and departed, smiling over the hide-and-go-seek game she and Mrs. Phillips were playing.

When Thursday came Mrs. Sherwood had a frantic message at noon from a relative in Oak Park, whose baby was ill, and left on the nextrolley. Arriving home she found the card of the will-o'-the-wisp, Mrs. Phillips. "So sorry," a message on it ran. "We seem fated. Mr. Phillips has told me such nice things about you I'm longing to see you. Come over soon."

"How sweet of her," said Mrs. Sherwood. "I know I'll like her—she's a dear."

This beatific mood lasted till her next trip to the grocery store, where she demanded a harmless can of soup.

"Just sold the last two cans to this lady," said the clerk. Mrs. Sherwood turned and beheld her sworn enemy, the lettuce woman, clasping the clerk to her heart, triumphantly lighting her eyes. "Perhaps she will let you have one," the worried clerk added, with an attempt at diplomacy.

The lettuce lady smiled blandly, as she saw her chance. "So sorry," she said, "but I need them both. I always like to keep an extra can on hand."

Mrs. Sherwood went home shaking with wrath. "I hate that selfish and ill-bred creature so," she wept upon her husband's shoulder, "that I'll

change my grocery store! She is unbearable!"

Three months after the first interchange of cards began Mrs. Sherwood on presenting herself at the Phillips' door was told her hostess was at home. She was ushered into the reception room and approved of the surroundings. "Good taste and judgment," she murmured. "Just what I imagined she would have."

As Mrs. Phillips hurried down the stairs and entered with smiling face and outstretched hand, Mrs. Sherwood went to meet her with her most brilliant look of pleasure and a graceful phrase on her lips.

But before their hands touched they halted, paralyzed. Mrs. Phillips and the hated lettuce lady were the same. Remembering that salad and can of soup, Mrs. Sherwood's angelic facial expression was extinguished as by a lightning stroke. It was a desperate situation, and her brain whirled.

Mrs. Phillips' black eyes flashed dangerously, but she proved to be a diplomat of the most audacious order. "So glad to see you at last," she said, smoothly, and added, with childlike ingenuousness, "Isn't it strange, living so close to each other, we have never happened to see one another out anywhere?"

"Such superb nerve," concluded Mrs. Sherwood to her husband that evening, "should be made a penitentiary offense at hard labor."

WEARS A SILVER SKULL.

George Burns, a 70-year-old civil war veteran, who wears a silver skull and is known as a marvel of surgery, is lying on a cot in Bellevue Hospital, New York. The old man is just recovering from the latest of a series of accidents, which have left him with only a fraction of the anatomical outfit with which nature endowed him.

According to records in different hospitals in this country, Burns has thus been dismembered:

Loss of the entire bony vault of skull; the top of the head being covered with a silver plate.

Five ribs gone from his left side, removed by surgeons.

Portion of right hip gone.

Both legs fractured in two places and both elbow joints missing.

Heart moved from its original position owing to absence of ribs on left side.

Imbedded in breast bone a bullet, which cannot be removed, owing to its presence near a main artery.

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Malt Breakfast Food

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Why fill the stomach at breakfast time with food that depresses bodily strength and brain activity? Such a course leads to a multitude of little ills and troubles that make life miserable and your daily work a burden, instead of a pleasure.

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Malt Breakfast Food is a truly concentrated food; therefore the most economical to use. One package will make a full meal for twenty-five or thirty people. Ask your grocer for it; after one trial you will never give it up.

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Thousands of young and middle-aged men are troubled with this disease—many unconsciously. They may have a smarting sensation, sharp, cutting pains at times, weakness, and all the symptoms of nervous debility—they have STRICTURE. Don't let doctors experiment on you by cutting, stretching or tearing you. This will not cure you, as it will return. Our NEW METHOD TREATMENT absolutely cures the stricture tissue, hence removes the stricture permanently. It can never return. No pain, no suffering, no detention from business by our method. The sexual organs are strengthened, the nerves are invigorated, and the bliss of manhood restored.

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Many people enjoy themselves to the limit during winter. They know that the body requires an extra amount of heat and consequently a greater quantity of food during the cold months, and so they feed up on fat stuffs and richly seasoned dishes. With the approach of warmer weather the body does not need this kind of diet. So it is that there remains a waste, which begins to rot in the bowels and intestines, and the blood becomes overheated and filled with poison. Clean out all filth with Hutch, and start the spring with a healthy body and pure blood. Hutch is good as a spring medicine. Chocolate coated.

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