

TESTING

# Wearing Things Out

## National Bureau of Standards Scientists Destroy All Manner of Things—To See How Good They Are

By LEONARD H. ENGEL

UNCLE SAM's hired hands have been scientifically and systematically wearing things out for many years now, entirely on purpose. This time it isn't the patience of government critics, either, that has been getting the wear and tear.

In one of the greatest long-range testing programs ever developed, scientists and technicians in the sprawling laboratories of the National Bureau of Standards in Washington have been putting all manner of goods and materials through use and abuse to see what they can take and which is best.

Paint to mark the center lines of highways has been worn to the point of disappearance by a rubber-shod wheel that has traveled many thousands of miles without ever getting anywhere. Iron-wheeled trucks have worn ruts into a dozen varieties of flooring material. Paints have been subjected to weathering tests that equal in one month a year's exposure to the elements. A whole host of things have been deliberately worn to the breaking point.

No estimate is possible of the amount of money that has been spent over a period of years on the Bureau's now famous simulated service tests, but it runs into millions, even though the Bureau's total appropriation is just under two million dollars a year today and was formerly much less.

### Many Millions Saved

But no matter exactly how many millions have been spent on the tests, they have saved untold millions more through raising standards generally and through serving their original aim—guidance of purchases by the Federal government. Uncle Sam is by far the nation's biggest purchaser of consumers' goods. Hundreds of articles, used regularly by the different agencies of the United States, are purchased today on the basis of rigid performance specifications drawn up by Bureau of Standards scientists.

Dozens of machines have been built by Bureau engineers to carry out this work. Among the best known is the machine developed several years ago at

the instance of the General Federation of Women's Clubs to duplicate in scientific fashion the effect of wear on women's silk stockings.

Stockings were expanded and then allowed to "relax" just as they do from the natural movement of a human knee in walking. The machine in a short time gave accurate, reliable information that has gone far to standardize a once chaotic industry. So successful has this machine been that it has been marketed by a private company for use by the manufacturers.

### Wearing Carpets Thin

Testing programs are carried out in nearly every one of the Bureau's sections. Paints and varnishes are the special care of one section. The Bureau's textile section has worn carpets thin, silk dresses have been worn until they failed and then Bureau scientists have analyzed them to learn why, gloves have been used to the end of their lives, silks have been subjected to severe aging tests. Windows have been raised and lowered until the window sash cord just gave up and broke. The service to be expected from wool textiles has been carefully determined.

Two types of test have been generally employed—the test that quickly "ages" a given product to determine not only its life under normal conditions, but why it fails when it does; and simulated service tests which put goods through a machine routine that not only comes close to duplicating conditions encountered in real life, but does it with scientific accuracy and in a much shorter period of time.

Both types of tests are essentially modifications of the test to determine performance; in insistence on the fact that performance must be the criterion the bureau, headed by Dr. Lyman J. Briggs, and its staff of some 840 men and women, have played a leading role in the gradual recognition of this truth throughout American industry.

"The really essential qualities of a product cannot be determined from mere inspection," declares a publication of the Department of Commerce, of which the Bureau of Standards is a part. "Labora-

tory research is necessary which sometimes involves months or even years of work. The method used in testing must likewise be developed with much care. Accelerated tests are necessary in many instances, which is one of the most difficult phases of commodity testing.

Yet while keeping a healthy, scientific skepticism of the accuracy of its own work, the Bureau has still gone far.

### Industry Benefited

The whole program of wearing things out on purpose is not by any means an isolated project in itself. It fits into the general purpose of the Bureau and was actually begun in order to prepare specifications for purchases by the Federal government, still one of its major jobs. Yet in carrying out this purpose it has directly benefitted industry and the consumer alike in several ways.

Prior to work by the Bureau, standard specifications, standard ways of describing commodities, did not exist within many fields. Silk stockings appeared under a bewildering variety of descriptions, to the confusion of consumer and manufacturer alike and certainly to the disadvantage of the former. The studies of the Bureau and their systematic wearing out of hundreds of pairs of dainty, sheer hose have resulted in establishment of a small number of standard grades and a general raising of quality throughout the whole industry.

### Consumers' Commodities

Much of the Bureau's standardization work has been concentrated in the field of consumers' commodities because of the absence generally of technical bodies which have drawn up suitable standards in other fields. Boiler performance standards, for example, are looked into carefully by a committee of the American Society of Mechanical Engineers. But such groups too often do not exist or carry out such a function in the case of materials sold in small lot orders to the general public.

Great progress has been made in the United States generally in the field of standardization, bearer of mass production's low prices. Outside the Bureau the most important group is the American Standards Association, which frequently cooperates with the men in the Bureau's neatly kept plant.

True enough it is that brand names

of tested products are not available except to the government agencies concerned. But, a spokesman for the Bureau explains, a reason for that is the fact that if any comparative list were published, it would be out of date the day after it was compiled because manufacturers down at the bottom of the quality list would quickly alter their product. And, to be entirely accurate, (a passion among the busy scientists in Bureau employ) the list would then have to be revised. But the process becomes endless—and increasingly expensive.

Building a machine to wear something out is by no means a simple procedure, for the machine must duplicate the wear the commodity receives in actual service.

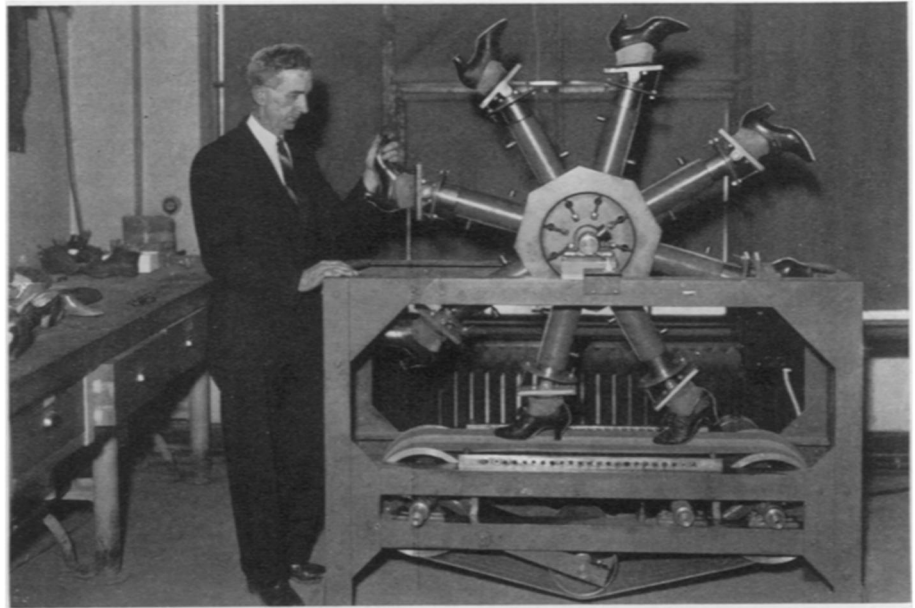
### Machine Walks Floors

Are you testing flooring materials for houses? Very well then, a machine that walks on the floors in much the same way as you and I, only tirelessly, must be built.

There is such a machine at work today. It has been set to work as part of a \$200,000 testing program on low-cost housing materials. The program was launched almost a year ago by a special act of Congress as one of Uncle Sam's contributions to the new push toward low-cost housing and is under the direction of Dr. Henry L. Dryden. It is currently the largest single program of the Bureau.

A leather-shod wheel moves endlessly around a circular track on a floor consisting of many sections, each made of a different material. It presses down on the vari-sectioned floor with the weight of a man. New materials as well as old are being put to test in order to enable comparison between old standbys and the newer, often synthetic products of American laboratories.

Shoe leather has been rigorously tested in another wheel device, partially at the instance of the Post Office Department working through the Treasury's Procurement Division, which does much of Uncle Sam's buying. Postmen do



### BOOTS, BOOTS, BOOTS, BOOTS!

*E. L. Wallace, of the Leather Section, demonstrates this walking machine which tests the uppers of shoes. The wheel and the endless track go around and the shoe gets the same kind of flexing treatment it receives every time a person makes a step. Scientists of the Bureau are studying with its aid not only shoe quality, but different types of shoe construction.*

more walking than even the cop on the beat, and shoes make up a sizeable item in the Post Office budget. Poor shoe leather that wears out quickly can pile up an enormous amount of waste over a period of years.

Paint-aging machines are something uncomfortable to look at, particularly if you don't have smoked glasses along. For in each machine, essentially a drum which rotates slowly, is a powerful lamp giving off light that is as close an approximation to sunlight as possible. Light has a deleterious influence on paint; so the super-bright exposure brings out the defects in a relative hurry, one month of wear here equaling a year outdoors. In addition, the paint samples that line the drum are tortured by heat and drenched with water representing rain.

An even more severe weathering test is the lot of brick walls being put through the mill as still another part of the housing program. Fierce "storms"—water sprays shot at the walls by a forty-mile-an-hour gale whipped up by electric fans—beat upon them continuously. Whitewash on the other side of the wall betrays the slightest leak with a tell-tale stain. Meanwhile, records kept by the careful scientists tell them exactly how long elapsed between the beginning and the end of this treatment.

Much of the Bureau's work has been

carried out at the request of non-government organizations. In addition to the studies of stockings, the General Federation of Women's Clubs had the Bureau carry out a similar study of gloves. The same group is aiding research to determine what kind of shoe uppers are best; for this job a spoked wheel, each spoke with a shoe fitted on it, turns ceaselessly on a moving tread with the shoes flexing and unflexing as they do every time a wearer takes a step. Silk dresses were critically examined in cooperation with the American Home Economics Association.

Other commodities tested in the widely-varying Bureau activities include garden hose, insulating material, special fuel "dopes" to improve the quality of gasoline, paper used for permanent records and a wide variety of other purposes. It was the Bureau that discovered that some paper towels lose a part of their ability to absorb water after a few months' storage. Tires and brake linings, both of interest to a government that uses an enormous number of motor vehicles for its armed forces and other services, have been systematically tested to the wearing-out point for years.

But though the wear-testing and the simulated service test are major portions of the National Bureau of Standards' activities and have attracted their share of attention, they constitute by no means

## ● Earth Trembles

Information collected by Science Service from seismological observatories and relayed to the U. S. Coast and Geodetic Survey resulted in the location of the following preliminary epicenter:

Monday, Aug. 29, 10:22.2 a. m., E.S.T.

Philippine Islands, southeast of Manila.  
Latitude 12 degrees north, longitude 124 degrees east.

For stations cooperating with Science Service in reporting earthquakes recorded on their seismographs see SNL August 13.

the Bureau's entire roster of activities. Fundamental research is being carried on there, 365 days a year. Two Bureau scientists were the men who worked out the details of what a blind landing system for airplanes must do, for example—and incidentally, devised many of the devices that will soon be used with such systems. Other scientists have added materially to the chemist's knowledge of textile fibers.

The list of Bureau research achievements is long and brilliant. And the Bureau is still the keeper of standard weights and measures for the United States of America; it has not forgotten one of the primary purposes for which it was established by act of Congress in 1901.

*Science News Letter, September 10, 1938*

For the third time, Ossetian people of the Central Caucasus have acquired a new alphabet: they used an Arabic alphabet before the revolution, then the Latin, and now have one based on the Russian.



#### LIGHTS THAT MUST FAIL

*The Bureau tests Uncle Sam's electric light bulbs by checking a random selection from the many hundreds of thousands of bulbs bought to light Federal offices throughout the country. If they do not meet specifications set by Bureau scientists, back they go to the manufacturer.*

#### PSYCHIATRY

## Mind of Society Needs To Call in the Doctor

SCIENTISTS recognize the right of society to be protected from those who prey upon their fellows. Criminals should be segregated where they cannot do harm. But prison incarceration as a cure for the habitual criminal is not supported by scientific research.

For the normal child, punishment may have its value in the educative process. But for the child with warped personality, beatings from the parent are often succeeded by a succession of equally futile repressive measures in reform school, jail and penitentiary. What he needs is straightening out.

America's estimated \$13,000,000,000 crime toll is the penalty paid by the community for harboring a small minority of untreated, chronically crooked personalities, declares Dr. Raymond B. Cattell, British psychologist, who was formerly psychotherapist in the School Psychological Clinic of Leicester.

"Whether it is the obsessional petty thief who works such havoc in the big 'chain' stores or criminals of world notoriety like Kürten, the Düsseldorf mass murderer, who had murdered two of his school-fellows by the age of eight,

we clearly have to deal with a rooted abnormality of character which began in childhood and should have been treated in childhood," Dr. Cattell writes in *Crooked Personalities in Childhood and After*.

Mass hysteria, which has afflicted society as a whole from the days of the Crusades through epidemics of dancing mania, witch-hunts, and stock exchange excitement, demands medical treatment.

"Today Europe groans under a nightmare emotion of war fever and suspicion; and no one knows how to alleviate the vicious psychological circle of fear and aggression," writes Dr. Cattell.

Children need understanding and mental care during the formative years. Aid is needed again when the individual reaches the difficulties of adult life and marriage adjustment. Perhaps even more is psychic advice needed when we attain the difficult age of waning powers, retirement, and old age. Society must provide this aid and must eliminate superfluous stresses and strains such as overcrowding, poverty, and insecurity.

*Science News Letter, September 10, 1938*

#### INVENTION

## New Type Traffic Light Changes Colors Gradually

A NEW TYPE of traffic light, with colors that fade gradually from one to the other instead of changing abruptly as in the familiar street standard, has been placed on exhibition at the New York Museum of Science and Industry.

Invented by 72-year-old Martin Sieveking, a former concert pianist turned inventor, the new light is stated to be cheaper to construct than the more conventional signal. In addition, its inventor claims, its gradual change feature gives pedestrians and motorists a better warning of a change, enabling automobiles to stop gradually and pedestrians to know when traffic is about to move against them.

Mr. Sieveking estimates the cost of his lamp as but \$25 as against the \$200 cost for the average type of light. The device is of the rotary type, consisting of an outer metal shell with four windows. Inside the shell a glass drum, divided into eight sections of green, amber and red, continuously revolves, the colors dissolving smoothly into one another slowly and progressively. About 10 seconds are required to make the complete change from one color to another, although the mechanism may be set to afford longer intervals if desired.

*Science News Letter, September 10, 1938*