

New Source of Power Predicted

Engineering

World Nearing Production Limit of Present Methods

MAN has nearly reached the limit of development of steam power and will soon discover a new method of transforming energy to his uses.

This far reaching prediction was made in an address delivered in Berlin this week before thousands of engineers from all parts of the world attending the World Power Conference, by C. F. Hirshfeld, research engineer, of Detroit, Mich.

Scientists can now calculate the limit of power production possible under theory yet to be applied. In fact, they could attain this limit if metals strong enough to stand the increasing pressures and temperatures were available, Mr. Hirshfeld explained.

"If we may judge from human history," he said, "this means that somewhere around the corner of time there lies a radically different process for power development. It means that before we have quite reached the limit of possibilities with present methods the new methods will appear as an undeveloped infant to be fought over and nourished and carried through the period of adolescence."

Mr. Hirshfeld did not attempt to indicate what the predicted development will be. Apparently he was not thinking of power development possibilities which have already been projected, such as the gathering of heat from the sun or the utilization of temperature differences between surface and deep water in the tropics or between sea water and atmosphere in the Arctic to operate a boiler. He said:

"There is no saying whence this new development will come nor from whose hands. But, if we follow the path that man has trod thus far, it ought to come out of the fundamental research now in progress or undertaken in the near future.

"With our inherited ideas regarding matter and energy, corpuscle and wave, continuity and discontinuity all thrown overboard or, at least, so modified as to make them all unrecognizable, we appear to have before us a boiling pot out of which something of epochal significance may arise.

"And it is at least conceivable that this may be something that will make obsolete our present power plants before we have had time to find and commercialize metals which will stand the torture to which we are preparing to subject them."

National leaders interested in power—engineers, executives, financiers and educators—from 49 countries are now pooling their knowledge and experience at the second World Power Conference in session June 16 to 26, in Berlin. The first conference was held in London in 1924.

Steam, water, electric, coal, oil and gas power and their essential influence on modern civilization are being discussed.

A STATISTICAL barometer will soon register every week the condition of business in the United States. The production of electricity will be the unit of measure.

"Electrical production is one of the most accurate, as well as the most immediate, indices of the activity of industry and trade in the United States," William Morgan Carpenter, economist of the National Electric Light Association, told the Conference. "Three-quarters of manufacturing enterprises are now electrified and out of every three horsepower of electric motors, two are operated on power procured from the lines of electric light and power enterprises."

Plans are being worked out for the gathering of these statistics weekly by the National Electric Light Association, the trade association of the electrical industry.

SILENT welding, which joins metal to metal by fusion, has been used either wholly or partially to replace bolting and riveting in nearly a hundred bridges and buildings of the United States.

The tallest building which has been built in this way without the clatter of riveting is an 11-story, 180-foot hotel at Hot Springs, Va., Frank P. McKibben, of the General Electric Co., told the Conference.

Old buildings and bridges have been welded to strengthen rusted and overloaded beams so that the structures will last longer. Nearly all this work on both old and new structures has been done with the electric arc. However, a large steel building has just been completed in which the oxy-acetylene arc was used entirely.

Mr. McKibben said that the atomic-hydrogen method of welding, producing heat greater than that of the

electric arc itself has possibilities for extensive use. This method has been employed successfully to join non-ferrous metals or very thin ferrous parts, but it has not been tried extensively in welding the thicker steels of bridges and buildings.

The atomic hydrogen method is almost a combination of gas and electric welding. Inflammable hydrogen gas is forced into an electric arc. The hydrogen molecule immediately breaks up into its two atoms, which reunite to produce an intense heat, exceeding that of the arc itself.

THE United States has 55,000 miles of pipe lines carrying natural gas to a large part of the industries and homes of the country, and some of these lines extend as far as 400 miles from the producing areas, Dr. Gustav Egloff, of Chicago, told the Conference.

Natural gas is taking the lead in the great change in fuel practice now going on in America which is tremendously increasing the use of all kinds of gas, according to Dr. Egloff. Two and a quarter trillion cubic feet of gas valued at \$500,000,000 were produced in the oil fields of the United States in 1929. Its fuel value is equivalent to that of more than one-sixth of the coal mined in the country during the same period.

Three-quarters of this great output was natural gas. Petroleum distillation and the cracking process was the source of the remainder and produced a volume equal to that made in all the city gas plants of the country.

The expansion of gas consumption is not seen by Dr. Egloff as a menace to the coal industry, but rather as an enlarged opportunity for it.

"Coal should be carbonized at the mines," he said, "to furnish gas, oil and coke. The oil should be cracked to gas, gasoline and coke; and the coke should be gasified. The two products, gas and gasoline, would be pipe-lined to consuming centers. This process would be an immeasurable gain to the welfare of the nation as it would mean the burning in the cities of nothing but smokeless fuel."

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Gorilla Takes 5,600 Mile Auto Ride

Zoology

Fifth Specimen in America Lands at Camden

A 5600-mile ride in an automobile, all over equatorial Africa, was just a preliminary trip before a long ocean voyage that brought him to America, for a husky young male gorilla that was landed at Camden, N. J., by Julius Buck and his son Warren Buck. The Bucks are hunters and importers of rare wild animals, and in addition to the gorilla "boy," the prize specimen of their present cargo, they have a large number of valuable apes and snakes.

The young gorilla was taken in the Congo during the early stages of their recent expedition, so that it was necessary for his captors to carry him with them during all of their subsequent wanderings. He became very tame, and was quiet and affectionate as all captured young gorillas are said to be, so that he gave no trouble during his long journey. His amiable disposition has continued since his landing on this side, so that it has not been necessary to chain or cage him. This makes it possible to study his



behavior with much less restriction.

Dr. Adolph Schultz, of the Johns Hopkins University, has done considerable work on the growth of anthropoid apes, with especial reference to the growth and shedding of their milk teeth. Since no gorillas have ever been born in captivity, the ages of the animals under observation have always been in question, and each new specimen makes it possible to gather more definite data.

The new specimen brought in by the Bucks makes the total number of gorillas in this country now five. The most recent previous importation was brought over on the Graf Zeppelin last year. Julius Buck already has one successfully acclimated gorilla specimen to his credit—little "N'gi," who lives at the National Zoological Park at Washington, D. C.

Science News-Letter, June 21, 1930

The gorilla that rode all over Africa in an automobile, with one of his captors, Warren Buck of Camden, N. J.

World Power Conference—Continued

WHEN Engineers have made the largest electric generators possible, they will be able still further to increase the capacities of the huge machines another 25 per cent. by running them in an atmosphere of hydrogen gas.

The light, inflammable gas has already been used successfully with a small enclosed generator, M. A. Savage of the General Electric Co., told the World Power Conference. Engineers have learned from its operation how to apply hydrogen to the largest units.

"These data indicate that large generators can be built with efficiencies at rated load six-tenths of one per cent. higher when operating in hydrogen and that the active magnetic material can be reduced some 25 per cent. for the same kilowatt output," Mr. Savage said. "Expressing this in another way, machines of 25 per cent. greater output will ultimately be possible when the limit in capacity is reached in air cooled generators.

"Hydrogen cooling is a perfectly practical thing and its adoption will

mark the next big step in the increase in efficiency of these large units."

Although an increase in efficiency of only six-tenths of one per cent. seems very insignificant, if applied to the world's largest generator, it would mean an additional capacity of more than 1,200 horsepower. The capacity of this one unit exceeds 200,000 horsepower and operates at an efficiency of about 98.5 per cent.

Hydrogen is more desirable than air as an atmosphere for generators because it reduces one of the machines' greatest losses, that caused by wind resistance. Hydrogen has only one-fourteenth the density of air. Just as it is easier for a cook to stir water than a thick cake batter, so the rotor of a generator turns more readily in hydrogen than in air.

THE widely heralded efficiency of the United States was measured before the other nations of the world in a paper presented by F. G. Tryon, of the Brookings Institution and the U. S. Bureau of Mines.

In the United States the produc-

tion of electricity from coal has become 400 per cent. more efficient than it was in 1902, Mr. Tryon said. Six pounds of coal were required to produce one kilowatt of electrical energy in 1902, 3.3 pounds in 1917, and 1.76 pounds in 1928.

A railroad train runs now 40 per cent. farther on a ton of coal than it did 30 years ago. A ton of steel is made by the consumption of a third less coal and the manufacture of a barrel of cement requires 20 per cent. less than was needed just 20 years ago.

Progress will continue, Mr. Tryon believes, both through new inventions and through the bringing of average performance closer to the level of what best performance has already proved feasible.

"The most efficient central station," he explained, "requires only nine-tenths of a pound of coal per kilowatt hour, or barely half as much as the average for all stations. The best steam locomotives in use require only 70 pounds of coal per 1,000 gross ton-miles, as against an average of 127 for all locomotives."

Science News-Letter, June 21, 1930