COMMISSIONER'S DECISION

UNOBVIOUS : In View of Applied Prior Art.

INSUFFICIENCY : Essential characteristic not defined in claims.

Final Action erred on fact that the prior art disclosed tobacco substitution mixtures comprising proteins and thermally degraded carbohydrates. Proposed new claims fail to specify that the composition comprises protein added to the modified carbohydrates.

FINAL ACTION : Modified.

This decision deals with a request for review by the Commissioner of Patents of the Examiner's Final Action dated September 13, 1973 on application 108,536 (Class 131-15). The application was filed on March 23, 1971 in the name of Robert C. Anderson and Robert A. Hall and is entitled "Improved Smoking Mixture."

This application relates to a tobacco substitute composed of a modified carbohydrate as smoke-producing fuel combined with protein in which the weight ratio of protein to smoke-producing fuel is in the range of 1:1 to 1:60.

In the prosecution terminated by the Final Action the Examiner rejected all the claims as unpatentable over the following references:

United States Patents

2,576,021	Nov. 21, 1951	Koree
3,369,551	Feb. 20, 1968	Carroll

In the Final Action the Examiner stated (in part):

> Claim 1 is rejected as unpatentable in view of either the Koree or Carroll disclosure of a tobacco substitute containing a smoke producing fuel such as bagasse, processed lettuce etc. and protein up to 5% in Koree and 9 to 22% in Carroll by weight of the fuel. The fuel as taught by Koree, contains gums, fats and waxes admixed in proportions very close to proportions of these ingredients in the dried tobacco plant.

The feature of a "modified carbohydrate" fuel now claimed in claim 1 is not deemed to provide a patentable difference in view of the Carroll disclosure of a carbohydrate base, modified by a treatment such as water and solvent extraction.

The features set forth in the dependent claims 2 to 6 and 10, relating to the combustible material and claims 7 to 9, relating to the proteins are not deemed to bestow patentability on the subject matter of claim 1 in view of the state of the already known art exemplified by the cited references and acknowledged in the preamble to the application.

The selection of specific compositions set forth in claims 2 to 10 is not deemed to be inventive, but rather within means and possibilities of a man skilled in the art and knowing tobacco substitute fuels such as degraded cellulose or condensation products described in applicant's earlier British patent 1,113,979 and Canadian 907,452, both acknowledged on page 3 of the specification

The applicant in his response dated Nov. 20, 1973 stated (in part):

Of the two citations, Koree can be readily dismissed. The patent fails to mention protein at all. The limiting figure of "up to 5%" is applied to amino acids (e.g. glycine) which are much simpler compounds than proteins, amino acids being the units of which protein molecules are constructed. However, proteins and amino acids are not equivalent in their effect on smoke flavour. Finally, Koree does not disclose any of the modified carbohydrates now found in amended Claim 1. The Examiner is referred in this respect to the foot of column 1 of the patent.

The Carroll patent also does not disclose the modified carbohydrates of amended Claim 1. The Examiner is referred to column 1, lines 62-70 of the patent. The treatment given by Carroll to lettuce leaves, etc. is merely on extraction to remove soluble matter and leave a residue of cellulose and nitrogen compounds.

Thus, neither the Carroll nor Koree references describes the smoking mixture of amended Claim 1 and the Examiner's objection to Claim 1 on the ground of anticipation would appear to fail. As Claim 1 is novel and all the subsequent claims are dependent thereon, it follows that all of these claims are also novel.

Turning now to the objection based on lack of invention, Applicant considers that the Koree reference is not directly relevant, because it does not disclose smoking mixtures comprising carbohydrate and protein.

Thus, Applicant will consider the objection with reference to the Carroll U.S. Patent No. 3,369,551, only.

...

> The mixtures claimed in the amended claims are not the equivalent of the mixtures disclosed in U.S. Patent No. 3,369,551 because they have to be made by quite different methods. They are not obtainable by extraction of any naturally occurring material. Instead it is necessary to carry out a chemical reaction upon a pure carbohydrate, giving a product which is no longer a carbohydrate, and then to mix the product with pure protein.
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> ...
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> Thus the cigarette containing the thermally degraded cellulose was technically superior to that containing cellulose, thus justifying the Applicant's contention that the amended claims define a patentable invention. The prior art fails to suggest any reason why protein should be mixed with the modified carbohydrates and the technical advance is totally unexpected.
>
> It is also noteworthy that the inclusion of small amounts of protein in smoking mixtures based on the modified carbohydrates does not significantly affect the smoke yield of chemicals which are known to have an adverse effect on health. Thus a comparative analysis of cigarette smoke from a smoking mixture comprising thermally degraded cellulose and from an otherwise identical mixture containing fat-free casein showed that the yields of hydrogen sulphide, carbon dioxide, carbon monoxide, total volatile matter, phenols, formic acid, acetic acid and acetaldehyde were not significantly different. There was a slight increase in hydrogen cyanide and acrolein in the smoke from the casein-containing mixture, but this was insignificant compared with the larger amounts of these chemicals in tobacco smoke.
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> On this basis Applicant contends that the smoking mixtures presently claimed, being undoubtedly novel, are also inventive since the prior art fails to suggest them and their properties are advantageous compared with the prior art type of mixture.

We note that in the art cited, the Koree patent relates to a tobacco substitute comprising bagasse fibres. The use of a sugar cane bagasse is preferred because it simulates the taste, aroma and burning characteristics of natural tobacco. It has a chemical composition in respect of such non-volatile ingredients as cellulose, gums, fats and waxes which is very close to the proportion of these ingredients in the tobacco plant. After extraction of the sugar cane juice the bagasse is processed by washing, disintegrating, digesting, beating and finally sheeting. At the sheeting stage a composition to simulate taste, aroma and colour of natural tobacco is added.

The Carroll patent relates to a tobacco substitute manufactured from a residue of treated leafy plants such as lettuce, cabbage, broccoli etc. These are treated with appropriate additives to provide taste, aroma and flavour. In order to obtain this residue the leaves are subjected to a water extraction phase for leaching out salts and other water soluble ingredients. This is followed by a drying stage to attain the desired moisture content, and the dried produce is then placed in a controlled humidity atmosphere. The nitrogen content of the product can be increased by applying anhydrous ammonia to the extracted leaves prior to the drying operation. Next a two phase organic solvent extraction process is used to remove the oily and oil soluble constituents from the leaves. Heat is then applied to remove the residual solvent and the dried material is then toasted to a golden brown color. Treatment with appropriate additives such as flavoring, humectants, aroma and burning aids is done at this time.

The question to be decided by the Board is whether the applicant has made a patentable advance in the art. As previously mentioned this application relates to a substitute smoking mixture suitable for cigars, cigarettes and smoke pipes. It is composed of an organic combustible material to which is added a protein constituent in the ratio of 1:1 to 1:60. Other ingredients which are normally used in smoking mixtures to impart desired physical properties and burning characteristics are also added. Claim 1 as now proposed by the applicant reads:

> A tobacco substitute-based smoking mixture comprising protein and, as smoke-producing fuel, a modified carbohydrate selected from thermally degraded carbohydrates oxidised carbohydrates, carbohydrate ethers and solid condensates produced by acid- or base-catalysed condensation of a compound of the formula $R^1COCH_2.CH_2.COR^2$(I) (or a precursor thereof), wherein R^1 and R^2, which may be the same or different, each represents a hydrogen atom, or an alkyl, hydroxyalkyl or

> formyl group, the amount of protein to smoke-producing fuel being in the weight ratio range of from 1:1 to 1:60.

In the Koree process the bagasse fibres are digested with sodium hydroxide or sodium sulfide for about 2 hours at 100°C. This places it in the category of a "modified carbohydrate selected from the group including thermally degraded carbohydrates" as specified in applicants claim 1. Koree shows that the additive composition for imparting taste, color, aroma etc. to the bagasse constructed leaf does contain up to 5% amino acid (glycine). While amino acids are fundamental structural units in complex protein molecules, the two are not equivalent. Therefore we conclude that a protein is not shown in the Koree patent, and for that reason it is inadequate as a reference.

In Carroll the toasting of the dried material to a golden brown color does produce a "modified carbohydrate" which is a "thermally modified carbohydrate." Carroll states that treating the water extracted leaves with anhydrous ammonia prior to drying increases the nitrogen content of the product. Proteins however are "compounds of large molecular weights and contain carbon, hydrogen, nitrogen and with few exceptions sulphur also." The addition of anhydrous ammonia is not the same as the addition of protein to the product.

In column 6, lines 64 to 75, the Carroll patent states:

> There is thus described specific extraction procedures and additive compositions whereby the principles of the present invention are effected, to produce from leafy vegetation a tobacco substitute for smoking and chewing products. As has been indicated previously, on following these procedures, the base material, prior to treatment with the additives, is composed essentially of protein and related nitrogen compounds, and carbohydrates. Analysis of typical products produced in accordance with these procedures shows a composition of 9%-22% protein and related nitrogen compounds, 76%-90% carbohydrates, and 1%-2% plant acids and salts.

This shows that the proportion of protein to carbohydrates (1:5 to 1:10) is in a range similar to that proposed by the applicant. However the applicant adds protein to the carbohydrates after modification in order to obtain the desired features of filling power, taste and after taste. In his example #26 the applicant shows the use of enzymatically hydrolysed lettuce leaf sprayed with 0.2 parts of casien protein in 10 parts of aqueous ammonia to provide his improved product.

One important factor in the economics of cigarette manufacture is the "filling" power of the mixture. Applicants disclosure indicates that the addition of protein to the mixture after modification gives a better "filling" power than mixtures not so treated. Neither reference shows the addition of protein to the mixture contemplated by the applicant. This addition, according to the applicant, gives a new and improved result which is superior to that previously used. There is no reason apparent why we should disagree with the applicant on this point.

Another important factor is flavour. As the flavour of the product is an elusive quality unpredictable in advance, it may well be that the addition of protein to certain modified carbohydrates after modification imparts special properties making them acceptable as tobacco substitutes. On this point too, we feel we should take the applicant at his word.

It will, of course, be necessary for the applicant to restrict his claims to such compositions as he has properly disclosed which produce such improvement, and also to avoid the prior art disclosed in Carroll. In doing so it will be essential to limit the smoking mixture to those compositions recited in proposed claim 1. It will also be necessary to indicate that the protein is added to the smoking mixture after the carbohydrates have been modified (in order to avoid the Carroll reference).

We agree that the rejection of the claims presently on file as made by the examiner was proper, since those claims do not contain such limitations. We are also satisfied that the proposed amendments do not go far enough. If, however, the applicant adds to them the further limitations indicated above, the application should be allowed to proceed. The broadest claim would be acceptable if it read:

> A tobacco substitute smoking mixture comprising as smoke-producing fuel a modified carbohydrate selected from thermally degraded carbohydrates, oxidised carbohydrates, carbohydrate ethers and solid consendates produced by acid or base-catalysed condensation of a compound of the formula $R^1COCH_2CH_2.CDR^2$ (or a precursor thereof) wherein R_1 and R_2, which may be the same or different, each represents a hydrogen atom, or an alkyl, hydroxyalkyl or formyl group, to which is added a protein in the weight ratio of from 1:1 to 1:60.

We recommend that the claims on file and the claims now proposed by the applicant be refused, but that if the applicant amends the claims as we have suggested the application be allowed to proceed.

Gordon A. Asher,
Chairman,
Patent Appeal Board.

I concur with the findings of the Patent Appeal Board and refuse all the claims. The applicant has six months with which to submit the proposed amendment, or to appeal this decision under the provisions of Section 44 of the Patent Act.

Decision accordingly,

A.M. Laidlaw,
Commissioner of Patents.

Dated at Hull, Quebec
this 27th day of
November, 1974.

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