The AUTOMOBILE

HOW IGNITION PLAYS ROLE IN LIFE OF AUTO.

It is a great puzzle to a lot of folks just how the automobile gets its ability to go ahead. To many it is a deep mystery how gasoline from the fuel tank is taken into the engine and translated into the power that enables a car to move forward or backward.

In the automobile engine power is obtained through producing heat by burning gasoline. The gasoline flows from the fuel tank to the carburetor, where it is measured out, broken up into a fine spray and mixed with the proper quantity of air to provide a sufficient amount of oxygen to give rapid and complete combustion.

This combination of gasoline and air goes into the engine in the form of gas, not in liquid form. On the suction stroke of the engine the engine cylinder becomes filled with this mixture. The inlet valve then closes and the gas is compressed into a small space at the top of the cylinder by the returning piston.

Up to this point no power has been generated in the engine. On the contrary a small amount of power has been consumed in drawing in and compressing the charge. This explains the need of cranking the engine over when it is desired to start it.

PRODUCTION OF POWER.

In order to produce power this compressed charge must be burned. To ignite it there is a spark plug placed in the top of the cylinder and an electric spark about 1-32 of an inch in length is caused to occur between the two points of the plug on the inside of the cylinder. This spark ignites the compressed gas and as it burns its temperature greatly increases. This causes a high pressure that pushes the piston toward the bottom of the cylinder and turns the crank shaft. This in turn rotates the driving wheels.

In the modern car the electric current for causing the spark is obtained from a storage battery. This battery is also used for supplying current to operate the starting motor, for lights and other electrical accessories. The current used from the battery is replaced by the generator when the engine is in operation.

The current from the battery is usually of six volts pressure. This pressure is not sufficient to cause the electricity to jump the gap in the spark plug. Consequently the current is led from the battery to an induction coil or transformer, which builds its pressure up to perhaps ten or twelve thousand volts. This pressure is sufficient to cause the electricity to jump the gap.

In the coil are two windings called the primary and secondary windings. The current from the battery flows through the primary winding and energizes the coil. When the current from the battery is suddenly caused to stop flowing a current will flow from the secondary winding to the spark plug for a brief instant.

STRENGTH GIVEN SPARK.

It is, of course, necessary that the spark occur in the cylinder at a certain specific time. To effect this an interrupter is provided, which, through the medium of a cam and a movable point, interrupts the primary circuit at the moment the spark is desired in the cylinder.

As interrupting the flow of current tends to draw an arc or create sparking at the interrupter points, a condenser is provided which absorbs the spark and increases the strength of the spark at the plug. Not only is it necessary that the spark occur at the proper time, but it must be sent to the cylinder that is ready to receive it. Therefore the igniter which houses the interrupter point also includes a rotating switch called the rotor, which distributes the sparks to each cylinder in its turn.

It takes a fraction of a second to ignite the gas, get it thoroughly burning, and have it produce power. Therefore a setting of the spark timer that would cause the spark to occur when the piston is at the top of the cylinder would be all right for slow engine speed, but as the engine is speeded up the piston might easily travel half way out of the cylinder before the gas has become sufficiently burned to give power.

Canadian's Gift to Imperial Unity.

Colonel Leonard's gift of No. 10 St. James' Square to the British Empire for the British Institute of International Affairs, with his further contribution towards its remodelling and maintenance, will mean an expenditure of at least $500,000 by this patriotic Canadian. That this splendid contribution towards Imperial unity and co-operation was timely, is seen from the following excerpt from a letter from a Canadian in London: "This gift of Colonel Leonard's has created a very remarkable and favorable impression upon the people here, as there was a very uncomfortable feeling as regards Canadian views on Imperial matters. This can be attributed to the official attitude of Canada, which has been summed up many times as "benevolent aloofness." This famous old mansion has been the residence of three of Britain's greatest Prime Ministers—the elder Pitt, Earl of Chatham, the younger Pitt, and W. E. Gladstone. It was from the first of these came the name Chatham House. No more noteworthy gathering has there been in London in many years than that which accepted this splendid contribution to Imperial unity. Lord Grey presided, and those who spoke were the Prince of Wales, Duke of Devonshire and Viscount Curzon.

Colonel Leonard stated that "to me the British Empire is the greatest of human achievements. To serve it rightly is to serve mankind. After some months spent here, including an extended visit to the continent, I want to say simply that in my opinion the people of this country are carrying a load heavier than any other which fought on the same side."

Improve Human Race.

"The character of a child can be moulded in the impressionable years between infancy and manhood. Educational direction, wholesome environment and moral training are forces to which every normal child will respond. I hope the same laws which I discovered and demonstrated in plant life will be applied to the improvement of the human race."—Luther Burbank.

Running No Risks.

The hospital nurse smoothed the sufferer's pillow. He had only been admitted that morning, and now he looked up at her pleadingly.

"An' phwat did ye say the docthor's name was, nurse?" he asked.

"Dr. Kilpatrick," was the reply.

The sufferer winced and pulled a wry face.

"That settles it," he said. "That docthor won't get no chance to operate on me."

"Why not?" asked the nurse, in surprise. "He's a very clever man."

Distributing Pickerel Fry.

The lakes and rivers of Ontario and Manitoba have been enriched to the extent of over 211,000,000 pickerel this year, as that number was distributed by the Department of Marine and Fisheries from their five hatcheries at Belleville, Sarnia, Collingwood, and Kenora, in Ontario, and Gull Harbor in Manitoba. This is an increase of nearly 20 per cent over last year.

"A wise or educated man might almost be described as one who keeps his eyes open." I want you to learn to read the great book that is not printed, the book of nature; for God makes this book and there are no mistakes in it and there is no end to it; learn to look steadily and closely and as it were—into things.

Charged Often Enough.

"That bootlegger's a live wire."

"Well, he's been connected with cells enough in his time!"

Rippling Rhymes

by Walt Mason

FAIR BUT FOOLISH

My step-niece is a beauty, the fairest in the land; the young men call her Cutie, and she's in great demand. She drives around with Willie in Willie's gaudy wain, and all she says is silly, and all she does is vain. You never see her reading the works of E. P. Roe; you never see her kneading a lump of wholesome dough; you never see her sweeping, or making windows bright, or diligently keeping the house fires all alight. And yet she has, dodgast her, her suitors six or eight; I weep when I contrast her with my step-cousin Kate. This latter is a winner, the kind I most respect; and she can cook a dinner that's gorgeous and correct. And she is always dusting, or darning things of mine, she keeps the spoons from rusting, and makes the windows shine. And she would be a treasure as any young man's wife; she'd fill with wholesome pleasure the struggling workman's life. But Kate, whom I've respected since childhood, long ago, is lonesome and neglected, and never lands a beau. Her chances still diminish, as go the days so fleet; we'll see her, at her finish, in some Old Maid's Retreat. And now the motors tooty come honking to my gate, and young men call for Cutie, and bless her as they wait.

Now Autumn Wanes.

Now autumn wanes
Amid the swirl and slant of chill gray rains,
And we must say good-by
To the bright panoply
Spread the far reaching slopes and heights along—
Good-bye to song.
Around glooms Melancholy;
Only the fir and holly
Persist in their green bravery to cheer
The rustling footfalls of the passing year.
Heap high the logs and let the flames suspire!
There still are dreams, fair dreams within the fire;
Visions of vanished days for you and me;
Visions of coming April ecstasy!

—Clinton Scollard.

"Master of human destinies am I.
Fame, love and fortune on my footsteps wait,
Cities and fields I walk; I penetrate
Deserts and seas remote, and, passing by
Hovel, and mart, and palace, soon or late
I knock unbidden once at every gate."

—John J. Ingalls.

He Will.

Bug—"My, I wish I were going on a long trip!"

Game Increase in Jasper Park.

The manner in which big game animals are responding to sanctuary conditions in Jasper National Park in northern Albert is one of the gratifying features of a recent report of the Superintendent. Exceptionally large numbers of elk, deer, and caribou have been found feeding in the Buffalo Prairie region and guides in the habit of grazing their pack-horses in that section report difficulty in finding sufficient feed for their animals. As many as one hundred elk have been seen feeding there at one time, while sheep and goats are also reported numerous.

Conscience is an inner voice that warns us somebody may be looking.

Where and How Insulin is Made

Tucked away in an obscure corner of the University of Toronto grounds, overshadowed by the new electrical engineering building and flanked by a row of venerable elms, stands a two-storey, red-brick building formerly occupied by the University Y.M.C.A. A year or two ago it was planned to remove the building, as it was not suitable for any university purpose. To-day, housing, as it does, the only "Insulin laboratory" in Canada, the building, together with its recently installed equipment, is worth upwards of $35,000.

The Insulin laboratory is one of the latest chapters in the romance of Insulin. It stands as a confirmation of the success of the research of Dr. F. G. Banting and his fellow-investigator, Charles H. Best, M.A. Its management and operation are in the capable hands of Mr. Best, who has, from the beginning, been in charge of the large-scale production of insulin. The laboratory is operated as a division of the famous Connaught Anti-Toxin laboratories, of which Dr. J. G. Fitzgerald is director and Dr. R. D. Defries, associate director. The business administration is in charge of Dr. Fitzgerald and Dr. Defries. Mr. Best is assisted in the new laboratories by D. A. Scott, M.A., as assistant director, and a staff of twenty-six people working night and day shifts. With the exception of three trained chemical technicians, under direction of Mr. Arthur Wall, who was the first technician to assist Mr. Best when the manufacture of insulin was begun, and four chemists, the staff is largely technically untrained. During the summer months five medical students were employed in the laboratories and during the winter two students are engaged in part-time work.

The erection of such a completely equipped plant was made possible through the Ontario Government's grant of $25,000, the remaining $10,000 to $15,000 being secured from funds of the laboratory and from private donations. The plant is now producing in the neighborhood of 250,000 units a week for distribution throughout Canada, Ireland, South Africa, Central and South America, New Zealand, Australia, and other countries where plants have not been established. The average dosage for the diabetic patients for whom such a large quantity of insulin is being prepared varies from 15 to 20 units a day.

The price for which insulin is distributed is, as with other products of the Connaught Laboratories, governed entirely by costs of material and of production. The Connaught Laboratories are not engaged in commercial business but constitute a department of the University of Toronto. Mr. Best has called attention to the gradual fall in the price of insulin. In May, 1923, the material was sold at 5 cents per unit, in June at 3 cents per unit and now at 2 cents per unit.

The distribution of insulin is effected through two channels. The first is hospitals which have organized departments for the administration of insulin. The second is through physicians trained in the use of insulin. For these latter a special short course of instruction was provided at the University of Toronto last July under the direction of Professor Duncan Graham.

The preliminary stages in the preparation of the health-giving extract are conducted in a large laboratory in the north-east corner of the insulin building where beef and pork pancreas (sweetbreads), fresh from the abattoirs, are first minced in a large meat-grinder, dissolved in vats of alcohol, and then placed in a large basket centrifuge. The liquid is drawn off from the centrifuge and further clarified by filtration through paper in glass funnels. This liquid, containing the soluble constituents of the pancreas, is reduced to a small volume by evaporation of the alcohol and water content in a large vacuum still. The residue contains the insulin. The solution is purified in two chemical laboratories, one on the main floor and one on the second floor, by chemical procedures known as "fractional precipitations." The purified product is then sterilized, standardized, and filled into vials for distribution by the Connaught Laboratories.

But the equipment of the Insulin Laboratory embraces more than the mere processes necessary to produce the serum. A distilling room on the main floor contains a large rectifying still, vacuum pumps, and condensers by which the used alcohol is reclaimed. An oil-burning furnace in the basement supplies steam for the vacuum still and a refrigeration machine cools the alcohol condenser and manufactures cakes of ice for small refrigerators. A large electric fan is kept running continuously to ventilate the laboratories and clear the air of alcohol fumes.

On the second floor, in addition to the purification laboratory, there is a laboratory in which two chemists are employed on research work in connection with insulin. Clean, well-ventilated rooms are provided for the animals used and a small operating room is near at hand.

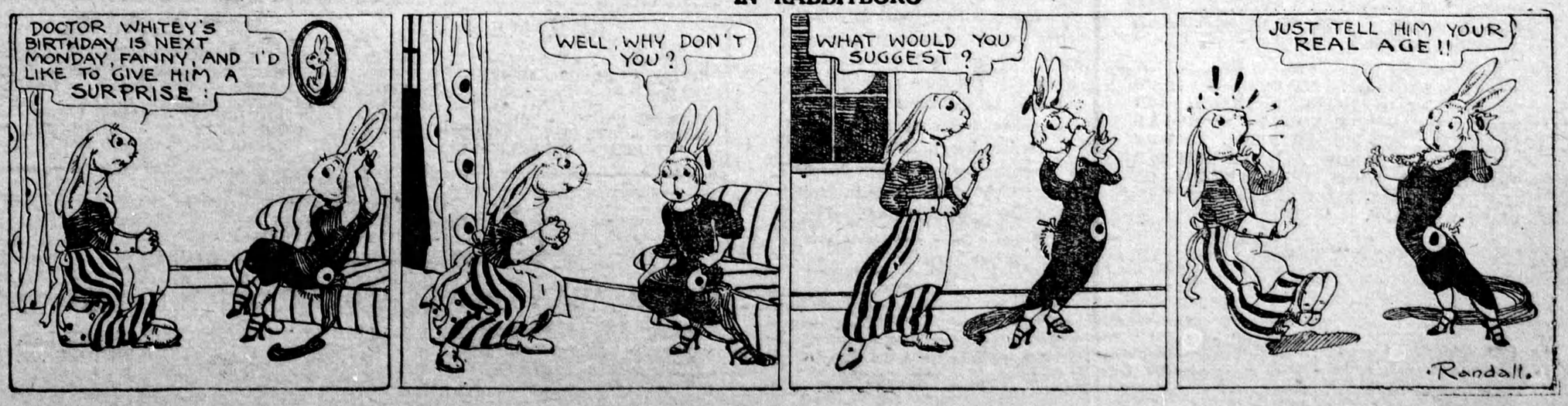
The preparation of insulin is controlled by patents applied for in various countries of the world by the original investigators. These patents have been assigned to the University of Toronto and a committee, appointed by the Board of Governors, is responsible for the administration of patent and other rights and for the promotion of efficient production and distribution of insulin in all countries of the world. The original investigators, Dr. Banting and Mr. Best, receive no financial benefit from the patent but desired to prevent the filing of other patents which might restrict the preparation of insulin. In Great Britain complete patent rights have been assigned to the British Medical Research Council and in the United States the Ely, Lilly Company of Indianapolis has been licensed by the University of Toronto to manufacture insulin. The licensing of other firms in the United States is at present under consideration. Rights in all countries except Great Britain have been retained by the University of Toronto. The patents for insulin have been obtained largely through the efforts of C. H. Riches, a patent lawyer of Toronto, who has given his services to the University without charge.

In addition to carrying out his duties as director of the Insulin Laboratory, Mr. Best is continuing the fifth year of his course in Medicine, which he interrupted in 1921 to collaborate with Dr. F. G. Banting in the researches which led to the discovery of the insulin treatment of diabetes.

A PARADISE FOR BLIND CHILDREN

The Ontario School for the Blind at Brantford, where more than a hundred and fifty children are taught to view life from the cheerful standpoint of independence and education, is a veritable paradise for the unfortunate boys and girls who are bereft of one of the most essential senses. At the upper left-hand corner of the picture is W. B. Race, B.A., the far-seeing superintendent of the institute, and in the lower right-hand corner is W. B. Dorkin, the totally blind manual training teacher, who is a living example to his pupils of the triumph of the intellect over physical handicaps. The other pictures show the girls at a sewing class, and also in their pretty club room, and in the oval, the boys and girls on the "junglegym," where they indulge in healthful exercise. The institute was founded in 1872.

To the Death.

"How the rival mosquitos fought a duel for their lady love!"

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