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UNION OF INDUSTRIAL ESTABLISHMENTS, CHAMBER OF COMMERCE AND INDUSTRY
VISIT TO FABRIQUES DE TABACS REUNIES, SERRIERES (NEUCHÂTEL)

18TH DECEMBER, 1959

Present on behalf of B.A.T.

J. B. Lynham, Esq.) (Extension Suisse)
J. Kendrick-Jones, Esq.)
Dr. D. G. Felton) R. B. D.E.

The visit was made, in conjunction with other members of the 'Association Suisse des Fabricants de Cigarettes', to attend a demonstration by Drs. Neukomm and Bonnet of the prototype of their machine for the treatment of tobacco. Those attending on behalf of the member Companies were mainly technical or manufacturing executives: Mr. Cottler (President), M. Schurch (Director of F.F.R., Serrieres) and Mr. Lynham were the only persons present who normally attend Association meetings. Others present included M. Matthey (Cantonal Chemist, Vaud), certain Cantonal Councillors and representatives from Baumgartner (firm of papermakers and filter manufacturers). Apologies for absence were received from Dr. Utan (Federal Chemist), Professor Rutter (Federal Analyst), and one or two others.

Background to the Meeting

Dr. Neukomm and his assistant, Dr. Bonnet, had been in receipt of a research grant from the Association to investigate the chemical and biological properties of cigarette smoke. In the course of this work, Neukomm and Bonnet claimed to find carcinogenic properties in several fractions of cigarette smoke, notably in the polycyclic hydrocarbon fraction, in the aliphatic fraction and in the brown polymeric fraction. Following this and other leads provided by Wynder, Lam and others, Neukomm and Bonnet investigated the effect of extraction of tobaccos by organic solvents, e.g. carbon tetrachloride and other similar low-boiling non-inflammable solvents. As a result, they filed patents in a number of countries (Belg. Pat. 566,664 is an example) covering the treatment, and approached the Association for

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support in development.

After discussions, a grant was made towards the expenses of development and apparently facilities were afforded Neukomm and Bonnet by F.T.R., largely through the agency of M. Schurch. The Association also secured an option on the process and machine by payment of a second sum to Neukomm.

The writer has already commented on Belg. Pat. 566,564 and addressed the Association on the general problems of ensuring that cigarette smoke after treatment is "safe". At that time, it seemed clear that Schurch was more enthusiastic than many of the other members and appeared to know more than the Patent disclosed e.g. the possibility of a treatment with an organ-metallic catalyst subsequent to extraction.

Preliminary Talk

When the members were all assembled, M. Schurch introduced Dr. Neukomm who read a prepared statement. This was in the nature of a general talk on the background to the problem of smoking and health and throughout consisted of scarcely-veiled threats of what might be the consequences of neglecting to follow the advice he was giving. Thus he made the following points:-

- (a) Lung cancer rates in Switzerland were rising, the rise paralleling the consumption of tobacco and especially cigarettes.
- (b) Cigarette smoke had been shown to contain fractions, proved to cause malignancies in animals.
- (c) Cigarette smoke also had been shown to contain a number of polycyclic hydrocarbons, which were carcinogens and, therefore, it was logical to conclude that these were the causative agents of lung cancer.
- (d) In inviting the members of the Association to the demonstration, Neukomm had not invited the Press, because publicity was always given to this subject by journalists and the public were, therefore, liable to become a pressure upon

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the manufacturers.

(e) He then proceeded to outline the process which he and Bonnet had elaborated in the laboratory. Basically, it was the extraction of cut tobacco with a solvent, with or without a subsequent treatment with an organo-metallic compound. This resulted in a product which gave greatly reduced amounts of tar, polycyclic and aliphatic hydrocarbons.

(f) Neukem then read from the report by M. Matthey (Cantonal Chemist of Canton Vaud). In outline this stated that tar was reduced by 2%, polycyclic hydrocarbons (exemplified by 3:4-benzopyrene, pyrene and anthracene) by 5%, aliphatic hydrocarbons (waxes) by 8%. Nicotine was reduced by 10%, only for Maryland tobacco; there was no reduction in smoke nicotine for Virginia, oriental or American-type blended cigarettes. He also read from a report by Prof. Finzer (?), the Federal Analyst which stated that the treatment conferred no acute toxicity to the tobacco or smoke.

(g) In designing the machine, he and Bonnet had been guided by the need for continuous operations such that would fit into a processing line. The present prototype was designed to process 15-20 Kg cut tobacco per hour. They envisaged the next step to be an expansion to a machine capable of processing 100 Kg per hour, and based on their present knowledge, this would cost S.F. 10,000. The usage of solvent was 7 Kg per 100 Kg tobacco processed, representing a cost of S.F. 9.00. Power consumption was 25 kWh. for the prototype machine. Their calculations led them to believe that the treatment would add 1/10th centime to the price of 20 cigarettes. Different machine settings would be needed for different blends and types of tobacco and they had considered that a number of machines would need the varied needs of individual factories.

No questions were invited at this stage and the meeting adjourned to a

lead to a cost of only 5 S.F. for 100 Kg of tobacco

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nearby outhouse in which the prototype was installed and where Dr. Bonnet gave a further description and demonstration.

Demonstration

The prototype machine consists of a rectangular box, approximately 15 ft. long, 4 ft. 6 ins. wide and 6 - 7 ft. high, surmounted at the beginning by two solvent reservoirs rising to 10 or 11 ft. The machine is divided into three sections and there is a separate control panel fitted with starter buttons and neon-indicators and connected to the machine by a number of cable leads.

First Section

This is the part surmounted by the two reservoirs. Tobacco is fed by a hopper onto a perforated belt, approx. 10 inches wide, the rate of feed being controlled by hand so that a continuous bed of tobacco about two inches deep was formed by a rubber scraper closing the hopper exit. The belt travelled very slowly, almost imperceptibly (say 1 - 2 inches per minute maximum). The belt and tobacco were visible throughout this section through a glass inspection panel. The tobacco was subjected to sprays of liquid over a distance of about 1½ - 2 ft., so that it became thoroughly wetted. A removable panel beneath the belt, in the spraying zone, concealed a number of collecting funnels fitted with wire gauze filters. The outside of the funnels was covered by white and brown incrustations, which turned out to be a feathery ice formation, indicating that this section was probably under reduced pressure, and that some leakage of solvent was occurring. The solvent employed was said to be methylene chloride; a number of canboys labelled thus were greatly in evidence and superficial examination of the spraying liquid tended to confirm this.

After the demonstration, the meeting inspected the machine and, by questioning Dr. Bonnet, Mr. Kendrick-Jones and the writer elicited more information than was disclosed at first. The solvent extraction is in two stages. The first section consists in a simple recirculation, the solvent recovered being pumped back to the

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reservoir and thence back to the tobacco. It, therefore, soon becomes saturated with extracts. The second stage is in the nature of a rinse and the extract is fed to a still at the back where it is distilled through a condenser and back to the reservoirs. Distillate is supplied to the first reservoir in order to maintain the volume constant, and fresh solvent is added to the second stage as "make-up". It is apparently, this "make-up" volume which amounts to 7 Kg per 100 Kg/hr of tobacco, and this represents a 5% loss (but see below). Thus 140 Kg of solvent would appear to be used per 100 Kg of tobacco and this is continuously recirculated. Heat for distillation is supplied electrically in the present prototype.

Second Section

This is surmounted by eight dial gauge thermometers, indicating temperatures variously from 25 to 55°C. The points of temperature measurement were not indicated. The meeting was informed that this section could not be revealed. It apparently contained a type of bands feed and was said to be essential for the regular feeding of the tobacco to the drier section. The second section was also surmounted by a large insulated pipe, similar to the six on the third section (see below) and one likely guess is that a certain amount of drying takes place in this. Otherwise, it is difficult to see why there needs to be further control of the feed of tobacco, other than that in the first section. The rear of the second section is occupied, apparently, by an intake fan and thermostatically controlled air heater.

Third Section

This section, like the first, is provided with an inspection window, running the length of the section and revealing the tobacco spread out on another very slowly moving perforated band. This section also has six insulated pipes arching above it which blow hot air down on the tobacco and through the belt, thereby carrying away the solvent. This air is finally exhausted via a large pipe outside the building. There is no recuperation plant attached to the prototype and the solvent removed from

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the tobacco is lost to the air. The calculation of loss of 5% of the solvent used was said, by Neukom, to be based upon a machine provided with a recuperation unit such as is used by e.g. dry cleaners; but a representative of F.T.R. (the nephew of Schurch) stated that 5% of the solvent used was added as "make-up". Bonnet was questioned assiduously on this point, but succeeded in misunderstanding the question every time! A further ambiguity, at this stage, was whether or not steam was employed. Bonnet maintained that steam was not used; the air was heated electrically, the heating being adjusted thermostatically to maintain the first two air blasts hotter than the next two, which in turn were kept hotter than the last two, e.g. 50°, 45°, 30° or 55°, 45°, 35°. Water was added by spray, at a controlled rate, to the third blast, to maintain the tobacco in condition. On the other hand, Schurch's nephew (Walter?) stated that low pressure steam was used in conjunction with air to remove the solvent while maintaining the tobacco in condition. No steam lines led to the machine and Walter (?) stated that steam was generated within by electric heating.

The tobacco left the machine at the end of the perforated band and fell into a skip. There was no perceptible odour of solvent clinging to the product but there were a number of wet-spots in the rag, which would appear to confirm that water was used in accordance with Bonnet's explanation rather than that of Walter. There was no evidence of steam, or of condensation, anywhere in the visible channel.

Further Information

The writer enquired from Mr. Bonnet whether an organo metallic compound was being added and, if so, where. Bonnet replied that he regretted he could not reveal anything about this aspect, which was secret.

Later, Walter said that, of course, an organo metallic compound was added and implied this was in the mid-section. Walter is a voluble young man, who speaks good English but who gave the writer the impression he is one of those people who always

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wish to represent themselves as being "in the know". Mr. Lynham reported that he had heard that Wiltz had been eased out of F.T.R. and was now associated only with HORAC, the organization making homogenised tobacco, and this tends to confirm the writer's previous assessment of Wiltz.

A sample of the treated tobacco, obtained by Mr. Lynham, was made into a cigarette and smoked. Mr. Lynham and Mr. Kendrick-Jones believed they could detect a metallic aftertaste at the back of the throat, but to the writer, unaccustomed by Maryland tobaccos, it seemed no different from that of a normal "Mary Long", "Brunette" or "Marocaine". A second sample has been brought back to R. & D.E.

After the demonstration, discussion with H. Matthey elicited the facts that the sample cigarettes, which formed the basis of the report given by Neukorn, were smoked on a Staub-pattern machine at two puffs per minute, each puff being of 25 ml volume and 1.6 secs. duration; the butt length was 11 mm. Results were reported per 100 g tobacco smoked, thereby eliminating the effects of variable cigarette weights. Polycyclic hydrocarbons e.g. anthracene, pyrene and 3,4-benzopyrene, were estimated by ultra-violet spectrophotometry following chromatography on alumina. It was suggested to Matthey that it would be interesting to see his report in detail and he replied, somewhat unhappily, that he had been paid for the work and the report was no longer his property; in other words, it is now Neukorn's to disclose as he sees fit. What was not established was whether Matthey's sample cigarettes, which he tested, came from tobacco processed on the machine or from tobacco processed in the laboratory by Soxhlet extraction. This clearly needs to be clarified.

A number of practical difficulties, which occurred to Mr. Kendrick-Jones and the writer, were referred to Dr. Bonnet, namely, did the solvent sprays wash shorts and tobacco offal-dust through the perforated belt, what happened to casing applied to the tobacco before cutting, what was the loss in weight of the tobacco due to removal of waxes, what was the change in filling power? To all these questions

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Dr. Bonnet answered with a shrug of the shoulders. They had not found any tobacco or dust being washed away by the solvent. They supposed that dust would be blown away through the air exit pipe from the third section, but they had not attempted to collect it or determine the loss in weight. They had processed one batch of "Marlboro" rag (manufactured under license by F.T.R.) but had not detected any loss in casing, and a panel of taste-experts had disagreed on whether or not there was a difference in taste. Maltz pointed out that, in the agreement between the Association and Neukomm, no direction was given that the treatment must have no deleterious effect on taste. Bonnet adopted the attitude that it was up to the manufacturers to tell them how the machine should be modified and tested; Bonnet and Neukomm had merely shown how the process could be carried out continuously. He had no idea of how large a unit would be for processing 100 Kg per hour of tobacco, but suggested a wider band could be employed.

General Impressions and Observations

Mr. Kendrick-Jones reported that a number of the engineers and manufacturers present were scathing in their comments on the prototype as being unrealistic in terms of the size of their operations. They resented the air of secrecy surrounding it and looked upon the demonstration as being rather a waste of their time.

It is clear that Bonnet and Neukomm have moved away from their process as outlined in Belg. Pat. 560,684. This document described the process in terms of dipping the cut tobacco sheet in a liquid solvent slowly flowing in countercurrent. They have now abandoned this, in favour of spraying. As at present arranged, the initial spray circuit will only remove waxes until the solvent is saturated and it is clearly possible for tobacco to leave the first spraying zone bearing a net weight of waxes greater than it carried into the zone. Despite the great air of secrecy, and notwithstanding Maltz's comments, the writer formed the opinion that no

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organo-metallic compound was being added. Schurch probably knows the answer.

The next stage is that the Association has three months to discuss the matter and to decide whether to proceed further with it. It is understood that it was originally agreed that the Association as a whole had the option on the process and machine, but what is not clear is whether, in the event of the Association turning down the idea, the individual members are precluded by the terms of the agreement from adopting it for themselves alone. Mr. Lynham could not remember and consulted Mr. Cottler who had also forgotten. The information should be on file somewhere, however. F.T.S. and especially Schurch are clearly interested; since they have provided space and materials for the development and have assisted, to the extent of designing the Panda-type regulator in the second section, they know more than do other Association member firms.

In Neukom's opening address there was the implied threat that if the Association did not proceed with the matter, he would give a demonstration to which the Press would be invited. It is not hard to envisage what the reaction would be when reporters are confronted with a machine, gleaming with fresh paint, and flashing with neon indicators, dial thermometer gauges and all the other flim-flam. Feasibility, rate of throughput and the basic uncertainty of knowing whether or not benz-pyrene is a causative agent could all be swept to one side in the face of the analysis from the Rational Chemist.

Mr. Lynham had understood that member companies would have the opportunity of processing small quantities of their blends through the machine. No mention of this was made at the meeting. Some such arrangement should be sought, however, if only to determine the results actually obtainable and to check Matthey's analysis. Probably the amounts which would be processed would be insufficient to determine other important factors such as loss of shorts, loss of casting, effect on filling power etc.

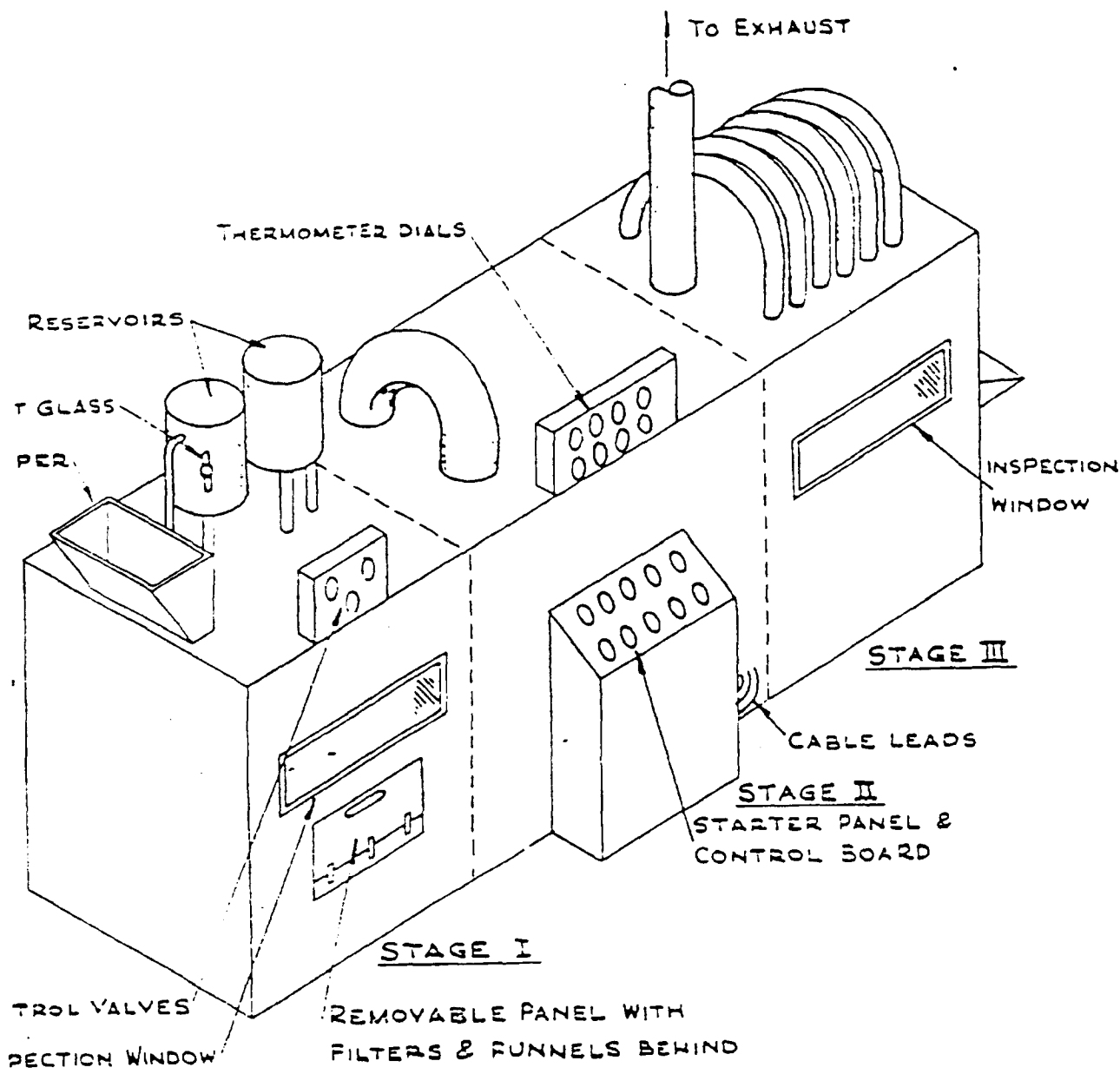
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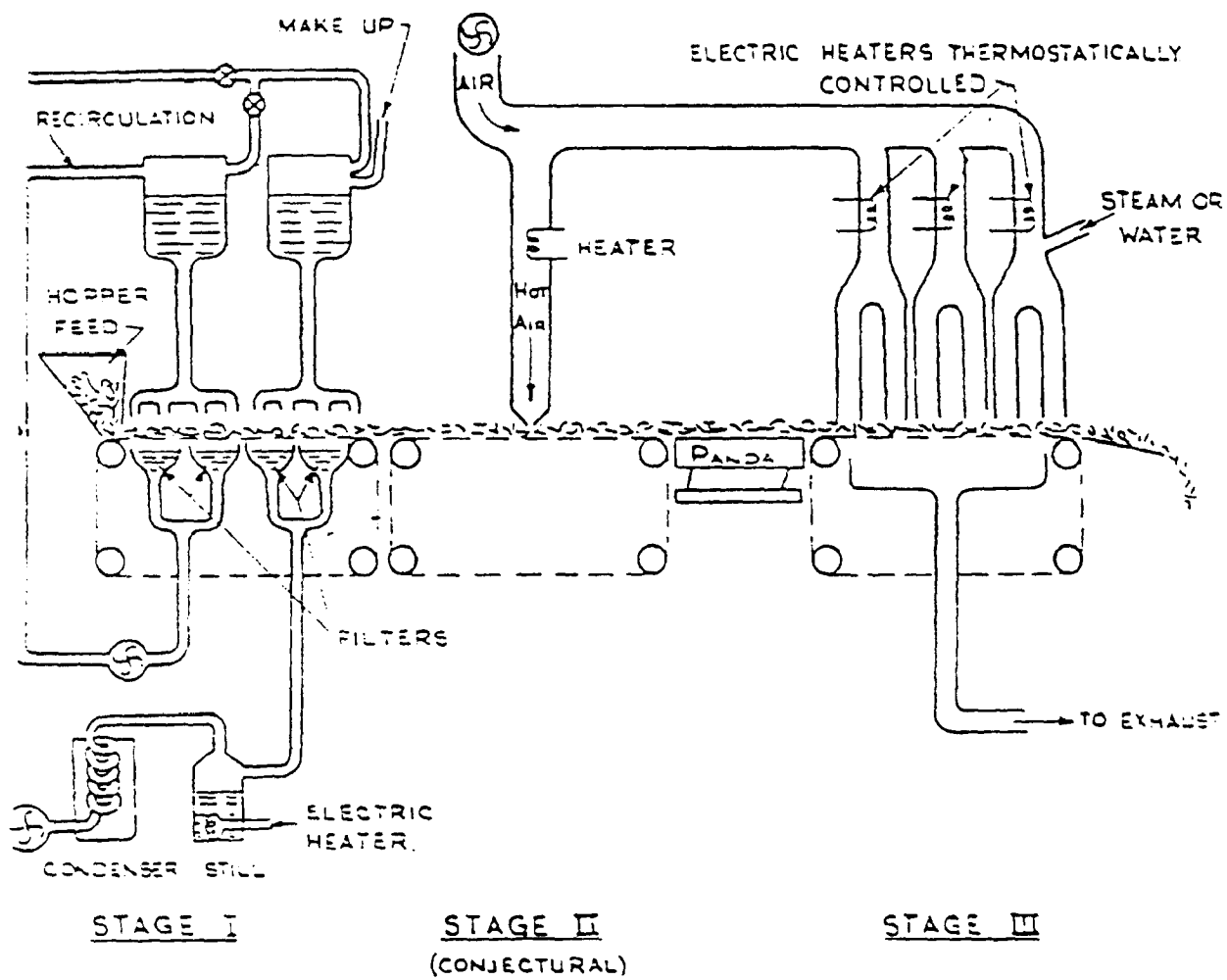
The fear remains that, by publicity, pressure could be brought to bear on the Federal Authorities who could legislate to compel manufacturers to process their tobacco by some such extraction process. Koukoms will play upon these fears and threaten pressure and publicity unless his claims can be refuted or his chain of evidence attacked at its most vulnerable point. In view of his claims to have reduced some of the carcinogenic fractions by larger percentages than the reduction in whole tar, the tar from his extracted cigarettes should show reduced potency per gram. He has not, as yet, produced unequivocal evidence that weight for weight his tar from extracted cigarettes is less carcinogenic or co-carcinogenic than tar from unextracted cigarettes.

The manufacturers should be able to withstand the pressure by calling for independent evidence of this and by demanding a more detailed knowledge of the process and especially of the organo metallic catalyst. The argument that no-one could be expected to sell cigarettes bearing a substance of unknown nature, effect or efficacy would appear irrefutable.

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