

12

**EUROPEAN PATENT APPLICATION**

published in accordance with Art. 158(3) EPC

21 Application number: 80902181.9

51 Int. Cl.<sup>3</sup>: **A 24 F 13/04**  
**A 24 F 13/06, A 24 F 1/02**

22 Date of filing: 11.11.80

Data of the international application taken as a basis:

86 International application number:  
PCT/JP80/00280

87 International publication number:  
WO81/01356 (28.05.81 81/13)

30 Priority: 15.11.79 JP 157553/79

43 Date of publication of application:  
25.11.81 Bulletin 81/47

84 Designated Contracting States:  
DE FR GB SE

71 Applicant: **JAPAN SPECIAL-HIGH TECHNIQUE  
RESEARCH INSTITUTE CO., LTD.**  
Room 66, Tokyu-Skyline Bldg., 21-6 Dogen-zaka,  
1-chome Shibuya-ku  
Tokyo 150(JP)

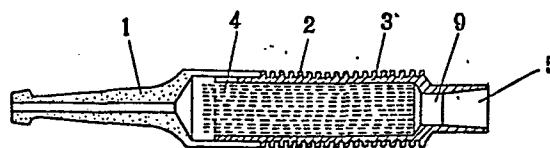
72 Inventor: **KAWAMURA, Masaya**  
Room 701, Yorin-dai, 47-8  
Den-en-chofu, 2-chome Otaku, Tokyo 145(JP)

74 Representative: **Lambert, Hugh Richmond et al,**  
**D. Young & Co. 10 Staple Inn**  
London WC1V 7RD(GB)

54 **DEVICE FOR PURIFYING TOBACCO SMOKE.**

57 A device for removing noxious substances in the smoke of tobacco in a cigarette holder or pipe, including cooling fins (2) formed on the outer periphery thereof, a front flue portion (9) for accomodating a fibrous substance (4) such as tissue paper or the like therein, and a metallic cylinder (3) having a cooling chamber of an inner diameter larger than that of the flue portion (9). The device is telescopically inserted into a mouthpiece (1), and is adapted to abruptly cool tobacco smoke owing to the cooperative action of heat dissipation by the cooling fins and the adiabatic expansion of the smoke upon flowing into the cooling chamber from the flue portion. As a result, noxious substances in the smoke, such as nicotine and tar, are condensed and allowed to adhere to the fibrous substance in the cooling chamber for effective removal.

Figure 1



## SPECIFICATION

## 1. TITLE OF THE INVENTION

Device for Purification of Tobacco Smoke

## 5 2. DETAILED DESCRIPTION OF THE INVENTION

With the objective of eliminating the noxious substances such as tar and nicotine in cigarette smoke, various cigarette holders or filters have heretofore been designed. However, in all of them, the elimination of noxious substances is mostly ineffectual and practically  
10 minimal at the most.

In this respect, it is the object of this invention to provide a smoke purifier which affords exceptionally efficient eliminative results.

In its basic form as illustrated in Addendum 1, Figure 1, to the  
15 fore of the mouthpiece (1) there is provided a metallic cooling-chamber tube (3) approximately 30-50 millimeters in length and with an inside diameter of approximately 10-20 millimeters, with outer cooling fins (2). The front end of the cooling-chamber piece is provided with a socket for a cigarette thus making the assemblage a cigarette holder  
20 whereby, as shown in Figure 2, a cigarette (6) is inserted and smoked; or, as shown in Figure 3, a bowl (8) with a combustion chamber (7) is attached and the assemblage used as a tobacco pipe.

As to its usage, referring to Figure 1 to identify each part, the mouthpiece (1) is detached and the cooling tube (3) is filled with 1-2  
25 sheets of Kleenex-type tissue paper or a like volume of some such fibrous material (4). The mouthpiece is then reattached. When a cigarette is inserted and smoked, the smoke flows through the flue (9), enters the cooling tube (3) wherein it is cooled by adiabatic expansion while, with the effect of the cooling fins (2) on the exterior surface  
30 of the cooling tube, exterior cooling is also attained. Consequently, noxious substances, such as tar and nicotine, present in the smoke in gaseous or atomized form, condense and adhere to the fibrous material (4) in the cooling chamber. It was found that the smoke which then emerges from the mouthpiece is extremely cleanly purified.

35 With respect to this purifying action, a point of special note is that the noxious substances in the smoke are not just filtered by the fibrous material but that the smoke which passes through the flue (9) is adiabatically expanded in the cooling chamber whose diameter is

larger and pressure lower than that of the flue section. Concurrently, by means of the cooling fins (2), the smoke is cooled from the outside. These reactions convert gaseous noxious substances contained in the smoke to fine liquid particles which join with those noxious substances in atomized form initially present in the smoke. Because the fibrous material is placed at the point of this cooling process, an exceedingly effective condensation and trapping of noxious substances occurs.

As proof of this, when the fibrous material (4) used in this device is taken out and examined after several cigarettes have been smoked through it, the material is, of course, colored a dark brown but a large amount of volatile noxious substances is trapped in the material and the odor given off is extremely foul. In contrast to this, when cigarettes are smoked without any device or with hitherto available cigarette holders or filters, this foul-smelling noxious substance is not at all trapped but is sucked in directly by the mouth and congeals on or is absorbed by the lungs, windpipe, lips, palate, tongue, and saliva; with horribly harmful consequences to physical health.

Incidentally, in applying this invention to a cigarette holder, as shown in Figure 2, the fins (2) may be omitted and a plain metal tube may be utilized, whilst it is also possible to manufacture it with synthetic materials. However, although such measures might reduce the manufacturing costs, concurrent reduction of condensation and elimination cannot be avoided.

In the foregoing respect, the conditions are identical in the case where, as shown in Figure 3, the usage is for a tobacco pipe.

Furthermore, because the fibrous material, such as tissue paper, which is used in the cooling tube (3) can be any such material readily available and easily replaceable, the cost of replenishment is close to nil. It is also a great advantage that the inconvenience and waste due to frequent and inevitable purchases of replacement cartridges for heretofore available holders and filters become quite needless.

As set forth, by means of an extremely simple method, a highly effective device for the purification of tobacco smoke can be provided, and, as a consequence of which, an immense effect can be made on hygiene.

### 3. SIMPLE EXPLANATION OF DRAWINGS

Figure 1 is a cross-sectional plan view of a smoke purification device per this invention.

Figure 2 is a plan view of an application of this invention in a

cigarette holder.

Figure 3 is a partially cross-sectional plan view of an application of this invention in a tobacco pipe.

- |   |                         |                  |                              |
|---|-------------------------|------------------|------------------------------|
| 5 | 1....mouthpiece         | 2....cooling fin | 3....cooling-chamber<br>tube |
|   | 4....fibrous material   | 5....socket      | 6....cigarette               |
|   | 7....combustion chamber | 8....bowl        | 9....flue                    |

10

15

20

25

30

35

## CLAIM

A device to purify smoke, comprising the special features, to the front of the mouthpiece, of a cooling chamber with an inside  
5 diameter of approximately 12 millimeters and with a capacity for lightly accommodating fibrous material equivalent to about 1 - 2 sheets of Kleenex-type tissue paper; of a socket at the front end of the cooling chamber to accommodate a cigarette; and, to be used as a cigarette holder or, with a tobacco-burning bowl attached, to  
10 be used as a tobacco pipe; the afore-mentioned fibrous material to be changeable when soiled.

15

20

25

30

35

Figure 1

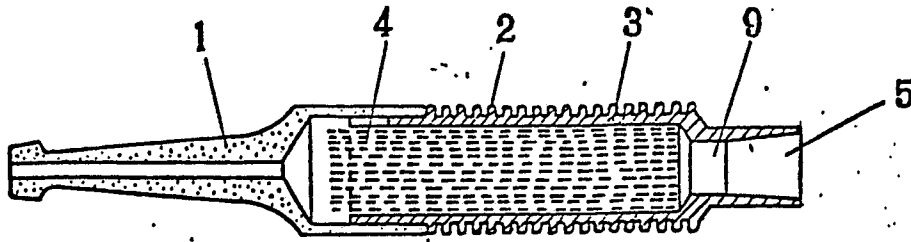


Figure 2

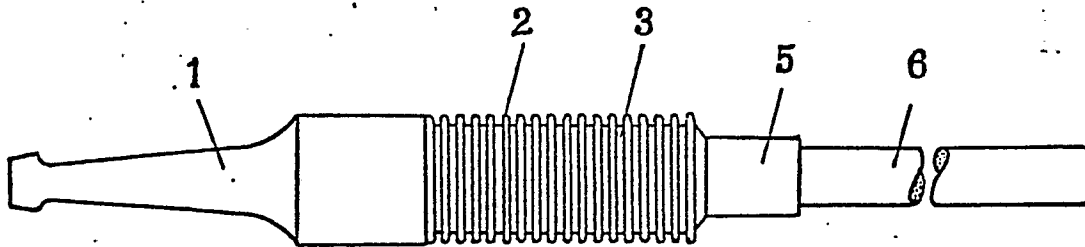
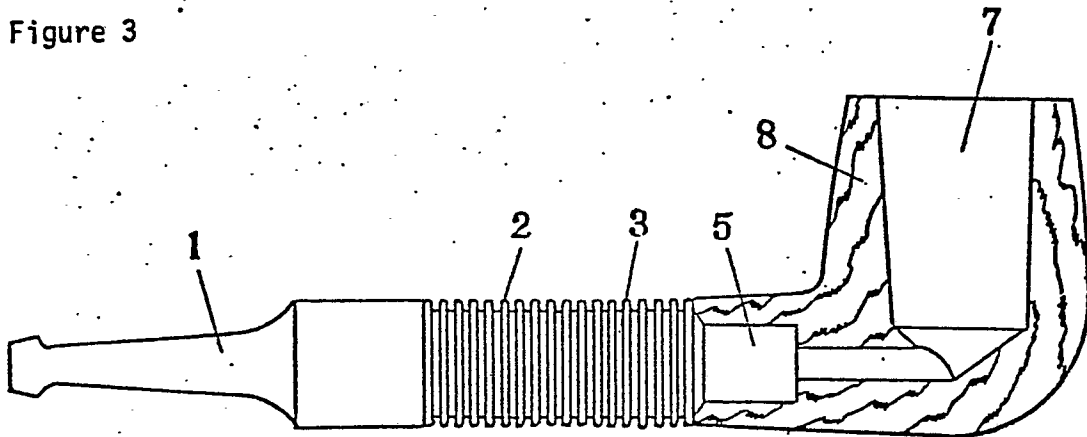


Figure 3



## INTERNATIONAL SEARCH REPORT

International Application No PCT/JP80/00280

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                |                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------|
| <b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                |                                     |
| According to International Patent Classification (IPC) or to both National Classification and IPC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                |                                     |
| Int. Cl. <sup>3</sup> A24F13/04, A24F13/06, A24F1/02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                |                                     |
| <b>II. FIELDS SEARCHED</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                |                                     |
| Minimum Documentation Searched <sup>4</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                |                                     |
| Classification System                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Classification Symbols                                                                                         |                                     |
| I P C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | A24F13/00, A24F1/00                                                                                            |                                     |
| Documentation Searched other than Minimum Documentation<br>to the Extent that such Documents are Included in the Fields Searched <sup>5</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                |                                     |
| Jitsuyo Shinan Koho                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1920 - 1980                                                                                                    |                                     |
| Kokai Jitsuyo Shinan Koho                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1971 - 1980                                                                                                    |                                     |
| <b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>14</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                |                                     |
| Category <sup>6</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup> | Relevant to Claim No. <sup>18</sup> |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | JP, Z1, 356053, 1946-8-2<br>Omori Takeo                                                                        | 1                                   |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | JP, Y1, 9-6114, 1934-5-12<br>Sato Umeji                                                                        | 1                                   |
| <p><sup>9</sup> Special categories of cited documents: <sup>15</sup></p> <p>"A" document defining the general state of the art</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document cited for special reason other than those referred to in the other categories</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but on or after the priority date claimed</p> <p>"T" later document published on or after the international filing date or priority date and not in conflict with the application, but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance</p> |                                                                                                                |                                     |
| <b>IV. CERTIFICATION</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                |                                     |
| Date of the Actual Completion of the International Search <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Date of Mailing of this International Search Report <sup>2</sup>                                               |                                     |
| February 11, 1981 (11.2.81)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | February 23, 1981 (23.02.81)                                                                                   |                                     |
| International Searching Authority <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Signature of Authorized Officer <sup>20</sup>                                                                  |                                     |
| Japanese Patent Office                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                |                                     |