TECHNOLOGY REVIEW.

November 1934



I'm no dirt farmer but I was brought up on a tobacco farm and I know mild ripe tobacco... *have a Chesterfield*

Down where tobacco is grown folks say . . .

"It's no wonder that so many people smoke Chesterfield cigarettes.

"To begin with they buy mild ripe tobacco...and then they age it.

"It costs a lot of money... but it's the one way to make a milder, better-tasting cigarette."

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CARETTES

THE TECHNOLOGY REVIEW, November, 1934. Vol. XXXVII, No. 2. Published monthly from October to May inclusive and in July at 10 Ferry Street, Concord, N. H. Publication date: twenty-seventh of the month preceding date of issue. Annual subscription \$3.50; Canadian and Foreign subscription \$4.00. Entered as second-class matter at the Post Office at Concord, N. H., under the Act of March 3, 1879.

THE TABULAR VIEW

HEN Francis Bacon drew his unfinished plan for an ideal commonwealth ("The New Atlantis," circa 1623) the principal feature he described was Salomon's House, a great foundation of arts and sciences. The objective of this foundation was the "knowledge of causes, and secret motions of things; and the enlarging of the bounds of human empire, to the effecting of all things possible." Among its "Preparations and Instruments" were "houses of deceits of the senses; where we represent all manner of feats of juggling, false apparitions, impostures, and illusions; and their fallacies. And surely you will easily believe that we that have so many things truly natural which induce admiration, could in a world of particulars deceive the senses, if we would disguise those things and labour to make them seem more miraculous. But we do hate all impostures, and lies; insomuch as we have severely forbidden it to all our fellows, under pain of ignominy and fines, that they do not show any natural work or thing, adorned or swelling; but only pure as it is, and without Bacon, technological institutions strikingly similar in their characteristics to Salomon's House began to be formed and the great Faraday appeared as an ideal embodiment of that type of investigator which Bacon called Benefactor. Faraday even interested himself in deceits of the senses. His investigation of table-turning and table talk, which Mrs. KATHARINE MAYNARD describes on page 60, is an item in point. Mrs. Maynard is Vail Librarian at M.I.T. She will be recalled as the author of an article on the history of the balloon, published by The Review in April, 1928, and a second article on Oliver Heaviside, published in March, 1933.

AST January The Review presented a discussion of AST January The netrow probability as applied the mathematical theory of probability as applied to the game of bridge. The article received a great accolade in the form of comment and discussion, with the result that The Review requested its author, Professor L. F. WOODRUFF, '18, to prepare the sequel which appears on page 61. Professor Woodruff is an able mathematician and electrical engineer and his interest in bridge comes by way of avocation. He holds degrees from Georgia Tech, M.I.T., and Harvard. Plans have been made for a joint book by him and Ely Culbertson on mathematical probability as applied to bridge. CAL-BERT W. DUNNING, '32, after leaving the Institute, spent a period flying with the Navy. During fleet manœuvers off the coast of Mexico, he was forced down at sea and spectacularly rescued by means of a rubber boat dropped to him from a plane — the only time such a rescue has ever been made. His pictures on pages 58 and 59 were taken during his career in the Navy. **(** The new department, "Bending Moments," which appears on page 67 is what Punch calls a charivari ("a mock serenade of discordant noises"). It will appear occasionally.



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HAYDEN, STONE & CO. BANKERS NEW YORK BOSTON (46)

G-E Campus News



TWO POLES IN ONE

Radio entertainment and "airmail" have been sent to the Antarctic through General Electric's short-wave station W2XAF, ever since Rear Admiral Byrd arrived there last year. Recently, in conjunction with a Byrd program, another was sent out to Rockwell Kent and his son in the Arctic region-thus linking simultaneously Americans who are, in the matter of latitude, farthest apart. Governor McNutt of Indiana and other prominent Hoosiers spoke to the Byrd Expedition from Indianapolis in a program sponsored by the Indianapolis Star. Immediately afterward, the Coffee House Club, an organization of artists and writers to which Rockwell Kent belongs, sent music and greetings from New York to him on the island of Ubekjent, just off the coast of Greenland, 600 miles within the Arctic circle. Features of this program were special greetings from Mrs. Kent and her daughter, and a talk in the Eskimo language by Vilhjalmar Steffanssen, Arctic explorer, for the benefit of the natives. Both programs were broadcast over a coast-to-coast NBC network as well as by short waves.



GOOD-BYE, SMOKESTACK

For many years, the old central heating plant at Mt. Holyoke College in Massachusetts, with its tall, unsightly smokestack, barred the way to certain necessary improvements and landscape developments on the campus. This summer the old boilers and the smokestack were torn down. In one of the buildings of the old plant stand 120 General Electric oil furnaces arranged in circular groups of five. Fiftytwo more G-E oil furnaces are installed in the smaller or more isolated buildings of the campus, operating singly, in pairs, and, in one instance, in a battery of 10. In the central plant, only as many groups of furnaces will operate as are necessary to maintain the required steam pressure. The remainder will be shut down, avoiding stand-by losses. The individual furnaces and small groups in distant buildings permit the abandonment of some of the longer runs in the underground steam-distribution network. The high efficiency of the system is expected to produce savings which will pay for the installation in five to seven years. In addition, as a result of the more careful regulation of temperature, it is expected that health conditions at the college will be considerably improved.

The main plans for the system were drawn up by C. W. Colby, consulting engineer. D. W. McLenegan, Wisconsin, '21, assistant engineer of the Air Conditioning Department; W. O. Lum, and H. R. Crago, Penn State, '18, both of the same department, handled engineering details for General Electric.



FLYING POWER PLANT

Gold was discovered in 1925 along the Bulola River in New Guinea, an island just north of Australia. Prospectors worked the richer veins by hand methods, and packed their "take" on the backs of natives through 40 miles of cannibal-infested and nearly impassable jungles to Lae on the coast. After the best veins had been worked out, it became apparent that placer operations on a large scale would pay if the necessary dredges and other machinery could be brought to the location. Land transportation was impossible, so a plane was sent in. The pilot found a spot to land, and a flying field was cleared off.

Four 875-kv-a. General Electric waterwheel generators were among the equipment ordered. When they arrived at Lae, they were transferred to huge all-metal Junkers freight planes and flown to the location piece by piece. The largest single pieces had a net weight of 6545 pounds. As the load limit of the planes is 7000 pounds, it was a tight squeeze. D. B. Gearhart, Iowa State, '27, of International General Electric, Inc., handled the order for the Company.



(47)

OHIO WINS-33 to 5!



Has been operating continuously for 33 months; previous belt broke five times in 5 months

THE dollar-and-cents wisdom of buying belts cor-L rectly designed for, and accurately fitted to your particular set-up, is strikingly illustrated by the experience of The Ohio Oil Company, of Findlay, O.

Back in 1931, the belt on the pump of its L. T. Pate No.6 Well in the Smackover Field, Arkansas, had broken five times in less than five months' service, and had been cut seven times to take up stretch.

Things couldn't go on like that! Breakdowns and delays cost too much money. So the G.T.M.-Goodyear Technical Man-was called in.



This practical expert made his usual careful study of operating conditions. Analyzed load fluctuations, and finally recommended a double-deck construction Goodyear Compass Cord Endless Belt, 106'3" long by 14" wide.

This belt was installed on December 19, 1931, and

Still going strong after 33 months' continuous service

G.T.M.-specified belt

scores for oil company

with long "run"

has been running continuously 24 hours a day ever since, except for an occasional shut-down of an hour or two due to causes other than belt trouble.

Today this belt is still delivering the goods after 33 months' trouble-free service-more than six times longer service than the previous belt, to say nothing of the saving in replacement costs!

Savings like this explain why so many industries consult the G.T.M. regularly on their belting, hose and other mechanical rubber goods requirements. Why not see what he could do for you? A line to Goodyear, Akron, Ohio, or Los Angeles, California, or the nearest Goodyear Mechanical Rubber Goods Distributor, will bring him promptly.



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THE TECHNOLOGY REVIEW

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VOL. 37, NO. 2

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Refracted Light

THE TECHNOLOGY REVIEW

Vol. 37, No. 2



November, 1934

The Trend of Affairs

Western Thrillers

WHICH of the tremendous engineering projects now moving smoothly toward completion between the Mississippi and the Pacific is most likely to stir the imagination 20 years hence as does today the ditch at Panama — the waterway through which the *Anconia*, first of a majestic procession of more than 80,000 vessels, passed on August 15, 1914?

Will it be Boulder Dam, into which the two-millionth cubic yard of concrete was slipped last midsummer with

another million promised by Christmas? Grand Coulee? Either of the mammoth bridges at San Francisco? Or the \$200,000,000 Colorado Aqueduct, with its tunnel driving going ahead at a rate of nearly two miles a month — an aqueduct conceived to take from a river fluid too thick to drink and too thin to plow and deliver it crystal clear 240 miles away for the two-and-a-half-million folks who will, it is supposed, in due course of time, have taken up abode in the Los Angeles area?

RIGHT now Boulder Dam still commands favorable odds. All the western projects are notable for the excellence and audacity of their engineering and thus sheer dimensions may be expected to count heavily in the final judgment. Being 726 feet high ought to let Boulder keep the title of world's highest dam

BAEDEKER	
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for at least 20 years after its completion. That designation kept the similarly arched gravity type, 349-foot Arrowrock, built for irrigation purposes in Idaho, on front pages nearly ten years until 1924. Then the straight gravity, 362-foot Swiss Schraeh or Waegital (part of a power development for Zurich) came along. Today only four dams in the United States surpass the height of Arrowrock: 358-foot Pardee and 372-foot Pacoima in California, 389-foot Diablo (built by Seattle as part of the Skagit River venture), and 405-foot Owhyee in northeastern Oregon which, in type and purpose the same as Arrowrock, belongs also to

the U.S. Reclamation Service.

Owhvee, world's highest for two years past, will soon yield to the thin constant-angle arch of the 446foot Sautet, power dam of Forces Matrices Bonne et Drac, near Mens, France. But the Sautet, located in an extremely narrow canyon, has a shorter crest length (262 feet compared to Owhyee's 840), and will take but 78,000 cubic yards of concrete, less than 15% as much as Owhyee. Sautet's mass is really puny compared with the upwards of 4,000,000 cubic yards which will go into the barrier at Boulder, sufficient, if piled in a rectangular mass on a city block, to tower higher than the Empire State Building.

IF GRAND COULEE'S eventual plans are carried through — by building a higher dam around the



low dam now authorized -2,225,000 horse power would be generated at this point on the Columbia as compared with 1,835,000 at Boulder, and the concreting would also be greater in volume. The low dam, on which the contractor expects to have 2,000 men at work the middle of this month, is to have a crest length of 3,400 feet compared with Boulder's 1,180. The higher dam would stretch out the 3,400 to 4,000.

Many dams longer than 4,000 feet have been built. Five existing in the United States are: Keokuk, Wilson, Conowingo, Ashokan, and American Falls, ranging from 4,360 to 4,971. Abroad there are a number over 5,000; for examples: the twice-raised Assuan (now 6,398), the Sennar on the Blue Nile in the Sudan (nearly 10,000), the Hume on the Murray River in New South Wales (5,300), the Tansa and Krishnaraja in India (both over 8,500), the Ottmachau on the Neisse in Silesia (21,326), and the Lloyds at Sukkur and Mettur (both in India and both around 5,000).

The Lloyd at Sukkur, dedicated in January, 1932, diverts water into a 6,400-mile distributing system, one of the main canals being wider than Panama and two wider than Suez. Except for the extremely long earthfill (8,890,000 cubic yards) Silesian Ottmachau, which is only 56 feet high, and the Lloyd at Mettur on the

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Steam-electric generation of power is constantly improving in efficiency, as The Review points out on page 65. At the left is shown the oil- and gas-fired boilers and above the turbine room of Southern California Edison's Long Beach plant

Cauvery River (completed this fall, its masonry content totals 2,000,000 cubic yards, its height, 230 feet, and it is rated largest in the British Empire), all the abovementioned dams are in their vertical dimensions between 100 and 200 feet.

But the top of the high 4,000-foot long dam at Grand Coulee would, if built, be 500 feet above its lowest foundation!

IN THESE columns a month ago reference was made to the swift tempo of modern bridge-building as illustrated by the San Francisco-Oakland Bridge and, even more forcefully, by its companion structure across the Golden Gate. Only a scant four years ago the 3,500-foot span of the George Washington Bridge across the Hudson was thought to be the *last* word, but the structure now being built to give a northern traffic outlet from San Francisco is to be a fifth longer.

Size, therefore, is apparently not so sure a criterion as to how a bridge will be regarded 20 years from now. Sentimental attachment for such an engineering structure is often a compelling force, as is instanced by the long-standing controversy over the demolition of Waterloo Bridge — the nine-span affair James Rennie placed astride the Thames in 1817 — and its replacement by a new six-lane structure. If, then, the Golden Gate crossing can but provoke in the mind of the man on the street in the 1950's the sort of affection rendered the Waterloo, or the Brooklyn Bridge, to cite another illustration, its fame will be secure.

EVEN a most casual acquaintance with history reinforces an opinion that the Colorado Aqueduct, like the Panama Canal, will be looked upon in time to come as one of the "wonders" of the Twentieth Century. For aqueducts, even though long disused, have the habit of lying around to excite the awe of countless semicomprehending generations.* Traces of the Colorado

^{*} The Roman aqueducts, for instance. In the Third Century B.C. Marcus, the praetor, built what was probably the world's first highlevel aqueduct. Its length, 58.4 miles, was only a quarter of the Colorado Aqueduct. Modern masonry, as The Review observed last July, may not be nearly so permanent as the Roman.