AMAZING CHEMICAL DISCOVERIES

SECRETARY Lane of the interior department recently announced that Dr. Walter P. Rittman, chemical engineer of the bureau of mines, had made two chemical discoveries of epoch-making importance. One, it was announced, will greatly increase the production of gasoline; the announcement stated that the other will make the United States independent of the rest of the world in the production of materials necessary for the dye industry and the manufacture of high explosives. These discoveries have the double importance of being of the highest interest scientifically and probably of the highest value commercially.

The old method of refining petroleum was to heat up the material in a still and condense the vapors coming off. Gasoline is all of the vapor which passes off up to 150 degrees centigrade. This was a simple distillation process. The experimental work of Doctor Rittman has been done at various ranges of pressure from up to nearly 500 pounds per square inch down to partial vacuum and at ranges of temperature from 1,000 degrees centigrade down to the lowest temperature at which the apparatus could be worked.

In his laboratory at Havemeyer hall at Columbia university he has an experimental apparatus which occupies one end of a small room and in which he can make experiments upon any oil under any conditions he chooses. The results are carefully tabulated and the products produced are analyzed. Before carrying out these actual experiments, however, the problem was attacked from the purely theoretical side.

Working from a theoretical standpoint, the expected results were mapped out and then the experiments were tried under the chosen conditions in order to either verify or disprove the prognostications. Using this general method of procedure, the research was carried on and the discovery made of the conditions necessary to produce larger yields of gasoline from petroleum. Later were found the conditions necessary for the production of toluol and benzol from petroleum.

The consumption of gasoline by automobiles, motor cycles, aeroplanes, motor boats, and the various types of internal combustion engines used for power has increased enormously in the last few years. The increase in the number of motor vehicles shows this, for, according to the best estimates, there were, in 1910, 350,000 such vehicles; in 1912 there were 990,000, while at the present time the number has reached 1,500,000. Upon the assumption that each motor vehicle uses ten barrels of gasoline per year, the demand from this source alone would be 15,000,000 barrels of 42 gallons each. The gasoline exported and that used for other purposes makes our annual consumption reach a total of about 25,000,000 gallons, which is the present production.

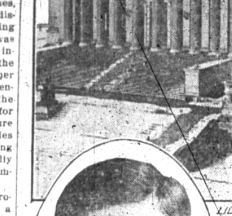
The supply has not been increasing as fast as the demand, however, and even now it would be inadequate were it not for the fact that in the last three years many new processes have been patented for increasing most of the production. These have had no commercial value, however, except one, the Burton process, which is controlled by the Standard Oil company.

The situation which developed when this process was brought out three years ago was an interesting one. The supply of gasoline was so nearly exceeded by the demand that the situation was very critical and the price was high. There was a real "gasoline problem." It seemed impossible to meet the increasing demand with an adequate supply.

Benzol was also put forward as a substitute. It was found possible to use this material for motor vehicles in Europe to a certain extent by employing special carburetors, although it was not entirely satisfactory.

After all, nothing was really able to take the place of gasoline in being entirely satisfactory, nor was there an adequate supply of any other material. It was at this time that the Standard Oil company solved the "gasoline problem" by utilizing the Burton process, which gave prospect of an abundant supply of gasoline for some years at least.

However, the independent refiners, who were prevented by the patents from using this superior method of distilling their crude oil, could not materially increase their output



DR. WALTER F. RITTMAN.

LIBRARY OF COLUMBIA UNIVERSITY

of gasoline, and it is in this connection that Doctor Rittman's discovery will be of such great benefit. Not only will it be available to the Standard Oil company, but it will be at the disposal of any reputable company in the United States.

The patents when they are issued, will be given absolutely to the people of the United States, and measures will be taken to insure that the new process will never be allowed to any one to use as a monopoly.

The discovery as to gasoline is perhaps exceeded in importance, however, by the discovery of the fact that such products as toluol and benzol, heretofore obtained from coal tar alone, can now be made from petroleum.

In normal times there is produced an enormous quantity of benzol and toluol in Germany, where, as in all Europe, the coke is made in by-product ovens, and the tar and its associated products saved. In the United States only about 25 per cent of the coke is made in such a way as to save the by-products.

Benzol and toluol are raw materials in the manufacture of many medicines, dyestuffs and explosives. The fact that the United States is apparently to have a plentiful source of raw material for the making of these will probably be a stimulus to the building up here of new industries. Up to the time of the present war Americans produced only a small fraction of the dyestuffs actually used in American industries. The fact that since the outbreak of the war the United States has been unable to obtain an adequate supply of dyes has had already an effect in causing effort to be made for launching an industry for the production of dyestuffs.

The Rittman discoveries are also of the utmost importance as to explosives. In case of a war in which the United States would be shut off from an outside supply of benzol and toluol, it would be able to produce for the use of the army and navy from its large supplies of petroleum practically any amount of these materials desired.

Many of our modern drugs and medicines are made directly or indirectly from benzol. The production of this latter material at a cheap price would be a great stimulus to the building up of a large synthetic drug industry in this country. At the present time Germany has a monopoly in this business.

The man who has made these notable discoveries was born in Sandusky, Ohio, December 2, 1883.

In 1908 he received a bachelor of arts degree from Swarthmore college, in Pennsylvania, and in 1909 he received his master of arts degree from the same place. During 1909 he served as chemist for the United Gas Improvement company of Philadelphia. He served as lecturer and laboratory instructor in Swarthmore from 1909 to 1912, and continued his studies in engineering, so that he was granted a degree of mechanical engineer in 1911. While at Swarthmore, and especially during the last three years, he was engaged in professional chemical engineering work, both in chemical and mechanical lines.

In the fall of 1912 he came to Columbia university to do the work which got for him, in June, 1914, the degree of doctor of philosophy. The research work for this degree was carried out in the industrial laboratories of Havemeyer hall, Columbia, under the direction of Prof. M. C. Whitaker. The results of these investigations were published in the May and June, 1914, numbers of the Journal of Industrial and Engineering Chemistry, and were upon the subject "Thermo-Reactions in Carburetting Water Gas." In this research work was laid the foundation for the work which led to his discoveries. This piece of research was so much praised that he was asked to take a position with the United States bureau of mines at Pittsburgh as chemical engineer. After accepting this position he continued to study the problem of obtaining larger yields of gasoline in the distillation of crude oil.

He found that at the laboratories in Pittsburgh there was not the kind of apparatus that was required for the work which he had in mind. The work which he had done in studying the thermal reactions in the carburetting of water gas required a special piece of apparatus, and this had been designed and built in the laboratories in Havemeyer hall, so that it was desirable that in the continuance of his researches he be able to use this apparatus. Through the courtesy of the university authorities he was able to take up his investigation for the bureau of mines in one of the private laboratories of the department of chemistry, where he could make use of the apparatus which he had formerly used as a graduate student.

While his experimental distillation apparatus is not large enough to be called factory size, it is much larger than the ordinary laboratory size, and he was enabled to get results which give indications that the process was feasible on a commercial scale.

Doctor Rittman is modest in his claims and desires to have time to perfect his processes in larger size units before making any statements as to the cost of the production.

The apparatus which has been used in all of the experimental work is practically the same as that used in the research which won for him his Ph. D. from Columbia university last June. The oil, which may be a crude oil, and which by the ordinary process of distillation might yield no gasoline at all, is introduced into the apparatus by a feeding device which controls the rate at which it is led into the furnace. Besides crude oil it is possible to use residues which remain from former distillations by the old process, and even the oils from the California oil fields, which yield practically no gasoline. As the oil enters the top of the furnace it comes in contact with a mass of hot steel balls which vaporizes the oil. The furnace itself, into which the oil vapor next passes, is simply a piece of iron pipe heated by an electric current which passes through a coil of resistance wire surrounding the pipe but separated from it by asbestos.

What actually takes place in the distillation process is to doubt a breaking down of the larger and more complex molecules of the oil used, into the gasoline molecule or the benzol molecule as the case may be. This process is technically known as "cracking" the oil.

The foreign patents which Doctor Rittman is taking out will, of course, be his own personal property. The entire rights of the American patents will be vested in the public, however, and he will receive no compensation except his salary.

Dealing with Elementals

By G. W. MASTERS

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"Business is mighty slow," Professor Nahum," said Madame Ida, the medium, to the latest satellite whom she had picked up in the course of her journeys up and down the length and breadth of the land.

"It might be better," admitted the professor, gloomily."

Madame Ida, driven out of Iowa, and at her wits' end, had considered herself fortunate in securing the services of the starving young man who had agreed to work for her on the basis of a division of the receipts instead of on salary. They had had quite a successful tour in Ohio, stopping for a day and a night at the little country villages, where the gullible are just as numerous as they ever were in spite of education.

"Queer business, ain't it, profes sor?" soliloquized Madame Ida. "But Lord, all business is a graft. It's respectable, and it don't do no harm and does do a lot of good, that's what I say. At least, it makes some folks think they're seeing the spirits of their beloved dead, and even if they ain't sure that it's true it helps. That's what I say—it helps. Never had no folks of your own, did you, professor?"

"Not since I was a boy," answered the professor gloomily.

"Well, listen now," said Madame Ida. "There's a rich old guy in this place that's crazy on spirits. I got a line on him and I've sent him an advertisement of tonight's meeting. He ought to be good for fifty if we can work him right. Had a son who run away and was wild, or something of the sort, and he's got the idea that he's in the summerland and thinks he didn't treat him square. Work the game for all it's worth tonight, professor."

"Sure," answered the professor.

"Karpen is his name—Henery Karpen, and he's got a mint of money. We might manage to stay over a few days, and perhaps give him private settings. Shrewd old fellow he is, too, they say, in the law. But Lord, that's the kind that we catch the easiest. So work him, professor."

"I will," muttered the professor, rising and going into the cabinet, which was set with the accessories for the seance.

Madame Ida had advertised extensively, not through the newspapers, which was apt to bring down the attentions of the police, but by means of handbills, and by letters addressed to persons whom she had learned, through underground channels, to be spiritualistically inclined. As a result there was a fairly full house at a dollar apiece, among the audience being old Mr. Karpen. Watching him narrowly out of the corner of her eye, Madame Ida decided that the old lawyer could be "worked" as easily as the rest.

She had instructed the professor not to permit the spirits to approach the old man that night, this being the method adopted to pique and stimulate the curiosity. So while the professor, attired in flowing robes, capered about the assemblage in the dim light for the benefit of most of the audience, eliciting exclamations of awe by his shrewd "fishing" processes, Mr. Karpen saw no spirit of his son.

At last the spectators filed away, but the old man lingered. Presently he was alone with the woman, the medium being presumably entranced within the cabinet.

"Now, Madame Ida," he said, "I came here to see the spirit of my boy, and I generally get what I want in this world."

"Ah, Mr. Sharpen—no, the spirit tells me your name is Carp"—thank you, Karpen—"you see, it is difficult to get the spirits invariably at the first attempt. Spirits are like human beings. They are just as suspicious as we folks are. They, too, want to be sure that the parties who call on them are the real parties. The astral influence—"

"Would fifty dollars bring up my son's spirit for me?" asked the old man eagerly.

Madame Ida's mouth watered. Fifty dollars! That was just the sum she had longed for. Even a medium is human, and she had seen a spring suit—but why prolong the story? Madame Ida thought that the spirits might be induced to bring up his son—not, of course, for the money, but because of his faith.

"It's faith that counts, you know," she said. "Do you want the sitting at once, Mr. Karpen?"

She touched the fifty dollars and went into the cabinet.

"Professor, the old fool's stayed to see his son," she said. "Don't be scared to go out to him. I've got the fifty, and he won't try any rough-house business, I guess."

Old Mr. Karpen, seated alone in front of the cabinet, saw a luminous cloud upon the floor, which slowly changed into the form of a spirit. It was a tremulous spirit, for the professor was more ill at ease than he had been in many a day.

"Here is your son, Mr. Karpen," said the medium softly. "Don't touch him. He isn't fully materialized yet, and if you were to lay hands on him the astral influence might project an elemental in his place and snatch him away."

"Father!" whispered the trembulous wraith. "You wanted to see me, father. O how glad I am! You didn't treat me very well when I was in the world of fleshly phenomena—"

"I know I didn't, Percy," answered old Mr. Karpen.

"How is Edith?" inquired the ghost.

Oh, tolerable," answered the old man. "At least, she was the last time I heard of her. How did you die, Percy?"

"I am not dead," said Percy with a sob. "I have passed over into the summerland, as the result of a blow on the head, delivered—"

"In a saloon, Percy? How often have I warned you—"

"No, father. It was a quarrel in a freight car. I was working my way home to you, to implore your forgiveness, when the brakeman found me and struck me on the forehead. I was stunned by the blow and pitched forward over a bridge on to a jagged rock in the river bed a thousand feet below. When I recovered consciousness I was in summerland. Father, have you cared for Edith?"

"Why, no, Percy," answered the old man. "I told you not to get married until you found a job. I didn't feel called upon to support Edith. But I understand she has a steady job at a dollar a day as a seamstress—"

"Then listen, father!" cried the ghost passionately. "I swear to you that unless you take Edith into your home and cherish her I will haunt you for the remainder of your days. I will never give you peace. If you love me, cherish my poor wife—"

"I don't know about that, Percy," answered the old man thoughtfully. "I understand that she can take pretty good care of the child—"

"What!" shouted Percy, and for the first time a dreadful suspicion began to show itself in Madame Ida's manner. "Have I a child?"

"A pretty little two-year-old, Percy," said the old man wistfully. "As sweet a little toddler as ever I saw."

"And you have let my wife and child starve on a dollar a day, you infernal scoundrel!" shouted the ghost, throwing off its trappings and striding up to the father. "Father, it is I, Percy, in flesh and blood. I am not a ghost."

The old man rose stiffly out of his chair.

"That's just like you, Percy," he said reproachfully. "You never were strong for veracity. First you tell me you are a spirit and then you say you aren't. Which am I to believe?"

"He is a spirit," cried Madame Ida. "The elementals have got him and built up a framework of flesh and blood about him. I warned you, Mr. Karpen. Your son is in summerland—"

"I tell you I am a human being, you old impostor," shouted Percy, clutching his father by the arm. "Father, surely you know me. Look at me!"

"It does look like you, Percy," admitted his father. "But you know the elementals are clever fellows. How do I know you aren't in summerland and that the elementals are just fooling me?"

"Why, course they're fooling you," shouted Madame Ida angrily. "You aren't the first man that has been fooled by an elemental. Why, Queen Victoria once said to me—"

"I'm afraid you are an elemental, Percy," said his father, shaking his head. "I'm sorry, because if it was really you I'd ask you to forget the past and come home with me, where your wife and baby have been living two years past, and—say, Percy, you infernal chump, if you're ready to quit this foolishness and come home there's a job waiting for you and the calf ready for the butcher."

"You bet your life!" yelled Percy, flinging his arms about his father.

And Madame Ida, looking alternately at the door and at her fifty dollars, realized that she would have to find a new professor before the next seance.

"It's Faith That Counts, You Know."

Choate on Lord Aberdeen.

A characteristic remark of Mr Choate was made about Lord Aberdeen at a dinner in New York, where the then governor-general of Canada was the principal guest, appearing in kilts, in honor of his Scotch entertainers. Aberdeen had made a neat speech, and the applause had hardly ceased when Choate was introduced, and proceeded to say some complimentary things of the last speaker and to declare that if he had known that he was to be permitted to sit next to his distinguished Scotch friend, the governor-general of Canada, "this Gordon of the Gordons," he, too, would have come without his trousers. It was audacious, but the kilted guest was soonest to catch its humor and led the laughter it produced.

Money.

"Money makes this mare go," or perhaps it's vice versa, as a well-known gambler and race-horse owner once remarked. We presume money is desirable or else such a gigantic number of people would not be so busily engaged in the attempt to make some or make more. But the irony or justice of great wealth is that when we have everything that money can buy we awake to the realization that money cannot buy everything.

If you wish your flattery to stick, select a man as the mark for it.

Wash day is smile day if you use Red Cross Ball Blue, American made, therefore the best made. Adv.

Only a selfish man will allow his life insurance to lapse just before passing in his checks.

YOUR OWN DRUGGIST WILL TELL YOU Dr Morse's Indian Root Pile Ointment Cures Itching Piles, Eczema, Sores and Granulated Eyelids. No guessing—ask the druggist. The Indian Root Pile Ointment Co., Chicago.

Not Yet.

"I hear you have a new baby at your house. Is everything all right?"

"No; the trouble is just beginning. We're trying to select a name."

Many School Children Are Sickly.

Children who are delicate, feverish and cross will get immediate relief from Mother Gray's Sweet Powders for Children. They cleanse the stomach, act on the liver, and are recommended for complaining children. A pleasant remedy for worms. Used by Mothers for 30 years. At all Druggists, 25c. Sample FREE. Address, A. S. Olmsted, Le Roy, N. Y.

Explained.

"I have such an itching for office."

"Maybe it is because you have the scratch for a living."

Stop That Backache!

There's nothing more discouraging than backache. You are lame when you awake. Pains pierce you when you bend or lift. It's hard to rest and next day the same old story. With the trouble is nature's warning of kidney ills. Neglect may have the way to dropsy, gravel, diabetes or other serious kidney sickness. Don't delay—begin using Doan's Kidney Pills—the remedy that has been curing backache and kidney trouble for over fifty years.

A Michigan Case

Mrs. G. [illegible] Kessler, Main Street, Sturgis, Mich., says: "Doan's Kidney Pills relieved me of a bad case of backache. I was in such bad shape with kidney trouble that I could scarcely walk. My back was stiff and lame and I was tired and nervous. My kidneys were out of order and the secretions were unnatural. Doan's Kidney Pills put me on the road to recovery. Before long I was in good health."

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For Infants and Children.

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A Vegetable Preparation for Assimilating the Food and Regulating the Stomachs and Bowels of

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Promotes Digestion, Cheerfulness and Rest. Contains neither Opium, Morphine nor Mineral

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Pumpkin Seed =

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Anise Seed =

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Bi Carbonate Soda =

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Clarified Sugar =

Wintergreen Flavor

A perfect Remedy for Constipation, Sour Stomach, Diarrhoea, Worms, Convulsions, Feverishness and LOSS OF SLEEP.

Fac Simile Signature of

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At 6 months old

35 DOSES - 35 CENTS

Exact Copy of Wrapper.

THE CENTAUR COMPANY, NEW YORK CITY.

Healthy Baby Smiles.

An interesting mental process with physical manifestation which is found in every healthy baby is smiling. It is a remarkably early one, too, and a child of a month old will often show a distinctly pleased smile when its little face is patted or it is tickled. At first the smile spreads very slowly over the tiny features, then, as time passes, flashes up on the face and dies away again with equal celerity, and by the time the first three months are past is accompanied often enough by little chuckles of glee.

But laughter comes later, often much later, and many children never really laugh until they are a year old, or even more. It is, indeed, very rare to hear laughter before the first six months are accomplished, and when it is heard it should be regarded as a symptom of unusual intelligence, may be gratifying to a mother's pride, but most certainly not to be excited or provoked.

Rebuked.

"Who was Shylock, Aunt Ethel?"

"My dear! and you go to Sunday school, and you don't know that!"—Life

Rough Usage.

"How is your daughter getting on with her music lessons?"

"She's quit. The piano is all used up."

The Wherefore of School.

Little Herman was a very backward scholar and his teacher frequently lost all patience with him.

One day, when he seemed to be more dense than usual, the teacher explained:

"It seems you are never able to answer any of my questions, Herman. Why?"

"If I knew all the things you ask me, ma'am," replied Herman, "my father wouldn't go to the trouble of sending me here!"

The Telephone Pole.

The employer of a Polish girl, who has learned quickly to speak English tells of her attempted mastery of the telephone. After its use was explained to her, she was eager to answer every call. Ringing came and she jumped to the phone.

"Hello," came from the receiver.

"Hello," answered the girl, flushed with pride at being able to give the proper answer.

"Who is this?" continued the voice.

"I don't know," exclaimed the maid. "I can't see you."—Harper's Weekly.

The Mormon church was organized at Manchester, N. Y., by Joseph Smith, in 1830.

After a man has lost his wife's relatives who live in the East he ceases to be afraid of them.

A Physician's Opinion

A physician who uses Grape-Nuts in his family was recently asked his opinion of this food. He said—

"It is a concentrated, palatable, nourishing and healthful food. Sweetened slightly and moistened with good rich cream, Grape-Nuts makes a very toothsome dish."

There's a reason for these excellent qualities in Grape-Nuts. This food is made of whole wheat and barley, thoroughly baked and processed to render it easily and quickly digestible—generally in about one hour.

Grape-Nuts contains all the rich nutriment of the grains, including the phosphorus, iron, sulphur, and other mineral elements so necessary for proper nourishment of body and nerve cells. It's a healthful food, and economical also.

"There's a Reason" for

Grape-Nuts

—sold by Grocers everywhere

AND AFTER THAT, THE ALTAR

Really There Was Nothing Else to It When He Had Been Led to Make the Plunge.

Of course, when she stopped in front of the jeweler's window he had to stop, too. It would really have been polite to walk on and leave her there.

"Oh, see the tray full of lovely diamond rings!" she crowed.

"Yes," he admitted.

"They're engagement rings!"

"Shouldn't be surprised," he replied.

"But come on; we've seen them now, you know."

"They're the gorgeousest engagement rings," she sighed. "The diamonds look diamond-colored now, but when you put them on your finger they turn a bright pink."

"Peruke, I hardly believe that," he rebuked.

"They do! They do! Come and I'll show you," and she dragged him into the shop and had the jeweler bring the rings in out of the window.

"Now slip one on my finger and we'll see," she pouted, and held out the dangerous finger of her left hand, and with considerable curiosity he slipped a ring on it.

"Jack!" she exclaimed. "This is so sudden!"

"Ethel," he cried.

And, oblivious of the jeweler, of all else save love's young dream, they crashed into each other's arms.

As a matter of fact the chorus girl is merely a matter of form.

SET NEW JOURNALISTIC STYLE

Newspapers That Have Their Origin in the Trenches Have Some Remarkable Peculiarities.

The war is responsible for the appearance on every battle front and in almost every fortress of a series of newspapers which, for obvious reasons, set a new style in journalism. In parts of northern France where German troops are trying to get out German papers with French type cases, issues are already coming to be prized as curios in which the letter "v" has to be used for the "w" and the "q" for the "g," so common in German and so comparatively unusual in French. The "h" frequently is missing.

At points where troops are stationed for long periods it has been possible to make frequent use of the cartoon, and war has drawn into the ranks so many artists, writers and skilled tradesmen and printers that the output is often astonishingly good.

All over Europe, especially in districts that have been conquered, papers are issued in the native language for the purpose of educating the civil population to the conqueror's viewpoint and of combating the claims and statements of native papers. Many are printed in two languages. Besides houses, banks and factories are publishing papers full of home news, which they send to employees at the front.

When a girl yawns it is the curfew for the young man in the case.