May 1939

TECHNOLOGY REVIEW

THE TECHNOLOGY REVIEW, May, 1939. Vol. XLI, No. 7. Published monthly from November to July inclusive 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

FORTUNATE among their compeers in periodical journalism are alumni magazines, for they naturally find among their readers interest and responsiveness of a degree which many publishers must carefully and deliberately cultivate. This relationship of Review readers to their magazine meets frequent tests, when The Review quizzes them on one subject or another. Most recent appeal to readers in general was the housing questionnaire, response to which was reported in our March issue. A special group have now been called on to aid and abet; that they have done so with vigor and verve equaling the earlier general response is indicated in this issue's account (page 302) of Technology participation in the design and construction of the expositions with which East and West are signalizing 1939. The story was, perforce, written by the long-distance, remote-control technique, relying for content upon the coöperation of Alumni who used the snowball-rolling-downhill method of accretion in supplying facts. Thus a sort of mutual dragnet got into operation. If some Alumni escaped its sweep, to them an anticipatory apology is offered. To the members of the dragnet The Review here presents its thanks, with an especial gesture in the direction of Messrs. Walter D. Binger, '16, Joseph L. Hautman, '25, and William H. Latham, '26.

DR. W. V. QUINE, a member of the department of philosophy at Harvard University, serves Harvard's department of mathematics as well through the graduate study which he conducts in mathematical logic, a field in which he is recognized authority. Vice-President of the Association for Symbolic Logic, Inc., and a consulting editor of the *Journal of Symbolic Logic*, he has written widely on the topic in scholarly publications. His first consideration of it in lay terminology is presented on page 299. At Technology, as Dr. Quine reports, a start has already been made on exploitation of the techniques which mathematical logic offers to scientist and engineer alike. ¶ Far places and arduous ways of getting there have long since exercised on RICHARD HALLET a fascination which he has turned to account not only in fiction which Review readers will remember in the *Saturday Evening Post* but also in his recent book, "The Rolling World." In this issue (page 307) he elaborates from the engineering point of view upon his experiences in Australia some quarter of a century ago. ¶ To the Trend of Affairs this month The Review welcomes FRANK N. HOUGHTON, '22, sometime member of the Department of Economics and Social Science, who now, though not himself a lawyer, is in charge of patent matters for Arthur D. Little, Inc., in coöperation with attorneys. His discussion of current advocacy of modification of the American patent system appears on page 298. ¶ The Cover Club greets as new member this month FREDERICK G. SKEYHAN, '24, of Akron, Ohio, whose sense of composition and suggestion found the values inherent in coal barges on the Monongahela River.

MAIL RETURNS

Bombers for Defense

FROM LEWIS N. OMAN:

One question which has puzzled me hasn't yet been answered. Captain Frederic E. Glantzberg's article in your April issue gives me a chance to bring it up again in a new place. It is a question concerning the defense of cities against air attack. I do not mean, however, air attack by what might be called a "live" plane loaded with bombs and flying by its own power on a course set by its own pilot. I mean air attack by a "dead" plane, which I would define as a plane that has been disabled by gunfire from an antiaircraft battery. It is still flying, but this time by the power which it got from a wallop from a shell fragment, and it is on a course set for it by the explosion that killed its pilot. Maybe its bombs were detonated by the shell fragment. If they were, the plane itself might be a menace to people in the thickly populated area into which it is falling. If the bombs weren't exploded, some of them will probably go off when the wreck of the plane hits the ground. If so, it hasn't done much good to knock the plane out of the air. I don't say anything about the shower of shell fragments that are bound to drop back into the city from a height of two or three or more miles as a result of the fire of the city's own antiaircraft batteries. But it seems to me that in these two things are two more arguments to back up Captain Glantzberg ['27] when he says that the best defense against a bombing plane is a better bombing plane.

Pittsburgh, Pa.

From Long to Short Waves

FROM DONALD G. FINK, '33:

A slight correction should be made in a statement in my recent article, "From the Mountaintops" [April Review]. The statement is made on page 258: "Using this region [ultrashort wavelengths] of the spectrum, Major Armstrong devised a system of transmission. . . ." Major Armstrong advises me that the system he devised was originally developed on conventional long waves and operated successfully by him in that region of the spectrum. Later the system was placed in the short-wave region for the most practical use to be made of it.

New York, N. Y.

Disagreement

FROM NATHAN E. PERSSON:

Your correspondent, Eve Withers [April Review, page 238], is, it seems to me, altogether too sharp in what she has to say about how people talk about their houses. I think she has left out one step in her reasoning, in what might be called characteristically feminine fashion. It is always easy to get a harsh conclusion if you ignore facts when the facts might prevent your arriving at your preconceived goal.

She talks about the "great difficulty, if not the downright impossibility, of escaping from the house itself anyway." As if anyone wanted to escape from it! Or ought to be expected to want to escape from it! If a man works like a trooper to get some land and get a house built on it — cheese-box Modern or tweety-tweety Olde American or even gingerbready Victorian — and then continues working like a trooper to keep ahead of his mortgage and the uprising tax rate, why in the world ought he to want to escape from the house? The poor fellow is naturally more concerned about it than he is about almost anything else in the world. What if he can't talk about much else? When you take a look around these days, most subjects which might be made the center of conversation are so likely to end necessarily in a free-for-all over some kind of an ism or ology that you can't blame people who are content to talk about a decently manageable subject, especially if it is close to their hearts. And it is likely to be close to their hearts because it is pretty sure to be mighty close to their pocketbooks.

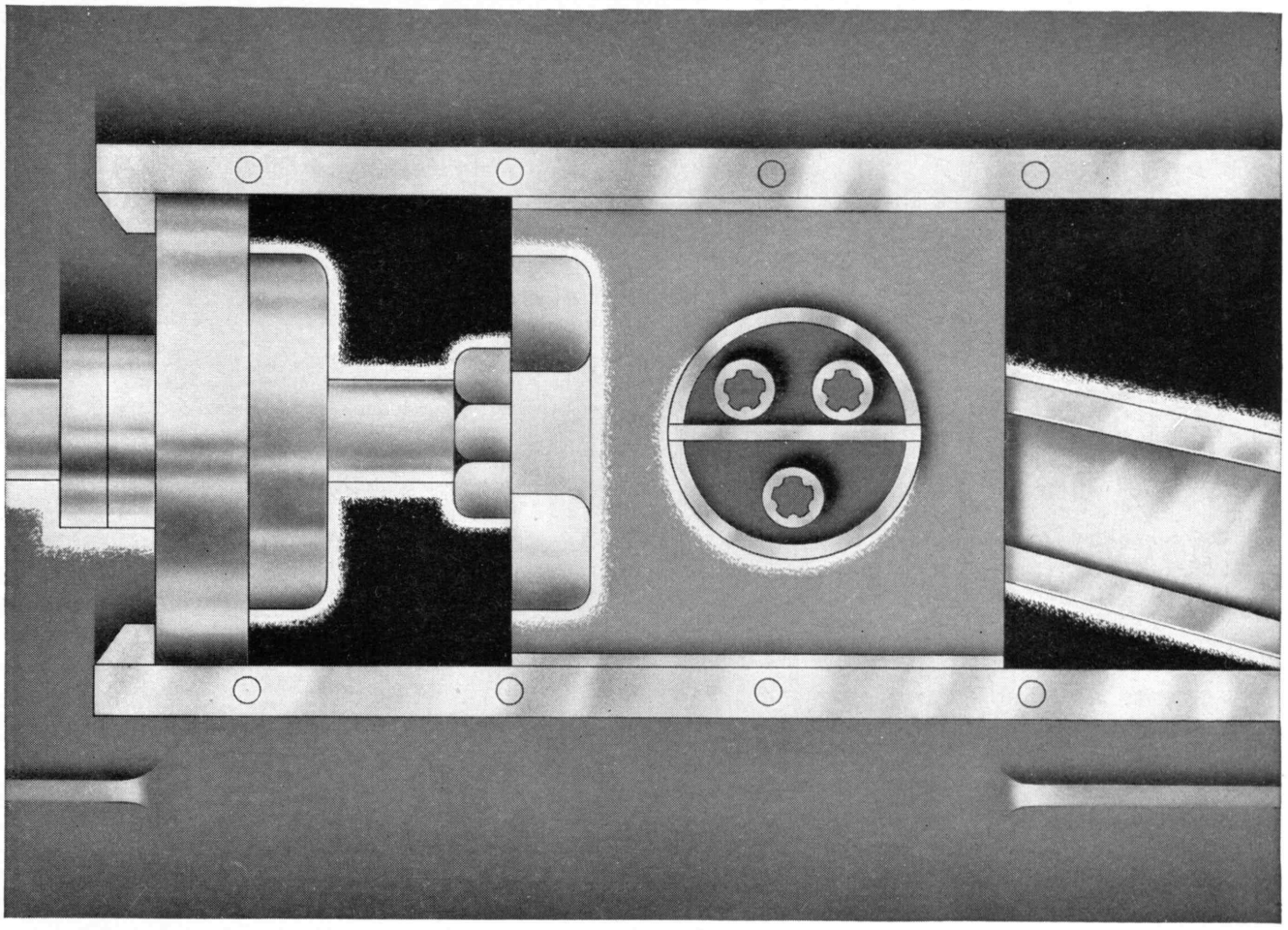
Bangor, Maine

Modern Again

FROM WILLIS HENLEY, '37:

"It is precisely on the plan and on austerity or simplicity of detail that Modern rests its case," you say in mentioning reader response to Modern architecture in the interesting housing survey presented by your March issue [page 210]. To this I reply: "So?"

Wilkes-Barre, Pa.



MAKING PRODUCTION DOLLARS S-T-R-E-T-C-H

The simplification or elimination of fabricating processes is one way of making production dollars go farther. Molybdenum steels are often a help in that way.

For instance, a manufacturer of high pressure motor driven pumps uses cast Nickel-Molybdenum steel for cross-head guides because it has the required toughness and hardness. In addition, the ready machinability and close grained structure of the steel make it possible to produce a good bearing surface in the guide runways by a light cut with a shearing tool. One finishing operation — grinding — is entirely eliminated.

Very often a re-check of material specifications reveals several places where Molybdenum steels will produce better results, or lower costs, or both. Our booklet, "Molybdenum in Steel," will be sent gladly without charge to any interested engineering students requesting it.

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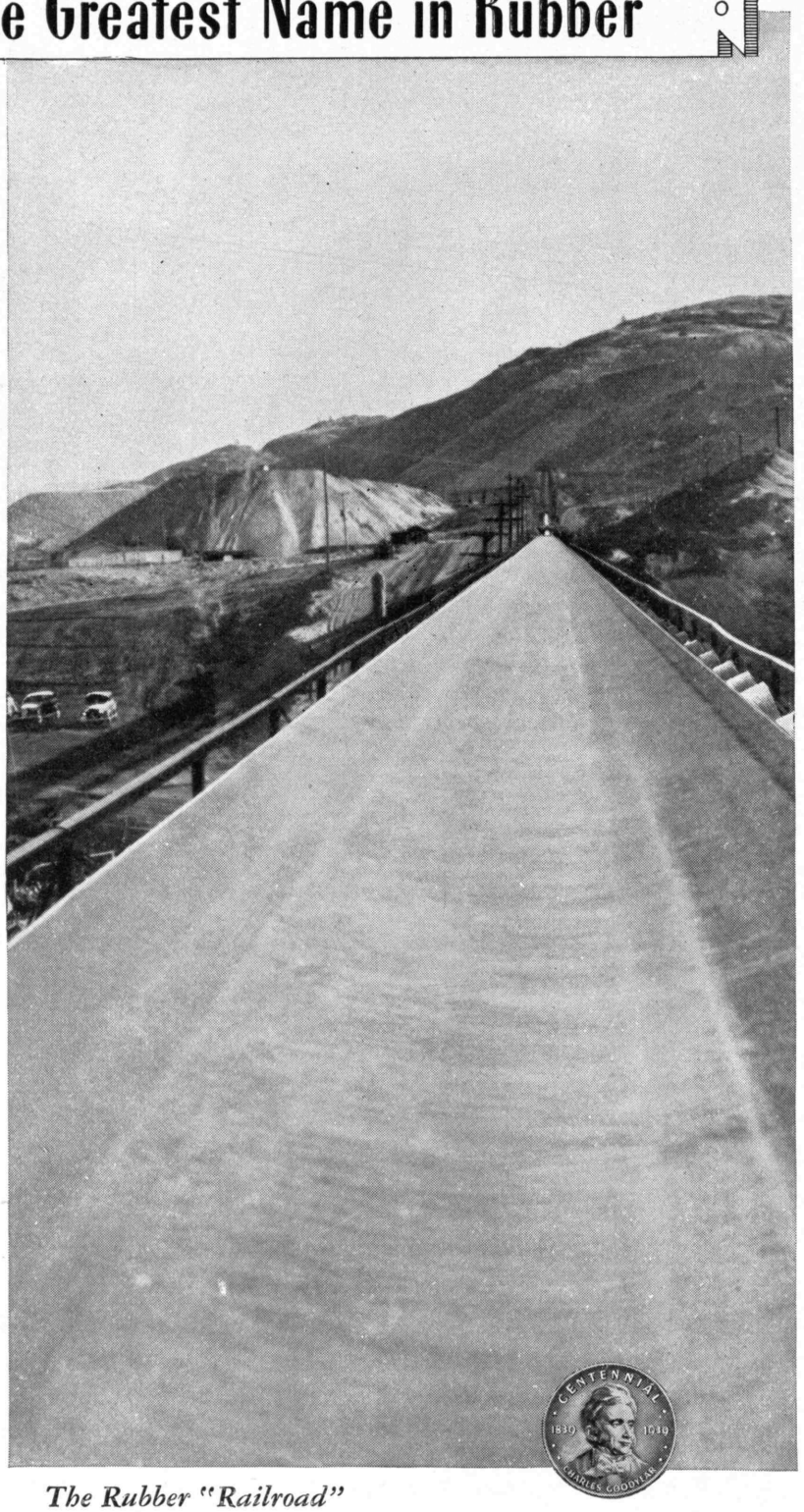
MOLY

Living up to the Greatest Name in Rubber

The Mile-Long CONVEYOR BELT

ENGINEERS all over the world are gleaning new ideas today from a spectacular achievement in Goodyear rubber—the world's longest conveyor belt now in service at Grand Coulee Dam. Twice as long as any belt ever built, it is a goliath of rubber 9,700 feet in length, 48 inches wide, weighing 80 tons. This veritable rubber railroad carries an endless load of stone aggregate—two thousand tons every hour—for a mile-long ride from screen house to dam site at lower cost than any other transport method. It opens a new era in the economical handling of bulk materials.

Never before has so large a single unit of rubber been built for any purpose. Its huge bulk involved strains and stresses of tremendous magnitude; ample safety factors had to be provided. Into its design went all the knowledge Goodyear has gained in building belts that hold the world's record for tonnage in other operations. Its successful performance bespeaks the skill of Goodyear Technical Men and Goodyear's great research laboratories in developing rubber to serve any task. It is one more evidence of Goodyear's stewardship of the greatest name in rubber.



The Rubber "Railroad"
—equipped with 9,700 feet of Goodyear conveyor belting; operates on centers 4,835 feet apart; travels 450 feet per minute; carries 2,000 tons per hour.

1839 · THE CENTENNIAL OF RUBBER · 1939

Great beyond all other names in rubber is that of Charles Goodyear—discoverer just a century ago of the process of vulcanization that made rubber usable to mankind. To honor him The Goodyear Tire & Rubber Company was named long after his death; from his lifelong effort to extend rubber's utility it takes inspiration, and seeks by serviceability to deserve his name.

THE GREATEST NAME IN RUBBER
GOODYEAR

Caribbean Sunset

THE TECHNOLOGY REVIEW

Title Reg. U. S. Pat. Office

EDITED AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

VOL. 41, NO. 7 MAY, 1939

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PUBLISHED MONTHLY FROM NOVEMBER TO JULY INCLUSIVE ON THE TWENTY-SEVENTH OF THE MONTH PRECEDING THE DATE OF ISSUE AT 50 CENTS A COPY. ANNUAL SUBSCRIPTION $3.50; CANADIAN AND FOREIGN SUBSCRIPTION $4.00. PUBLISHED FOR THE ALUMNI ASSOCIATION OF THE M.I.T. H. B. RICHMOND, PRESIDENT; ARTHUR L. TOWNSEND, RAYMOND STEVENS, VICE-PRESIDENTS; CHARLES E. LOCKE, SECRETARY; RALPH T. JOPE, TREASURER. PUBLISHED AT THE RUMFORD PRESS, 10 FERRY STREET, CONCORD, N. H. EDITORIAL OFFICE, ROOM 3-219, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE A, MASS. ENTERED AS SECOND-CLASS MAIL MATTER AT THE POST OFFICE AT CONCORD, N. H. THREE WEEKS MUST BE ALLOWED TO EFFECT CHANGES OF ADDRESS. BOTH OLD AND NEW ADDRESSES SHOULD BE GIVEN

Henry B. Kane, '24

DOPEY

A white-footed mouse in the 13th day of his age

THE
TECHNOLOGY REVIEW

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The Trend of Affairs

Putting Noise to Work

MAN has long depended upon his eyes for control of various industrial processes and upon his ears for many others, but the versatile and unprejudiced photoelectric cell has taken the place of the human eye in the control of many manufacturing operations; now comes an electric ear to hear and act upon variations in industrial sounds.

Just as we hear and instinctively react to various sounds encountered in daily life, so skilled industrial workers learn to judge and control operation of machinery in many manufacturing processes by variations in noise level. In the thunder of stamp mills treating gold ore, in the clatter of automatic looms, in machining operations, the roar of industrial fans, the hum of motors, the flow of liquids, and in countless other industrial processes the slightest variation in sound has a meaning to the knowing ear. But the human ear is not always a reliable detector, and long experience is required to understand the language of some sounds. Thus an alert electric ear which hears with unvarying accuracy has much promise.

The electric ear was developed for the control of ore-grinding machines of the ball-mill type and reacts to the characteristic noise of these grinding machines instantly. This remarkable instrument automatically maintains the noise level of the mill by controlling the rate at which material is fed to it. If the noise drops an infinitesimal amount, the ear causes the rate of feed to be reduced, but should the noise increase above normal level, the rate of feed is automatically increased.

The "ear" itself is a microphone, with a sound-insulated back, located close to the mill. The "brainwork," or control, which translates messages from the ear into action of the feeder mechanism is contained in a cabinet which can be located in any convenient out-of-the-way place. A single dial on the panel of the control cabinet adjusts the optimum noise level for the mill and thus fixes the loudness at which the automatic relays will increase or decrease the volume of material being fed to the machines. The electric ear is responsive to very small changes in noise level and can be applied to either wet or dry grinding. Fineness of the output can be altered at will, and overloading of the mill will still be guarded against even though the size and hardness of the feed vary.

The efficiency of the electric ear for control of grinding operations suggests the possibility of applying the method in other industrial processes in which variations in noise are closely related to efficiency of operation.

New Glass for Old

DROP a nine-ounce steel ball 28 feet onto a sheet of safety glass like that in your automobile windshield, and the ball will plunge through, breaking the pane into pieces. Substitute for the ordinary safety glass a sheet of the new high-test flexible glass and drop the ball again. The pane will bulge and crack under the impact, but the ball will not pass through.

With this and other convincing tests, the Franklin Institute recently introduced the result of a $6,000,000, six-year research program conducted jointly by five companies to develop a softer, safer safety glass. The secret of the new glass is a filler of polyvinyl acetal resin, a plastic that is much stronger and more elastic than the cellulose nitrate and cellulose acetate plastics previously used in laminated glass.

Almost simultaneously with the demonstration of this new achievement in the combined technology of glass and plastics, Dr. George W. Morey of the Carnegie Institution of Washington patented a method of making optical glass that yields lenses with the highest index of

refraction (light-bending power) ever reported — more than 2.00. Made from such rare elements as yttrium, lanthanum, and strontium, instead of silica, the optical glasses of Dr. Morey promise lenses of greater light-gathering power, fewer limitations for the lens maker.

These are but two of many recent demonstrations of what science may do, not only in confecting synthetic materials but in improving old ones. The World War found American industry unable to make high-grade optical glass, and only furious efforts by the Bureau of Standards and the Bausch and Lomb Optical Company made available to us glass approaching the quality of that produced by German manufacturers. Since then, our glass technology has steadily forged ahead, and we have witnessed a remarkable procession of new products ranging from record-sized telescope mirrors, glass bricks, glass yarn, and glass insulation to the superb Steuben museum pieces designed by Sidney B. Waugh, '27.

Back of these achievements have been physicists and chemists probing the challenging mystery of glass's structure. As The Review reported in its April, 1937, issue (page 237), the physicist is just beginning to understand how molecules and atoms link themselves together to form the anomalous material we know as glass. Out of this understanding will come an even greater versatility for an old material kept young by science.

Gold by Charcoal

EQUIVALENT to finding new resources of gold is a new and simplified process for the removal of that metal from ores which hitherto have been discarded or ignored because of the great expense, and even impossibility, of extraction of the gold. The method which was developed by Thomas G. Chapman, '09, professor at the University of Arizona, carries out two distinct processes simultaneously. It consists of dissolving the gold from a finely crushed ore with cyanide and, at the same time, allowing the dissolved gold to be adsorbed by activated charcoal. This procedure concentrates the gold in the carbon, which then may easily be isolated by flotation, and the gold may be removed from it by smelting.

Older methods of gold extraction have used cyanide to dissolve the mineral, but the gold has always been reclaimed from such solutions after they have been separated from the ores by filtration or decantation. Since the gold is removed from solution by the charcoal as fast as it is dissolved by the cyanide, the concentration of gold in solution is always low, and therefore the solution has a great affinity for more gold from the ore. Another advantage is the minimum possibility of the gold's being adsorbed by the constituents of the ore rather than by the charcoal. The combination of two operations — dissolution and adsorption — lends simplicity, simplifies the method of recovery. Thus the disadvantages of former processes, such as the necessity for allowing particles to settle, nonuniformity of filters, and the need for washing away the pregnant solutions, are circumvented.

The new method can be applied to certain ores which have long presented obstacles to the extraction of their gold. Ores containing graphite have offered difficulties to the metallurgist because the graphite, adsorbing the gold from solution — as does the charcoal in the new method — opposed the removal of gold from solution by the leaching methods. In the new process, the graphite acts in the same manner as so much additional charcoal

Underpass serving the Triborough Bridge, New York City

Paul J. Woolf