

## 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 refocused. 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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