ENGINEERING

Coal Dust Explosions Drive Motor for Power Plants

New Internal Combustion Engine Will Also Burn Ground-up Wood and Vegetable Powders

EXPLOSIONS of coal dust, often the cause of great disasters, have been confined in the cylinder of an internal combustion engine and made to behave so in obedience to the command of the engineer that they give promise of becoming one of the chief power sources of the world. At least this is what the inventor of the new dust motor, Rudolph Pawlikowski of Gorlitz, Germany, believes.

Before the Third International Conference on Bituminous Coal, Herr Pawlikowski described his latest work, changing the ignitionless, crude oil-burning or Diesel type of internal combustion engine into one which will use coal dust for fuel.

After twenty years of research on a problem that has baffled hundreds of inventors, the German engineer believes his laboratory has at last developed a motor that will be a more economical stationary producer of power than either the steam turbine or the Diesel engine and will eventually replace gasoline motors in automobiles.

These new dust motors have been run thousands of hours and now they are being subjected to experiment and production by laboratories other than the one in which they were developed. Herr Pawlikowski said that motors of 600 horsepower and larger may be on the market by the first of the year.

The immediate application of the motor is expected to be mainly in countries such as Germany where the cost of oil for Diesel engines is high and where it is wise to conserve coal. To operate a 10,000 kilowatt power plant in Germany for one year, Herr Pawlikowski said, Diesel oil would cost 1,480,000 marks, coal for steam generation 470,000 marks, and coal dust for a motor only 336,000 marks. The installation cost of the dust motor, however, would be higher than that for the Diesel but not as great as the cost of building a steam plant.

"The dust motor," Herr Pawlikowski summarized, "produces a kilowatt-hour for about 26 per cent. less than the steam turbine. The saving made by this engine is so great that it certainly will not be surpassed by any improvement in the Diesel engine, and probably not by the steam turbine, even with improvements in steam operation."

Coal pulverized for burning under boilers explodes satisfactorily in the cylinder-head of the dust motor. Italian sanzza, a meal made of the residue left from the manufacture of olive oil, and ground-up wood have operated the motor just as well. Cheap vegetable powders for which there is little use, such as those from palm kernels, sunflower seed, rape, hemp, peanuts and soya beans, were recommended as good motor fuels.

The dust motor is essentially a Diesel engine with the addition of an auxiliary chamber in which the dust fuel is prepared for admission to the cylinder head where it is compressed and exploded.

Science News Letter, December 5, 1931

ZOOLOGY

Same Parasite Infests Four Animal Groups

ONE PEST that infests four different animal groups, of only the remotest zoological relationships, has been discovered by Nelly J. Bosma of the University of Michigan. The parasite, a worm, is described in *Science*. At different stages of its life it is to be found successively in snails, tadpoles and frogs, mammals like raccoon, mouse, etc., and again in mammals like weasel, cat, dog or ferret. It must have four such unwilling hosts during its life. A parasite life-cycle complicated as this is of the greatest rarity.

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GEOLOGY

Present Geyser Action Theory Needs Changing

THE PRESENT accepted theory of geyser action, dating back in its inception about 85 years, must be modified in a number of points, Dr. E. T. Allen of the Carnegie Institution of Washington, holds.

The classic theory has been that water, flowing into the geyser tube or well, becomes heated at the bottom by volcanic steam from below, finally becoming superheated and flashing into a steam explosion when a little water at the top "slops over." But Dr. Allen points out that not all geysers "slop over" before they erupt.

Furthermore, many geysers have hotter water half-way down their wells than they have at the bottom. This points strongly at a probability of the heating steam or gases coming in from a side source instead of from the bottom.

It seems likely, also, that some geysers get not only steam, but at least some of their hot water as well, from side sources. This is evidenced by the measurement of the amount of water discharged during an eruption, which with some geysers, amounts to a great deal more than the well itself will hold.

Science News Letter, December 5, 1931

CHEMISTRY

British Report Most Potent Form of Vitamin D Yet Known

A CRYSTALLINE form of vitamin D, more potent in its ability to prevent and cure rickets than any similar preparation now known, has just been prepared by a group of scientists working at the National Institute for Medical Research in London.

The men who have made this remarkable scientific contribution are Drs. F. A. Askew, H. M. Bruce, R. K. Callow, J. St. L. Philpot and T. A. Webster. The leader of the group, Dr. R. B. Bourdillon, was prevented by illness from taking active part in the last stage of the work.

This new form of vitamin D is called "calciferol" by its discoverers. They say of it:

NOT A PAPER DOLL

But an example of the lost Indian art of biting designs in birch bark. Here is an Indian woman dancing. She is an old woman, it appears, for her shoulders droop and her knees take the bending step without any lively spring.

"The antirachitic activity of calciferol is the highest yet recorded in known units for any preparation."

Calciferol has more of this antirachitic potency than the crystalline preparation of vitamin D recently reported by the German Nobel Prize winner, Prof. Adolf Windaus of Goettingen, Germany, the British investigators state in their report to *Nature*.

Prof. Windaus has two vitamin D substances which he calls vitamin D_1 and vitamin D_2. Calciferol is not the same as D_1, but is much like vitamin D_2 in such physical properties as have been described. Prof. Windaus' vitamin D_2, however, has approximately the same activity against rickets as D_1. In this it differs from calciferol, which has much greater antirachitic activity than D_1, the British scientists found. Consequently, they concluded that the two substances, calciferol and D_2, are not identical.

Calciferol has been proved by them to be a direct product of the irradiation of ergosterol, known for some time as the parent substance of vitamin D. It has the same elements in the same relative proportion as ergosterol, although the structure of its molecule may be different from that of ergosterol.

Science News Letter, December 5, 1931

ETHNOLOGY

Biting Birch Bark Designs Was Indians' Lost Art

Museum Gets Specimens Covered With Delicate Patterns Which Cannot Be Duplicated by Chippewa Women Today

EVIDENCE of a real "lost art" which once flourished among Chippewa Indians around Lake Superior has been brought to the Smithsonian Institution by Frances Densmore, collaborator for the Institution. Miss Densmore, who has studied the customs of the Chippewas on their reservations, has collected about 170 specimens of the lost art. The U. S. National Museum has just acquired a portion of the collection.

The specimens are small pieces of birch bark covered with delicate patterns. They were made by Chippewa women, who took birch bark as soft and pliable as tissue paper and folded it and bit the designs with their teeth. Some of the outlines represent rows of dancing Indians, rather like the rows of paper dolls, all alike, that children cut out of folded paper. Other pieces of bark are marked with geometric patterns, like the lace mats that can be cut out of a square of paper folded again and again. When held to the light the bark pictures make attractive transparencies.

This trick of biting a design with little, neat, precise cuts is one that the younger generations of Chippewas cannot achieve, declares Miss Densmore. It is truly a lost art. Nor can the young Chippewa women keep in mind an elaborate pattern that is to be produced. That fine art of clear thinking, too, is lost. A woman of older Chippewa generations could think out a design of butterflies, leaves, beavers, or other nature forms, and then fold the bark—even as many as 24 folds—and without hesitation transfer the mental picture to the folded bark, perfect. When a young Chippewa today tries a hand at the old art, she "nibbles" the bark, leaving a heavy, patchy line, which betokens her mental uncertainty as much as her lack of dental skill.

The lost art of biting pictures in bark died out at least 50 years ago, Miss Densmore estimates. How long ago the pictures were first made is uncertain. When the Chippewa women brought out samples of the old art to show to Miss Densmore, they told how they thought the art began.

Some woman was sitting on the ground by a wigwam or campfire, they said. She picked up a broad leaf or piece of soft bark and idly folded it and bit a few lines into it. She looked at it and showed the others. So, other women tried it, and competition arose. The art flourished especially in the sugar camps, early in spring, when birch tree bark is suitably pliant.

Miss Densmore points out that the Indian has sometimes been called lacking in purely aesthetic art. It has been asserted that Indian art was employed to make useful things beautiful. But the transparencies are evidence that the Indian could and did produce art for art's sake. The little transparencies, like water-color sketches, were handed about and displayed in the firelight of the wigwams at night, and were treasured for years by the owners, merely because it was pleasant just to look at them.

Science News Letter, December 5, 1931

METEOROLOGY

Trees Will Die Unless Heavy Rains Fall

WHILE the drought of 1930, the severest on record, has been officially "broken," the rains have been insufficient to replenish the sub-soil moisture necessary to the life of deep-rooted trees. Unless the rains this winter are especially heavy next year will see increasingly large numbers of dead and dying trees. Already many of those which line the driveways in and around Washington, D. C., have succumbed to the lack of moisture.

Latest reports from the U. S. Weather Bureau show that southeastern United States, from Maryland down to northern Florida, is at present experiencing very dry conditions. South Carolina, Georgia, and eastern Alabama are especially hard hit. Tennessee, Kentucky, northern Arkansas, and parts of Illinois, however, have had good rains.

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