MATHEMATICS

## Googol? It's a New Word For Larger Vocabularies

WHAT is a googol? No, you are not really supposed to know, but it is the new name for a very large number that arose out of the collaboration of an eminent mathematician with a kindergarten.

Prof. Edward Kasner, Columbia University mathematician, was lecturing on graduate mathematics to kindergarten children (and they understood every word, he claims). It was raining, and he asked the children how many raindrops would fall on New York. The highest answer was a hundred. They had never counted higher than that.

### Great, but Finite

But how many raindrops hit the roof and how many hit New York? Prof. Kasner asked. How many single raindrops hit all New York in 24 hours? Professor and children decided that the number of grains of sand on Coney Island beach was about the same as the number of raindrops. They all agreed that it was finitely countable, not infinite.

That is where the googol came into the story which Prof. Kasner tells in an amusing article in *Scripta Mathematica*.

A googol is a 1, followed by a hundred zeros. Here it is (if the typesetter doesn't make a mistake): 10000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000. It is just larger than the largest numbers that are used in physics and astronomy. Eddington estimates the universe's electrons to number one with 79 zeros.

### Subgoogolic Finance

The largest number that Prof. Kasner has seen in finance represented the amount of money—in marks—in circulation in Germany at the peak of the inflation. It was 496585346000000000000, according to a professor of economics. It was less than a googol.

Those grains of sand at Coney mount up to almost the same number, 1 followed by twenty zeros.

A larger number? Prof. Kasner has a name for it—googolplex. A googolplex is one with so many zeros that the number of zeros is a googol, that is, 1 with a googol of zeros.

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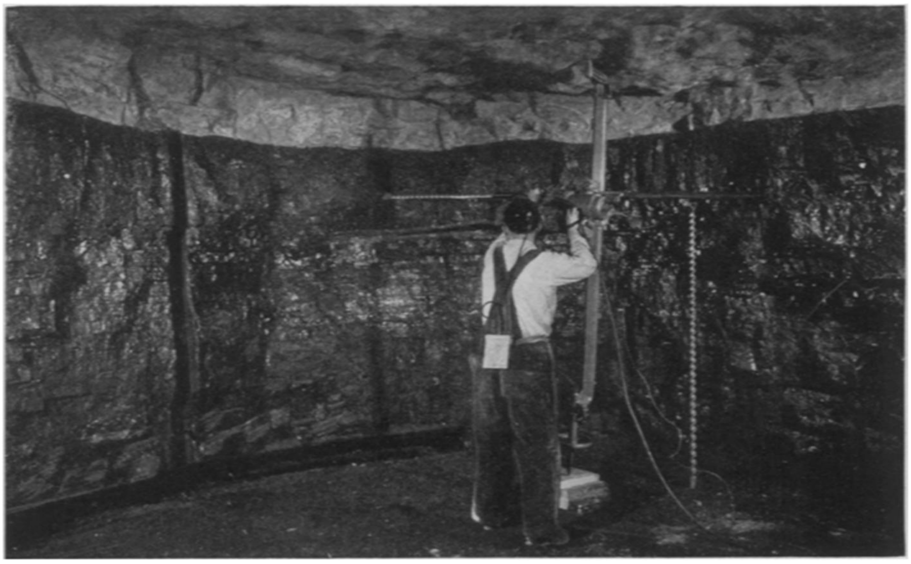
Night driving rates about four times as dangerous as driving in the day.



*STILL MORE COAL WILL BE NEEDED*

*Used much more scientifically and economically than at present, coal will be in demand in ever-increasing amounts, especially when it really begins to figure as industrial raw material as well as fuel.*

MINING

# Coal is Still Power King; Chemical Career Ahead

COAL is still power king and is the energy source upon which the future must rely, despite the relative decrease in its use that has occurred in recent years.

Natural supplies of oil and gas and the electricity that comes from water power will not in future years supply our needs. Technical experts look forward to the day when coal will supply us not only with the bulk of our power from central stations but with superior synthetic fuels, such as gas for heating, liquid fuels for internal combustion engines, and smokeless solid fuel for home heating.

Inevitably an end to flush production of petroleum and natural gas will arrive, not suddenly but gradually and steadily, a survey made by the Ontario Research Foundation shows. This will be due both to enforced conservation measures and to changes in the economics of the industry. Synthetic manufacture of oil and gas from coal will become more economically justified with increased cost of natural oil and gas. Relatively less coal will be burned raw.

Even now figures show that almost a third of the bituminous coal produced in America is processed. A single coking plant near Pittsburgh consumed one per cent. of all the coal mined in the whole world.

Processing of coal, taking out the rich chemicals that dye our textiles, make our medicines, supply raw materials for industries, creating gaseous and liquid fuels, and leaving coke for metallurgical and other uses, will inevitably become one of the largest of our industries.

*Science News Letter, February 12, 1938*

RADIO

## Towers Reach Skyward To Start Radio Waves

**See Front Cover**

BABEL'S Tower, we are told, was started by ambitious sons of men who wanted to reach the sky. It ended in frustration and a confusion of tongues. Modern towers of science reach higher than the builders of Babel probably ever dreamed of going, yet their modest ambition is only to give unconfused tongues a good jumping-off place for long journeys beneath the sky. KDKA's new tower, shown on the front cover, was run up to 718 feet by its daring riggers before they called it a day; its voice goes round the world.

*Science News Letter, February 12, 1938*

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