

Foolproof Matches and Cigarettes

Economics

Discarded cigarettes and matches will cause fewer fires if manufacturers adopt the methods of fireproofing suggested by tests recently conducted at the United States Bureau of Standards.

Fire loss statistics collected by the National Board of Fire Underwriters attribute about one-sixth of the property loss from known causes to matches and smoking. If the same ratio holds for the loss from unknown causes, for the unreported loss and for the original cause of communicated fires, matches and smoking are responsible for a property loss near \$90,000,000 per year. If some of the methods of making the cigarettes and matches go out sooner after they are thrown away are adopted, P. D. Sale, who conducted the experiments at the Bureau, believes that this loss might be reduced considerably.

Hundreds of cigarette butts were collected to determine what length is usually discarded unused. It was

found that the average smoker throws his cigarette away with an inch and a quarter unburned, while less than two per cent. of the butts are smoked down to the last quarter inch.

Approximately 170,000 cigarette stubs are discarded every minute, and laboratory tests, duplicating as nearly as possible an actual condition that might occur, indicated that from 50 to 90 per cent. of the butts falling on readily combustible materials such as the dry or nearly dry grass pad used in the tests, would, with a slight wind blowing, cause fires. The percentage of ignitions varied with the dryness of the grass and the wind velocity.

Under actual conditions most cigarettes do not fall lighted on inflammable materials, but the 250,000,000 discarded every day constitute an enormous fire hazard. The government is particularly interested in the problem because of the vast losses caused in public parks, national and privately owned forests, and public

buildings, by careless smokers. Over 30,000 fires are believed to have been caused by smokers in the public and private forests of the country in 1927, the latest year for which statistics are available, causing the burning over of 7,000,000 acres or more of land with a loss of more than \$6,000,000. So great has been the public loss that the Government has closed extensive areas of National Forest land to smoking during the forest fire season, and many large timber operators rigidly prohibit smoking in the woods by employees and visitors.

The problem was attacked by the Bureau of Standards, and in tests made to simulate the fire hazard incident to discarded smoking materials it was shown that cigarette tips can be applied that will smother the fire soon after they are discarded. It was found by using a cork tip an inch long, either plain or coated on the inside with water glass, a sodium silicate (*Turn to next page*)

Health Field Open

Hygiene

"We have not scratched the surface of the possibilities in the public health field," declared Dr. Louis I. Dublin of the Metropolitan Life Insurance Co. at the recent session of the New York Health Conference. In spite of the splendid work that has been done by various health agencies both official and unofficial, only a beginning has been made.

One-half of our population still lives in rural areas and the majority of this rural population has no public health service available. So far public health activities have made their greatest strides in the cities. The Cattaraugus County Health Demonstration has demonstrated that what may be accomplished in the cities is just as possible when applied to rural life, Dr. Dublin pointed out. However, carrying out public health activities in rural areas is more difficult and requires more money and more educational activity.

We need a standard by which the adequacy of public health services can be measured, Dr. Dublin added. Until we have such a standard, we cannot definitely measure adequacy of public health services, Dr. Dublin declared.

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Airplanes Noisy if Engines Muffled

Aviation

By THOMAS CARROLL

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As a fast military airplane dives toward the ground with a great noise perhaps you feel that the science of aviation is very backward in not providing airplanes with mufflers on the engine to quiet the noise.

If it were as simple as that the problem would have been solved long ago. Only recently it was reported that a great European inventor had made an airplane noiseless with a simple muffler on the exhaust.

But the sound of the engine exhaust is only a part, and a small part at that, of the noise of the airplane. Engine mufflers have been used for years and are very effective in cutting out the noise. These are not only of the type used in automobiles which baffle the flow of gas in a chamber, but there are many types specially designed to use the rapid passage of the plane through the air to assist in the muffling. These are arranged so that the exhaust gas is directed into a chamber which in

turn leads into a venturi or throat through which the air is passing at a rapid rate, thereby cooling the gas and muffling the noise.

But there are other sources of noises. The propeller for instance, makes as great a racket as the engine. Especially is this true of the newer metal propellers. Their howl or whine is deafening, like a sawmill sawing knotty boards. Here is a nice problem, one which has made the muffling of the engine look even easier than it is.

Some experimentation has been done. Manufacturing the propeller blades of some material which does not vibrate in the manner of metal has been tried. Wooden propellers make nearly as much noise and so do those of various compositions which have been in more or less general use. One solution of the propeller noise problem that has been suggested is the wrapping of the metal propeller with something like soft rubber. It appears to have some merit in stopping the noise but no one has come forward and shown us how to apply the rubber and make it stay on.

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Foolproof Matches and Cigarettes—Continued

substance, that the glow in the average butt would go out soon enough greatly to decrease the danger of fire. Laboratory tests with this type of cigarette compared with the untipped and uncoated variety showed that the number of fires caused when falling on dry grass was reduced some 90 per cent. Even the ordinary untipped cigarette partly coated with water glass cut down the fire hazard by 50 per cent. Other treatments found to have varying degrees of success were the use of asbestos paper, a double thickness of cigarette paper, and boric acid solution. These methods are not all believed to be commercially practical, however. Various length tips were applied to the average $1\frac{1}{4}$ inches usually discarded. It was found that a one-half inch tip would materially decrease the possibilities of causing fire and when this was lengthened better results were obtained.

S. H. Ingberg, chief of the fire resistance laboratory, of the Bureau of Standards, under whose supervision the experiments were made, said:

"It is difficult to state how these tips would affect the popularity of the cigarette. With the tips tried there may be some change in taste where the cigarette is smoked up into the tip and it would have to be smoked rather continuously to utilize this portion. However, further work may indicate the possibility of overcoming whatever disadvantage this might imply."

Although the tipping smothers the fire only in the last inch or less of the cigarette, it was found by observation that the longer butts are usually discarded at car stops and entrances to buildings, where there is little danger of their causing fires.

Having found a possible method of reducing the smoldering cigarette fire hazard, the engineers next turned their attention to making the unused portion of matches less hazardous.

The average cigar and pipe smoker takes from 6 to 14 seconds to obtain a light from a match, while lamps, lanterns and cigarettes are lighted in an average of half that time. The ordinary match burns from 15 to 30

seconds, depending on the position in which it is held, so it was estimated that a portion of the stem could be fireproofed without detracting greatly from its usefulness. The common paper pad match was found to be the greatest offender in causing fires, due to its paper composition, while the safety match was found to be less destructive.

By coating all but the one-half-inch next to the head with the same water glass preparation used in the cigarette tests, the possibilities of ignition were reduced approximately one-third in laboratory tests. Production and import statistics indicate that about 290 billion matches are used annually, or an average of 550,000 a minute. The match fire hazard is particularly great because there is an actual flame instead of a glow as in the case of the cigarette, so that a fire is caused almost every time a lighted match is carelessly thrown on inflammable material.

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Grapefruit peel is being tried out as fertilizer in the South.

The Scientist's Jig-Saw Puzzle

General Science

A. E. EDDINGTON, in *The Nature of the Physical World* (Macmillan):

The philosophic trend of modern scientific thought differs markedly from the views of thirty years ago. Can we guarantee that the next thirty years will not see another revolution, perhaps even a complete reaction? We may certainly expect great changes, and by that time many things will appear in a new aspect. That is one of the difficulties in the relations of science and philosophy; that is why the scientist as a rule pays so little heed to the philosophical implications of his own discoveries. By dogged endeavour he is slowly and tortuously advancing to purer and purer truth; but his ideas seem to zigzag in a manner most disconcerting to the onlooker. Scientific discovery is like the fitting together of the pieces of a great jig-saw puzzle; a revolution of science does not mean that the pieces already arranged and interlocked have to be dispersed; it means that in fitting on fresh pieces we have had to revise our impression of what the puzzle-picture is going to be like. One day you ask the scientist how he is getting on; he replies, "Finely. I have very nearly finished this piece

of blue sky." Another day you ask how the sky is progressing and are told, "I have added a lot more, but it was sea, not sky; there's a boat floating on the top of it". Perhaps next time it will have turned out to be a parasol upside down; but our friend is still enthusiastically delighted with the progress he is making. The scientist has his guesses as to how the finished picture will work out; he depends largely on these in his search for other pieces to fit; but his guesses are modified from time to time by unexpected developments as the fitting proceeds. These revolutions of thought as to the final picture do not cause the scientist to lose faith in his handiwork, for he is aware that the completed portion is growing steadily. Those who look over his shoulder and use the present partially developed picture for purposes outside science, do so at their own risk.

The lack of finality of scientific theories would be a very serious limitation of our argument, if we had staked much on their permanence. The religious reader may well be content that I have not offered him a God revealed by the quantum theory, and therefore liable to be swept away

in the next scientific revolution. It is not so much the particular form that scientific theories have now taken—the conclusions which we believe we have proved—as the movement of thought behind them that concerns the philosopher. Our eyes once opened, we may pass on to a yet newer outlook on the world, but we can never go back to the old outlook.

If the scheme of philosophy which we now rear on the scientific advances of Einstein, Bohr, Rutherford and others is doomed to fall in the next thirty years, it is not to be laid to their charge that we have gone astray. Like the systems of Euclid, of Ptolemy, of Newton, which have served their turn, so the systems of Einstein and Heisenberg may give way to some fuller realization of the world. But in each revolution of scientific thought new words are set to the old music, and that which has gone before is not destroyed but refocussed. Amid all our faulty attempts at expression the kernel of scientific truth steadily grows; and of this truth it may be said—The more it changes, the more it remains the same thing.

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