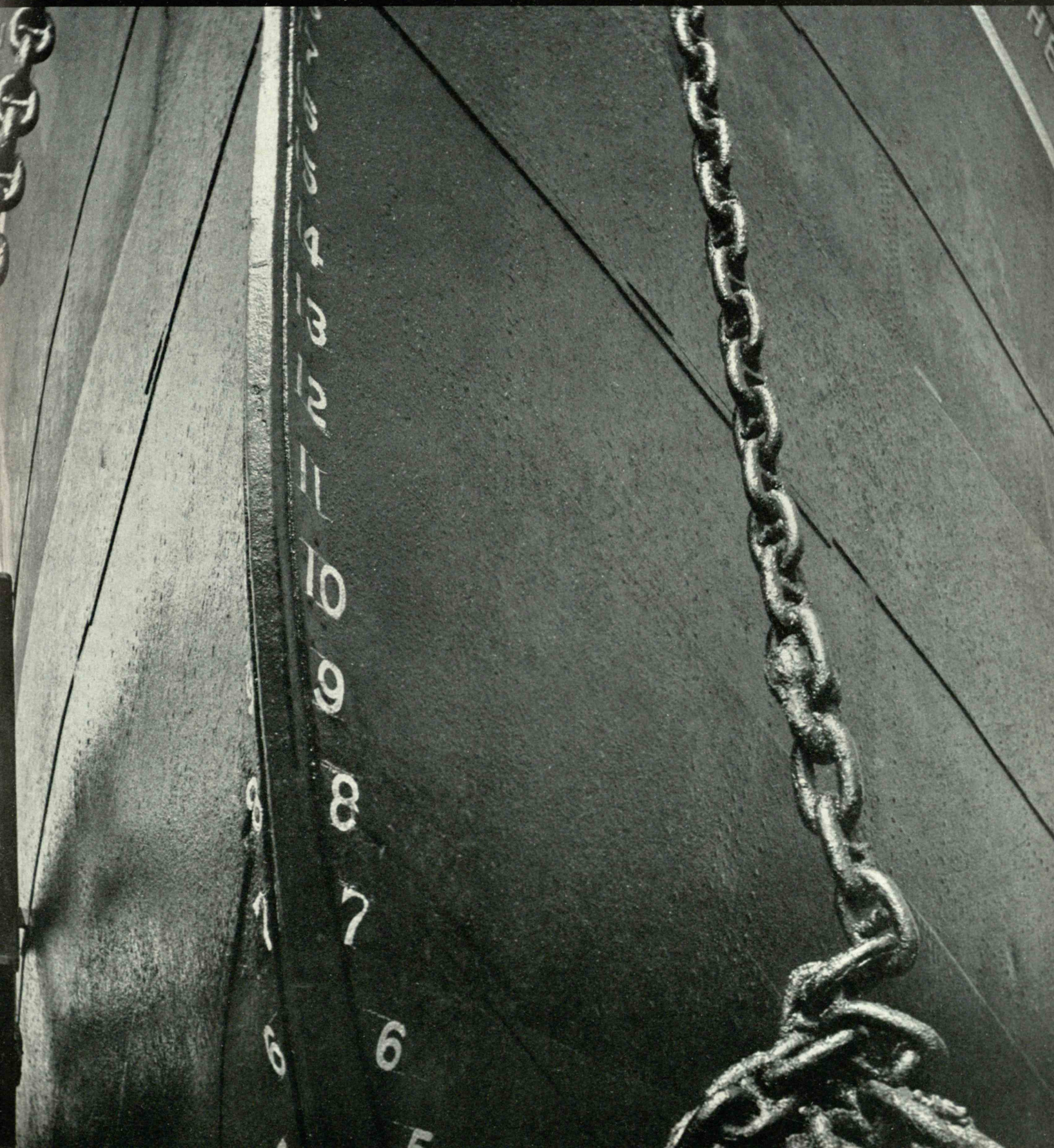


*December 1938*

# TECHNOLOGY REVIEW

Title Reg. in U. S. Pat. Office







*Merry Christmas  
Everybody...*



*...and to everybody  
more smoking pleasure*

Chesterfield Cigarettes in their attractive Christmas cartons appeal to everyone. Their refreshing *mildness* and *better taste* give smokers everywhere *more pleasure*.

**Chesterfield** *They Satisfy*

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THE TECHNOLOGY REVIEW, December, 1938. Vol. XLI, No. 2. 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

AS this issue goes into the mail, the Editors are sending to a geographical cross section of Review readers a questionnaire entitled, "What is the Matter with Our Houses?" Even if one does not answer the questionnaire (we hope you will), the document is stimulating and provocative, and we think you would like to have a copy. So if you do not receive one of these probes and have some pet gripes and strong feelings on home ownership, housing cost and construction, the problem of the back porch, and the removal of fingerprints and spitballs from Junior's wallpaper, drop a card to The Review, and a questionnaire will be sent to you with enthusiastic promptness. The document is designed to elicit information not from specialists but from the layman, whoever he is. (As some wag has paraphrased Gelett Burgess, '87: "I've never seen a layman, I never hope to see one. But this I know that anyhow, I'd rather see than be one.")

AMERICA has pioneered in air transportation since the Wrights first flew at Kitty Hawk. Take for example the high-altitude investigations described by S. PAUL JOHNSTON, '21, on page 71. It might be added as a footnote to Mr. Johnston's article, as Professor John R. Markham, '18, has pointed out to us, that the Boeing Company is building a "Stratoliner." The Curtiss Company has arranged the fuselage structure of a transport that they are building so that its cabin may be put under pressure if they decide to operate at high altitude later on. The Martin Company in Baltimore built an experimental fuselage on which they conducted a number of tests under pressure. The Douglas Aircraft Company has made a very thorough study of the problems involved in the trend toward flight at higher altitudes. There have been a number of publications on this subject, and at the last meeting of the Institute of the Aeronautical Sciences a section was devoted to the reading and discussion of these problems. A concise and thorough summary of the problems is given in an article by W. B. Klemperer in the *Journal of the Aeronautical Sciences* of March, along with other papers on the subject. Mr. Johnston is editor of *Aviation*. ¶ So far as we have been able to discover, the article on page 74 is the first popularized article that has been written on the important technique of powder metallurgy and there have been few scientific papers. JOHN WULFF, the author of The Review's pioneer presentation, is associate professor of physical metallurgy at the Institute, and at the present time he is conducting a seminar on the subject. ¶ KARL T. COMPTON is president of the Institute, and his article on page 77 of this issue is drawn from an address by him before the International Management Congress this fall in Washington. ¶ NORBERT WIENER (page 66) is professor of mathematics at the Institute and a frequent contributor to The Review. ¶ TENNEY L. DAVIS, '13 (page 80), is an editorial associate of The Review and professor of organic chemistry at Technol-

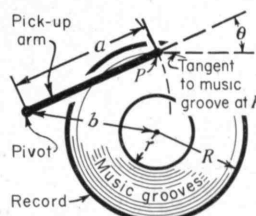
No. 11

*Just for Fun!*

## A CHALLENGE

TO YOUR INGENUITY

RECENTLY, much attention has been given to the "tracking" of phonograph pick-ups on disc records. Formula (1), below, is easy to derive, but can you verify formula (2)?



In the range  $R-r$ :

- (1) To keep the largest absolute value of  $\theta$  as small as possible, let

$$a = \sqrt{b^2 - Rr}$$

- (2) To keep the change in  $\theta$  as small as possible, let

$$a = \sqrt{b^2 + Rr}$$

These formulae may be well known, but we have not seen them elsewhere. They, and many others, were worked out in 1926 to solve this and related phonograph problems.

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## MAIL RETURNS

### *List All Papers Published?*

FROM LEICESTER F. HAMILTON, '14:

In looking over the President's Report, under date of October, 1937, and The Review for last month, it occurred to me that it would be advisable to ask the Editors of The Review to consider the following suggestion. I have talked this matter over with some of the members of our Department [Chemistry], and they concur.

The President's Report for October, 1937, gives space to a list of publications by the Institute staff — publications which are numbered consecutively and are credited to the various Departments of the Institute. This is a logical procedure and should be continued. I feel, however, that you might consider the advisability of allotting a certain amount of space each month to the publication of the titles and authors of such scientific articles as are printed as the result of the efforts of the staff. This suggestion is based on the belief that the graduates of the Institute are interested in scientific developments, and while they may be members of one scientific society and receive the journals, they are not necessarily members of all scientific societies; therefore, notice of the publication of many of the articles does not come to their attention. I realize The Review is an alumni journal and as such should be devoted to alumni affairs, but our Alumni are naturally interested in the Institute and its staff, and we should, perhaps, stimulate their interest by affording them the opportunity to know what the staff, or the Institute, is doing along scientific lines.

My suggestion is that a system be evolved whereby the Departments notify you each month of the appearance of these articles in the various scientific journals.

In the President's Report for October, 1937, 340 such articles were listed. On this basis, space will probably be required for about 40 titles in each issue of The Review.

I shall be pleased to assist in any way, if this suggestion is adopted by The Review.

*M.I.T., Cambridge, Mass.*

The Review is impressed by Professor Hamilton's proposal, will act upon it if Review readers agree. Would you welcome a monthly list of staff papers to supplement the list of alumni papers already published?

### *Wild Life at Night*

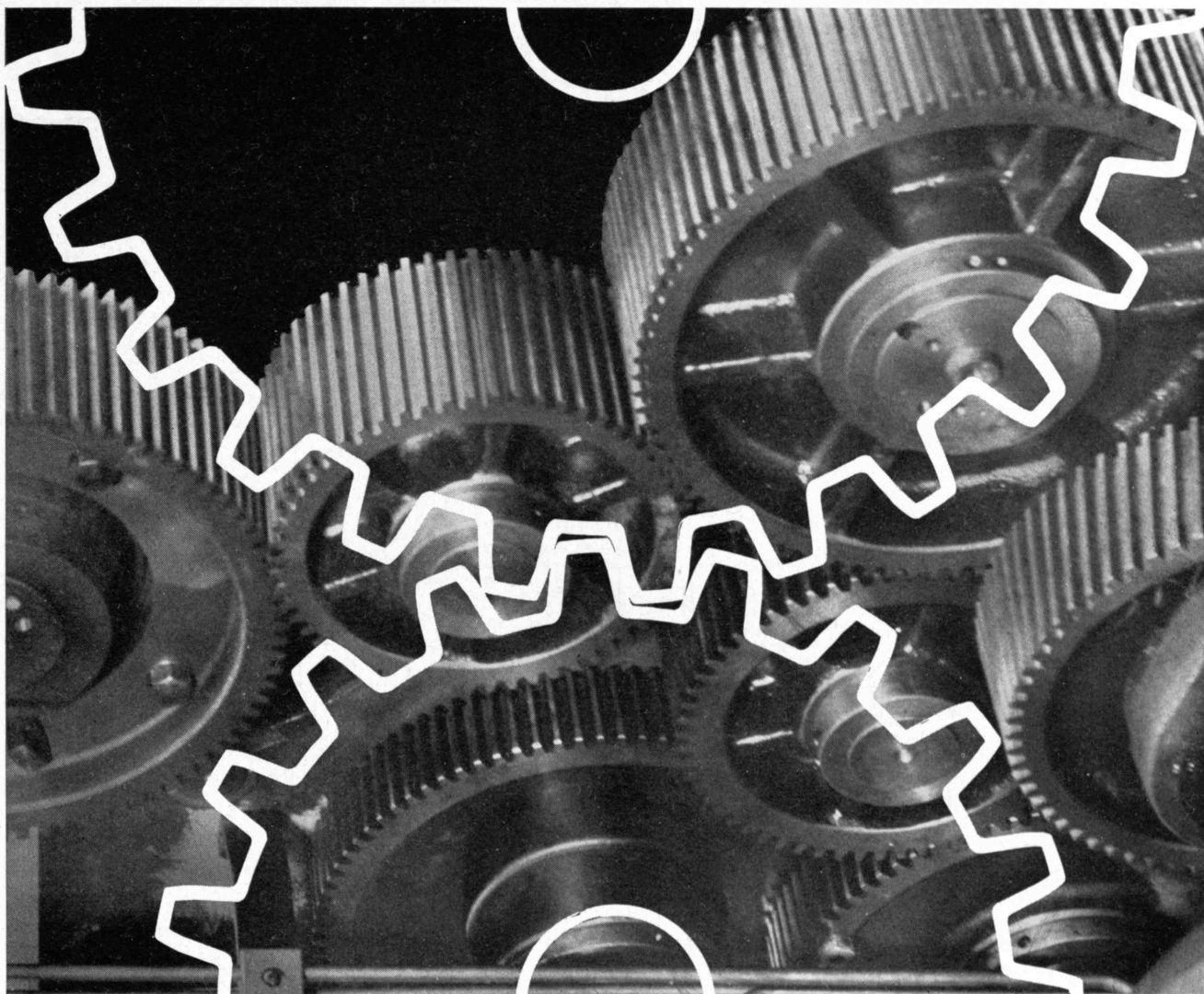
FROM HOWARD CLEAVES:



*New Jersey male tree frog in full song in natural location. Enlarged from 35-millimeter motion picture frame. Taken about 9:30 p.m. Illumination supplied by portable generator outfit*

... I wonder if you have heard of the work I am doing in making motion pictures of wild-life subjects in wilderness places *at night*. So far as I can learn this is a distinct technological advance in the making of motion pictures. Heretofore only still photographs by flashlight (mostly through the use of magnesium powder) have been taken by wild-life photographers. Apparently not even Martin Johnson ever thought of the method I am using, because if he had he certainly would have applied it in Africa. Think what he could have done around those water holes at night. ... I inclose a glossy print which you are at liberty to publish. ...  
*Staten Island, N. Y.*





## PRECISION GEARS AT LOW COST

THE quality of the gears in a high-grade machine tool determines its performance.

One well-known machine-tool builder finds 0.35% Moly Chrome-Molybdenum iron meeting all requirements for main and intermediate gears in an automatic crankshaft lathe. The iron is wear-resistant enough to assure maintenance of original tooth profiles, thus eliminating tool chatter. Its structure—and therefore its strength—is uniform. There is no trouble from porosity at the bases of the gear teeth. This Chrome-Moly iron also holds down production

costs. It is comparatively inexpensive. It machines easily. And in the case referred to above there has never been any waste from defective castings since it has been adopted.

If resistance to wear, uniform strength, plus economical production are vital requisites in the gears, pulleys or similar machine parts you make or use, investigate Moly irons. Our book, "*Molybdenum in Cast Iron*," is free to engineers and production executives. Climax Molybdenum Company, 500 Fifth Avenue, New York City.

PRODUCERS OF FERRO-MOLYBDENUM, CALCIUM MOLYBDATE AND MOLYBDENUM TRIOXIDE

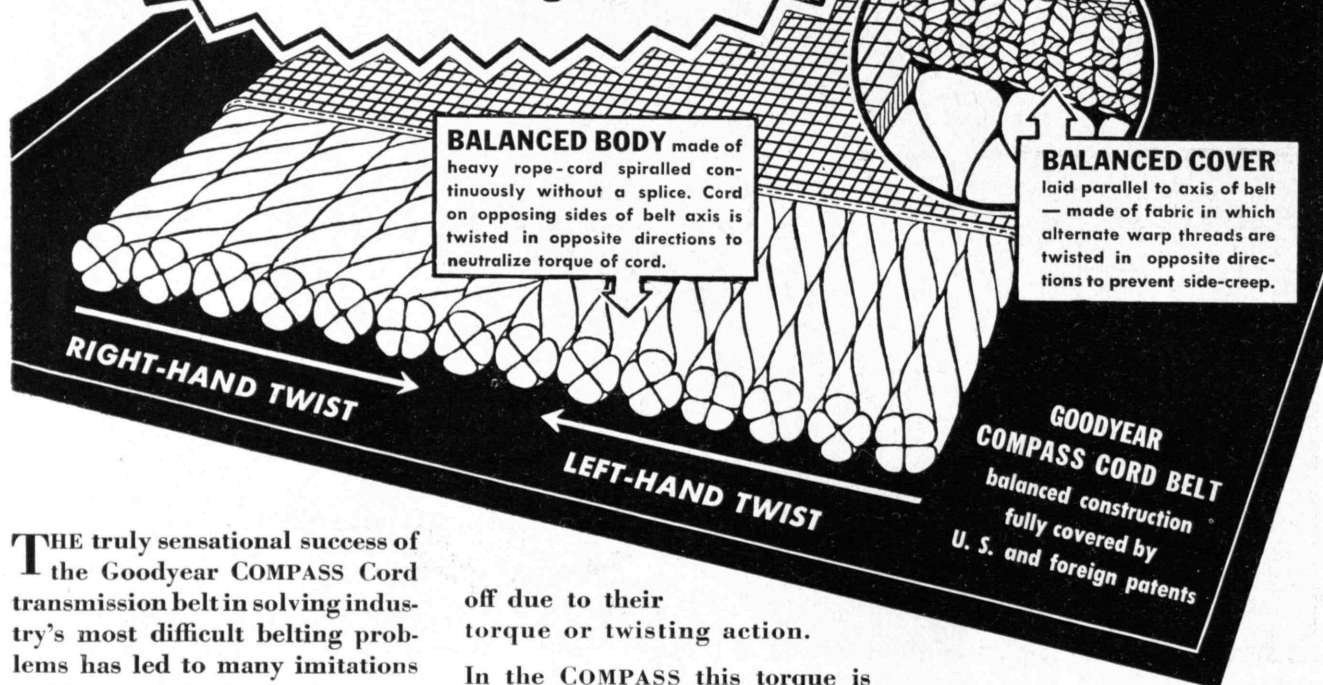
**Climax Mo-lyb-den-um Company**

**MOLY**



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a true-running belt



THE truly sensational success of the Goodyear COMPASS Cord transmission belt in solving industry's most difficult belting problems has led to many imitations seeking to capitalize on the magic word "cord."

But what makes the Goodyear COMPASS the truest-running, most nearly stretchless belt on the market—what gives it such exceptionally high flex-life and long wear—is a fully patented method of cord construction no other belt manufacturer can employ!

The Goodyear COMPASS Cord is a modernized flat belt version of the ancient rope drive. With rope drives, as you know, it is necessary to use grooved pulleys to keep the ropes from running

off due to their torque or twisting action.

In the COMPASS this torque is balanced by twisting the ropes, or cords, on opposing sides of the belt axis in opposite directions. Alternate warp threads in the fabric cover are similarly twisted. This patented construction in both body and cover neutralizes any tendency to run off the pulley with an equal pull toward the opposite side, insuring a belt that runs true.

More than this, it permits Goodyear to use larger, stronger cord, eliminating fabric plies entirely in the carcass, and making a thinner, stronger belt with far higher flex-life and longer service-life.

The best proof of this is the remarkable performance of COMPASS belts on industry's hardest drives. From two to five times longer life with practically no stretch is typical. So don't be deceived by the word "cord." The Goodyear COMPASS Cord belt is the only belt in the world with patented balanced cord construction that insures true-running, high flex-life, low stretch and maximum wear. To test COMPASS superiority for yourself, call the nearest Goodyear Mechanical Rubber Goods Distributor.

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*The Reclamation Era*

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# THE TECHNOLOGY REVIEW

*Title Reg. U. S. Pat. Office*

EDITED AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

VOL. 41, NO. 2

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*From a photograph by James N. Doolittle*

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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; J. RHYNE KILLIAN, JR., 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. COPYRIGHT, 1938, BY THE ALUMNI ASSOCIATION OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY. THREE WEEKS MUST BE ALLOWED TO EFFECT CHANGES OF ADDRESS. BOTH OLD AND NEW ADDRESSES SHOULD BE GIVEN.





James N. Doolittle

# SUNLIT GLADE IN TECHNOLOGICAL JUNGLE

*The complexity that is Hollywood silhouetted against the simplicity that is its product*

# THE TECHNOLOGY REVIEW

Vol. 41, No. 2



December, 1938

## The Trend of Affairs

*Hello!*

WE said a "hello" and a "What hath God wrought!" over one of the new telephones the other day, and it required a bit of subsequent investigation to find out why the instrument seemed to "talk" differently. The answer is that you no longer hear your own voice muttering in your own receiver as loudly as in the old instruments. "Anti-sidetone" it's called, and the phone is sleekly and pawkily contrived to reduce the sound level reproduced in your receiver from what you are saying into your own transmitter. This not only reduces the level of extraneous room noises (sidetones) in your receiver but induces you subconsciously to speak a little louder for the benefit of your listener.

The new combined set has its own bell in the base of the instrument and a plastic molded handset of new and economical design with quickly removable transmitter and receiver units. Working through the improved anti-sidetone circuit, these instruments give greatly improved transmission performance. They are also less susceptible to noise caused by power transmission systems on certain types of party lines.

The new instruments also have much quieter dials, a fact which the telephone user will overlook unless he has the opportunity to make a direct comparison. Incidentally, dials used by telephone operators in private branch exchanges operate much faster than those on the instruments of the subscribers. The operator one reaches by dialing O on a city exchange often completes calls by pushing buttons on a keyboard like that of an adding machine. These methods make possible the quick completion of calls.

There are other new tricks in dialing: To the already astonishing capabilities of the automatic machine switchboards, many of which are now being

equipped with a new and economical type of switch called the crossbar switch, has been added a new switching operation. Known in telephone parlance as "toll diversion," this system makes it possible to limit the use of dial telephones to calls having certain prescribed areas. By this method one may, for example, dial any five-cent call within the local exchange district, but should one try to dial a toll call or any call costing over five cents, the toll diversion system will automatically switch the call to an operator. This feature is particularly valuable in large private branch exchanges in industry and business for keeping an accurate record of long-distance calls. It effectively prevents unauthorized use of the telephone.

A development upon which telephone engineers are now working holds the promise of direct dialing of long-distance calls. By this method each city would have a dial code in letters or numbers similar to exchange names. Having dialed the code for the city, the subscriber would then follow with the local exchange code and telephone number of the person he wished to reach in that city. This system is already in use in some European countries.

New types of carrier-wave systems for ordinary cable and wire circuits have increased the capacity of these channels. It is now possible to carry 12 conversation channels on each pair in an ordinary telephone cable and 16 channels on existing open-wire pairs. This development greatly increases the capacity of present facilities and probably will make extensive expansion of wire and cable circuits unnecessary for some time in the future.

Although there are now only about 15 cities in this country which have enough telephone traffic of a nature to justify its use under present conditions, the coaxial cable — a copper tube with a concentric wire inside — has an amazing capacity for the transmission of con-



versations. Over a pair of such cables it is possible to transmit simultaneously 240, 360, or 480 separate conversations, the number depending upon the spacing of repeater stations. The shorter the spacing, the greater the channel. Aside from its possibilities for telephone communication, the coaxial cable holds great promise for carrying television signals.

England has the largest system of coaxial cables, four of which link London, Liverpool, Manchester, Leeds, and Newcastle. One pair is used for telephone circuits, while the other is employed exclusively for transmission of television programs. The only installation in this country is the coaxial cable between New York and Philadelphia.

There are — if you have a statistical tooth — over 37,000,000 telephones in service throughout the world, of which some 19,600,000 are in the United States. Of this number approximately 8,000,000 are dial instruments operating through automatic machine switchboards.

### *Aesculapius to Mercury*

AMONG the most delicate and difficult of the activities of publishing the news is that of presenting in understandable and accurate form reports of scientific developments. Problems of terminology alone would suffice to place this kind of writing among the most exacting; but these problems are augmented by the puzzle of how to explain the intricately technical to the untrained lay mind, by the constant hazard that the lay mind will draw utterly unwarranted analogies with what is written, and by the frequent peril involved in the fact that, in science especially, a little knowledge is dangerous.

In no aspect of its relation with science is the work of writing and publishing more subject to these troubles than in

the task of reporting matters having to do with public health and medicine. Here, more than in any other field, the danger of misinterpretation, of unjustified encouragement, and occasionally of rash application is increased in its seriousness by the fact that the question of life and death is concerned. Dread of disease easily leads the uninstructed reader to see in even a most cautiously worded story basis for hope which in reality does not exist. The moral responsibility of the writer to both the scientist whose work must not be prejudiced and the reader whose natural human impulses must not be misled is a decidedly heavy one.

Award of the Clement Cleveland Medal "for outstanding work in the campaign to control cancer" to the National Association of Science Writers is therefore an event of considerable import. The association, but five years in existence, consists of newspapermen who specialize in the presentation of scientific and technical news. The standards of performance which it has set and which have thus been signalized — involving as they do a still more exacting interpretation of the old-time journalistic requirement of accuracy — promise well for the future relations of science and the press. That these relations will continue to increase in importance is assured both by the growing volume of scientific news and by this evidence of greater confidence which the men of science are

### THROUGH DESERT SANDS

... The great man-made river known as the All-American Canal executes this impressive sweep. The canal will carry water diverted from the Colorado River to the great Imperial Valley in the southern part of the Salton Sink, where once was ocean. The lowest portion of this enormously fertile basin is 287 feet below sea level, 300 feet below the bed of the Colorado



*The Reclamation Era*