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Paper II – Practical

(Exploitation of Patents – Drafting, Specification & Patent Writing)

Time: 2 ½ hours. **Full marks: 60**

INSTRUCTIONS TO CANDIDATES

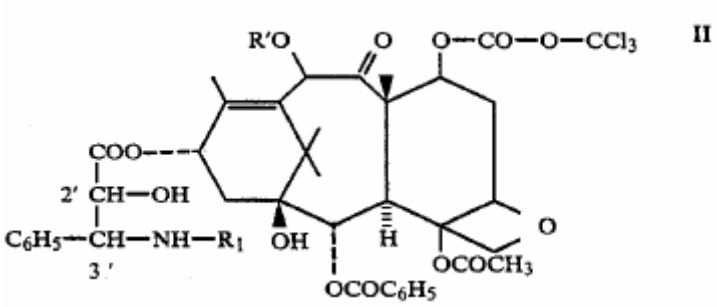
1. **The questions to be interpreted as given and no clarification can be sought from the invigilator.**

2. **The Figures in the question paper can be detached and used for your illustration of the Patent Draft.**

You are required to draft an US patent application with the following data and information. You are required to attempt either A or B (any one).

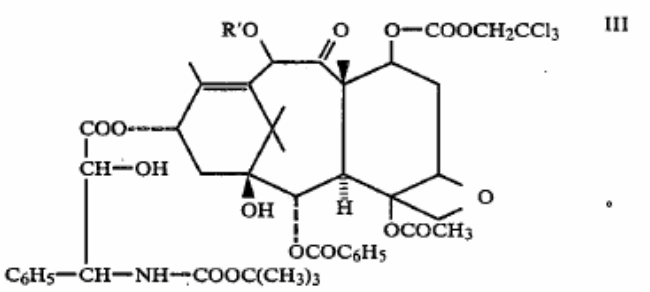
Option (A)

The present invention provides a process for converting baccatin III and 10-deacetylbaccatin III into taxol and 10-deacetyltaxol respectively, which have remarkable antitumour properties.
The conversion of baccatin III or 10-deacetylbaccatin III into the product of general formula:

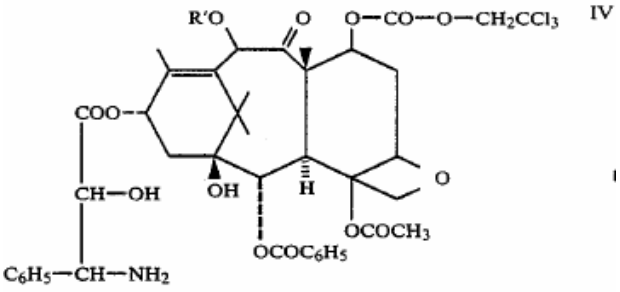


in which R' represents an acetyl or 2,2,2-trichloroethoxycarbonyl radical and R_1 represents an ethoxycarbonyl or paratoluenesulphonyl radical, is known, especially from V. Senilh et al., C.R. Acad. Sci. Paris, 299, series II, no. 15, 1039-1043 (1984). However, considering the complexity and the fragility of these products, it has not been possible until now to replace the substituent R.sub.1 with the benzoyl radical present in taxol and 10-deacetyltaxol.

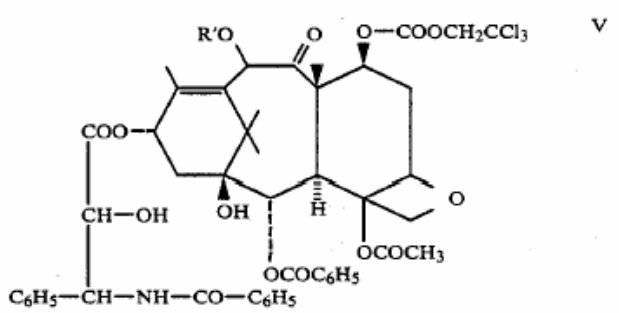
The process of the present invention for the preparation of taxol or 10-deacetyltaxol and their 2'S, 3'R isomers comprises reacting halotrialkylsilane with a compound of formula:



in which R' represents acetyl or 2,2,2-trichloroethoxycarbonyl, in an organic solvent to produce a product of formula:



in which R' is defined above, and reacting the said product with benzoyl chloride in the presence of an acid acceptor to produce a product of formula:



in which R' is as defined above, and then reacting this product with zinc in acetic acid to produce taxol (when R' in the starting material is 2,2,2-trichloroethoxycarbonyl).

The invention is based in part on the discovery that the compounds of formula III can be converted into products of formula IV in which R' is defined above, by reaction with a halotrialkylsilane such as iodotrimethylsilane, operating in an organic solvent such as acetonitrile at a temperature in the vicinity of 0.degree. C.

The product of formula IV is then converted into a product of formula V in which R' is as defined above, by reacting with benzoyl chloride at a temperature in the vicinity of 20.degree. C. and in the presence of an acceptor for acid such as pyridine.

The product of general formula V is converted into taxol or into 10-deacetyltaxol by replacing the 2,2,2-trichloroethoxycarbonyl radical(s) with a hydrogen atom, e.g. using zinc in the presence of acetic acid.
Taxol and 10-deacetyltaxol obtained by the process of the present invention may be purified by physicochemical methods such as chromatography.

The starting material of formula III exists in the form of stereoisomers (2'S,3'R and 2'R,3'S) from which taxol (2'R,3'S), 10-deacetyltaxol (2'R,3'S) and the 2'S,3'R isomers of taxol and 10-deacetyltaxol may be prepared.

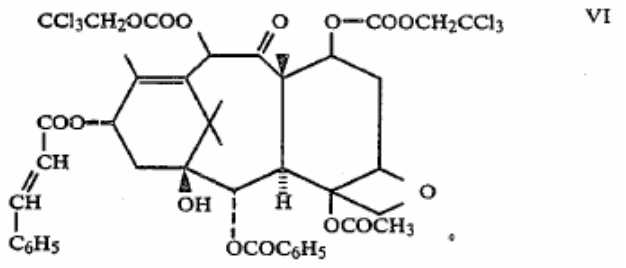
Iodotrimethylsilane (0.025 cc) is added, under an argon atmosphere and at a temperature of 0.degree. C. to a solution of the product of formula III (170 mg) in which R' represents a 2,2,2-trichloroethoxycarbonyl radical, in acetonitrile (5 cc). When the starting material has disappeared, methanol is added and the mixture is concentrated to dryness. The residue obtained is purified by silica thick layer chromatography, eluting with a methylene chloride:methanol (95:5 by volume) mixture. The product of formula IV in which R' represents a 2,2,2-trichloroethoxycarbonyl radical, with the following characteristics, is thereby obtained (yield=75%):
infrared spectrum: characteristic absorption bands at 3670, 3500, 3400, 2950, 1765 and 1735 cm^{-1} and
proton nuclear magnetic resonance spectrum ($CDCl_3$, 200 MHz, shifts in ppm): 1.18 (s, 3H): 1.25 (s, 3H); 1.85 (s, 3H), 2.01 (s, 3H); 2.31 (s, 3H); 2.56 (m, 1H); 3.89 (d, J=7, 1H); 4.16 and 4.34 (2d, J=9, 2H); 4.41 (broad s, 2H); 4.63 and 4.94 (2d, J=12, 2H); 4.81 (s, 2H); 4.96 (d, J=9, 1H); 5.58 (m, 1H); 5.69 (d, J=7, 1H); 6.19 (t, J=9, 1H); 6.28 (s, 1H); 7.47 (5H); 7.57, 7.69 and 8.18 (5H).

Benzoyl chloride (1 equivalent) is added to a solution of the product obtained above (30 mg) in pyridine (2 cc). The reaction mixture is stirred at ambient temperature until the starting material has disappeared. After hydrolysis, extraction is carried out with methylene chloride. After drying, filtering and evaporating off the solvent, the product of formula V in which R' represents a 2,2,2-trichloroethoxycarbonyl radical, with the following characteristics, is obtained in a quantitative yield:
infrared spectrum: characteristic absorption bands at 3560, 2440, 2950, 1765, 1740, 1730, and 1665 cm^{-1} and
proton nuclear magnetic resonance spectrum ($CDCl_3$, 200 MHz, shifts in ppm): 1.19 (s, 3H); 1.26 (s, 3H); 1.88 (s, 3H); 1.90 (s, 3H); 2.42 (s, 3H); 3.93 (d, J=7, 1H); 4.23 and 4.27 (2d, J=9, 2H); 4.63 and 4.94 (2d, J=12, 2H); 4.80 (s, 2H); 4.83 (d, J=2, 1H); 4.99 (d, J=9, 1H); 5.58 (m, 1H); 5.75 (d, J=7, 1H); 5.84 (dd, J=9 and J=2, 1H); 6.28 (s and t, 2H); 7.09 (d, J=9, 1H); 7.41-8.17 (15H).

The product obtained above is dissolved in acetic acid and zinc powder is added. The reaction mixture is stirred for 2 hours at 50.degree. C. and then filtered and concentrated to dryness. The residue is taken up with water and then extracted with ethyl acetate. The organic phases are concentrated to dryness. 10-Deacetyltaxol, the characteristics of which are identical to those described in the literature. [V. Senilh et al., J. Nat. Prod, 47, 131-137 (1984)] is thereby obtained (yield=90%).

The starting material of formula III in which R' represents a 2,2,2-trichloroethoxycarbonyl radical may be prepared as follows:

A solution of tert-butyl N-chlorocarbamate sodium salt (0.5 g) and silver nitrate (1 g) in acetonitrile (20 cc) is stirred vigorously for 5 minutes. A solution (0.2 cc) of osmium tetroxide in tert-butyl alcohol (0.1 mol per liter solution), the product of formula:



(2 g) and water (0.16 cc) are then added. After stirring for 20 hours at a temperature in the vicinity of 20.degree. C. and in the absence of light, tert-butyl N-chlorocarbamate sodium salt (0.5 g), osmium tetroxide solution (0.1 cc) and water (0.06 cc) are added. After stirring vigorously for 48 hours, the reaction mixture is filtered through Celite. The filter is rinsed with acetonitrile and the filtrate is concentrated to dryness. The product obtained is purified by chromatography on silica (Merck 7736 silica), eluting with an ether:hexane (50:50 by volume) mixture and operating under a slight pressure. The unreacted product of formula VI (900 mg) and the oxyaminated products are purified and separated by thick layer chromatography, eluting with a methylene chloride:methanol (98:2 by volume) mixture.

The following are thereby obtained:

(1) The product (2'R,3'S) of general formula III (295 mg) in which R' represents a 2,2,2-trichloroethoxycarbonyl radical, the characteristics of which are as follows:

specific rotation: $[\alpha]_D 23 = -38.4^o$. (c=1, chloroform)

ultraviolet spectrum:

λmax = 231 nm (15150)

λmax =275 nm (1200)

λmax =283 nm (1035)

infrared spectrum: main characteristic absorption bands at 3580, 3440, 2960, 1770, and 1730 cm^{-1} .

proton nuclear magnetic resonance spectrum ($CDCl_3$, 200 MHz, shifts in ppm): 1.21 (s, 3H); 1.27 (s, 3H); 1.36 (s, 9h); 1.86 (s, 3H); 1.96 (s, 3H); 2.39 (s, 3H); 2.62 (m, 1H); 3.90 (d, J=7, 1H); 4.17 and 4.32 (2d, J=9, 2H); 4.63 (d, J=3, 1H); 4.59 and 4.90 (2d, J=12, 2H); 4.77 (s, 2H); 4.96 (d, J=9, 1H); 5.27 (dd, J=9 and J=3, 1H); 5.42 (d, J=9, 1H); 5.55 (m, 1H); 5.69 (d, J=7, 1H); 6.21 (t, J=9, 1H); 6.23 (s, 1H); 7.39 (5H); 7.51, 7.62 and 8.09 (5H); and

(2) the product (2'S,3'R) of formula III (250 mg) in which R' represents a 2,2,2-trichloroethoxycarbonyl radical, the characteristics of which are as follows:

specific rotation: $[\alpha]_D 23 = -43.5^o$ (c=1, chloroform)

ultraviolet spectrum:

λmax = 231 nm (15300)

λmax = 275 nm (1035)

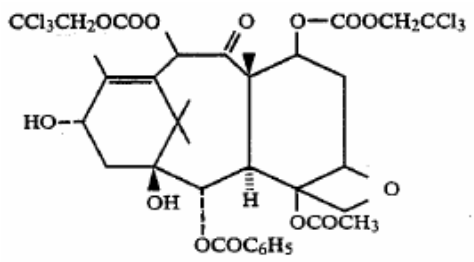
λmax = 283 nm (905)

infrared spectrum: characteristic absorption bands at 3400, 3000, 1770 and 1730 cm^{-1}

proton nuclear magnetic resonance spectrum ($CDCl_3$, 200 MHz, shifts in ppm): 1.18 (s, 3H); 1.23 (s, 3H); 1.40 (s, 9H); 1.86 (s, 3H); 2.08 (s, 3H); 2.24 (s, 3H); 2.64 (m, 1H); 3.94 (d, J=7, 1H); 4.17 and 4.32 (d, J=9, 2H); 4.48 (d, J=3, 1H); 4.60 and 4.92 (2d, J=12, 2H); 4.78 (s, 2H); 4.97 (d, J=9, 1H); 5.22 (dd, J=9 and J=3, 1H); 5.32 (d, J=9, 1H); 5.58 (m, 1H); 5.70 (d, J=7, 1H); 6.07 (t, J=9, 1H); 6.27 (s, 1H); 7.33-7.45 (5H); 7.48, 7.61 and 8.04 (5H).

The starting material for formula VI may be prepared by one of the following methods:

(1) Oxalyl chloride (11.92 cc) is added to a solution of cinnamic acid (9.84 g; 66.5 mmol) in anhydrous toluene (150 cc). The reaction mixture is stirred for 1 hour at 60.degree. C. and the excess oxalyl chloride is removed by distillation. The cinnamoyl chloride obtained is taken up with anhydrous toluene (300 cc) and the product of formula:



VII

(12 g) and silver cyanide (7.9 g) are then added. The reaction mixture is heated for 10 hours at 110.degree. C., with vigorous stirring. After cooling, the reaction mixture is filtered and the precipitate is rinsed with ethyl acetate. The combined filtrates are poured into ice-cold water. Extraction is carried out with ethyl acetate. The combined organic phases are concentrated to dryness and then taken up with ether (200 cc). A stream of ammonia is passed through this solution until the ammonium cinnamate formed precipitates. After filtering, the ethereal solution is concentrated and the residue is chromatographed on silica (Merck 7736 silica), eluting with methylene chloride under pressure. The product of formula VI (7.6 g), with the following characteristics, is thereby obtained (yield=55%):

$[\alpha]_D 23$ =-56.degree. (c=0.567; chloroform)

ultraviolet spectrum:

λmax = 217 nm (26800)

λmax = 222 nm (26900)

λmax = 232 nm (16100)

λmax = 276 nm (23600)

λmax = 283 nm (24400)

infrared spectrum: main characteristic absorption bands at 3420, 1760, 1725, 1710 and 1635 cm^{-1}

proton nuclear magnetic resonance spectrum ($CDCl_3$, 200 MHz, shifts in ppm): 5.73 (d, J=7, C_2H); 3.99 (d, J=7, C_3H); 5.02 (d, J=9, C_5H); 1.88 and 2.68 (m, 2.times.C_6H); 5.62 (m, C_7H); 6.30 (s, $C_{10}H$); 6.21 (t, J=8, $C_{13}H$); 2.48 (m, $C_{14}H_2$); 19.2 (s, $C_{16}H_3$); 1.23 (s, $C_{17}H_3$); 2.16 (s, $C_{18}H_3$); 1.88 (s, $C_{19}H_3$); 4.20 and 4.34 (d, J=9, 2.times.$C_{20}H$); 2.31 (acetate); 7.45, 7.60 and 8.07 (benzoate); 6.53 (d, J=16, C_2H); 7.89 (d, J=16, C_3H); 7.45 (4H); 7.60 (1H); 4.62 to 4.93 (d, J=12); 4.79 (s, 2H)

mass spectrum (chemical ionization): m/z 1023 (MH^+), 1005, 831, 813, 683, 665, 491, 431, 369, 309, 291, 149, 131 and 123.

(2) Cinnamic acid (35.52 g; 240 mmols), anhydrous toluene (1 liter), dicyclohexylcarbodiimide (49.44 g; 240 mmols), product of formula VII (53.5 g; 60 mmols) and dimethylaminopyridine (7.32 g; 60 mmols) are introduced into a 2 liter three-necked round-bottomed flask, equipped with a stirrer and a thermometer, under an argon atmosphere. The mixture is heated for 18 hours at 70.degree. C.under an argon atmosphere. After cooling at 0.degree. C. for 4 hours, the precipitate formed is separated by filtration and then washed with cold toluene (100 cc).

The filtrate is concentrated to dryness and then taken up with methylene chloride (1 liter). The solution in methylene chloride is washed with an aqueous 3% (w/v) hydrochloric acid solution (3.times.150 cc). After concentrating the organic phase, the residue (92 g) is taken up with ethyl ether (500 cc). The solution is allowed to stand at a temperature in the vicinity of 0.degree. C. for 48 hours. The precipitate formed is separated by filtration and washed with ethyl ether at 0.degree. C. The filtrate is concentrated to dryness. A product (89 g) is thereby obtained, which is chromatographed on Merck 7734 silica (2.7 kg), eluting with a toluene:methanol (95:5 by volume) mixture. The product of formula VI (58 g) is thereby obtained (yield=94.6%).

The starting material of formula VII may be prepared as follows:
A solution of 10-deacetylbaccatin III (30 g; 55 mmol) in anhydrous pyridine (480 cc) is cooled to 3.degree. C. under an argon atmosphere. 2,2,2-Trichloroethyl chloroformate (25.5 cc; 184 mmol) is added in the course of 3 minutes. The reaction mixture is stirred for 3 minutes at 20.degree. C. and then for 6 minutes at 28.degree. C. The solution is then cooled with an ice bath and quickly poured into ice-cold water (1 liter). The aqueous phase is extracted 3 times with methylene chloride (1 liter in total). After concentration, the pyridine is removed by exhaustive extraction with 1,2-dichloroethane. The crude product obtained (61.9 g) is purified by chromatography on silica (Merck 7736 silica) (1.2 kg), eluting with a methylene chloride:methanol (99:1 by volume) mixture.

The product of formula VII (45.6 g), with the following characteristics, is thereby obtained (yield=93%):
melting point = 233 – 234 ^{o}C.
specific rotation$[\alpha]_D 23$ = -58.degree. (c=0.465, chloroform)
ultraviolet spectrum:
λmax = 232 nm (19000)
λmax = 276 nm (990)
λmax = 283 nm (810)
infrared spectrum: characteristic absorption bands at 3420, 1765, 1730 and 1720 cm^{-1}
proton nuclear magnetic resonance spectrum ($CDCl_3$, 200 MHz, shifts in ppm): 1.12 (s, 3H); 1.16 (s, 3H); 1.85 (s, 3H); 2.16 (s, 3H); 2.30 (s, 3H); 2.30 (m, 2H); 2.05 and 2.65 (2m, 2H); 4.00 (d, J=7, 1H); 4.18 and 4.35 (2d, J=9, 2H); 4.63 and 4.92 (2d, J=12, 2H); 4.76 and 4.80 (2d, J=12, 2H); 4.92 (t, J=9, 1H); 5.00 (d, J=9, 1H); 5.61 (m, 1H); 5.66 (d, J=7, 1H); 6.30 (s, 1H); 7.50, 7.64 and 8.13 (2t and 1d, J=7, 5H)
mass spectrum (chemical ionization): m/z 893 (MH^+), 875, 701, 683, 579, 387, 327, 309 and 123.

The 10-deacetylbaccatin III may be obtained as follows:
Non-dried Taxus baccata L. leaves (100 kg) are ground and then subjected to accelerated percolation, using a rotary device, with 95.degree. alcohol (the actual alcohol content of which changes to 80.degree.-85.degree. because of the water contained in the leaves). The first maceration is carried out with alcohol (300 liters) and the following macerations are carried out with alcohol (4.times.200 liters) recovered by distillation and the alcohol level of which is maintained at 85.degree.. Each percolation lasts for 10 hours and is carried out at a temperature in the vicinity of 20.degree. C. The mixing is ensured by circulating the solvent using a pump.

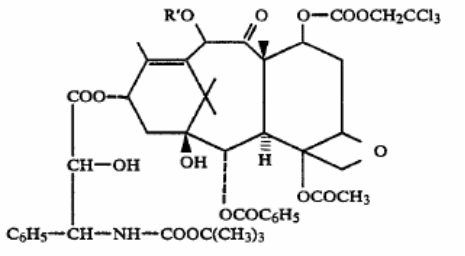
Each ethanolic phase is concentrated under reduced pressure (50-60 mm Hg; 5.4 kPa). The concentrates from each operation (approximately 70 liters), with high water contents, are combined and concentrated again to a volume of 20 liters so as to remove the residual alcohol.

The extract, which is not evaporated to dryness, remains in an aqueous medium (20 liters), in the form of a solid suspension. The suspension is taken up with methylene chloride (9 extractions with a total of 100 liters of methylene chloride).

The solution in methylene chloride thus obtained (87 liters), which contains the dry extract (2 kg), is concentrated to a volume of 5 liters.
Chromatography is carried out on a 24 cm diameter column containing silica (10.3 kg) (Zeosil: 8 kg; Celite: 2.3 kg).

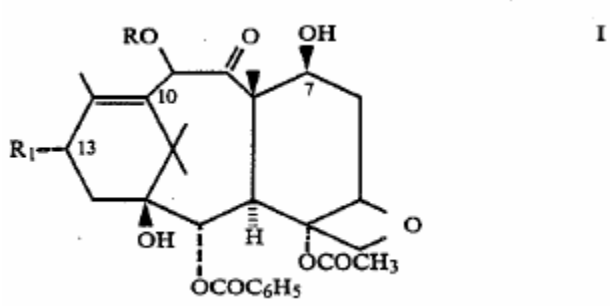
Successive elutions are carried out, at a flow rate of 8 to 9 liters/hour, with:
methylene chloride (150 liters) (fraction 1);
a methylene chloride:methanol (99.5:0.5 by volume) mixture (150 liters) (fraction 2);
a methylene chloride:methanol (99:1 by volume) mixture (170 liters) (fraction 3) and
a methylene chloride:methanol (98:2 by volume) mixture (130 liters) (fraction 4).
The first two fractions combined together give 1.74 kg of dry extract. The third fraction gives 390 g of dry extract. The fourth fraction gives 20 g of dry extract.
The third fraction (390 g), which contains essentially the 10-deacetylbaccatin III, is chromatographed again on silica, eluting with a methylene chloride:methanol (99:1 by volume) mixture at a flow rate of 4 liters/hour. 4 fractions are thus obtained, the most useful of which (154 g) gives, after concentrating and digesting in methylene chloride, 22 g of pure 10-deacetylbaccatin III.
The mother liquors (132 g), purified by chromatography on silica, give 8 g of 10-deacetylbaccatin III.
The total yield is 300 mg of 10-deacetylbaccatin III per kg of leaves.

Taxol and 10-deacetyltaxol are prepared from a compound of formula:



in which R' represents acetyl or 2,2,2-trichloroethoxycarbonyl radical, by removal of the t-butoxycarbonyl radical, benzoylation of the amine product obtained, and removal of the 2,2,2-trichloroethoxycarbonyl group(s).

Among taxan derivatives of general formula:



I

taxol is that in which R represents acetyl and R_1 represents a (2'R,3'S)-[--OCO--CHOH--CH(C_6H_5)NH--COC_6H_5] radical, 10-deacetyltaxol is that in which R represents hydrogen and R.sub.1 represents a (2'R,3'S)-[--OCO--CHOH--CH(C_6H_5)NH--COC_6H_5] radical, baccatin III is that in which R represents an acetyl radical and R_1represents a hydroxy radical, and 10-deacetylbaccatin III is that in which R represents a hydrogen atom and R_1 represents a hydroxy radical.

Taxol, 10-deacetyltaxol and baccatin III can be extracted with some difficulty from the trunk bark of different species of Taxus (yew) and the yields are generally low, of the order of 100 mg/kg in the case of taxol. However baccatin III is present in relatively large quantities in the wood.

10-Deacetylbaccatin III is extracted much more easily and with better yields (300 mg/kg of leaves) from yew leaves.

Whereas taxol and 10-deacetyltaxol are known to promote in vitro the polymerization of tubulin and to inhibit, at the same time, the depolymerization of microtubules induced by cold or by calcium ions, baccatin III and 10-deacetylbaccatin III only show these properties feebly and do not therefore constitute antitumour agents which can be used therapeutically.

Option (B)

In accordance with the present invention, there is provided a cosmetic dispenser having two separate elements. A first tubular element is used for holding and applying cosmetics, such as lipstick; and a second associated tubular element having a mirror is used to assist a person in applying the cosmetics. When assembled for storage, the second tubular element is typically inserted between an outer sleeve and an inner sleeve of the first tubular element to protect the mirror. The mirror is disposed in the second tubular element in a manner to provide additional protection to the mirror.

The second tubular element of the present invention is telescopically received in a space provided between the outer sleeve and the inner sleeve of the first tubular element. The second tubular element has a protective mounting, such as a recess, in which a mirror is carried. The protective mounting reduces the possibility of damaging the mirror when sliding the second tubular element into or out of the first tubular element. When not in use, the mirror is inside the outer sleeve of the first tubular element and is protected from dirt and scratches.

The first tubular element, when separated from the second tubular element, is open at one end to permit the cosmetics to be axially extended for application by the user. Means are provided for selectively moving the cosmetics from a position of storage to a position of use in the inner sleeve of the first tubular element.

BRIEF DESCRIPTION OF THE DRAWINGS

The above, as well as other advantages of the present invention, will become readily apparent to those skilled in the art in the following detailed description of a preferred embodiment when considered in the light of the accompanying drawings in which:

FIG. 1 is an exploded perspective view of the two tubular elements of the cosmetic dispenser in a separated position;

FIG. 2 is a longitudinal sectional view of the present invention after the two tubular elements shown in FIG. 1 have been assembled for storage and the assemblage has been rotated 90.degree. from the FIG. 1 illustration to more clearly show the overall structure;

FIG. 3 is a sectional view taken along line 3--3 of FIG. 2; and

FIG. 4 is an exploded perspective view of the two tubular elements, similar to FIG. 1, showing slide rails.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, there is illustrated in FIG. 1 an exploded perspective view of a preferred embodiment of the invention including a first tubular element 10 and a second tubular element 12 in a separated position preparatory to use. The first element 10 includes an outer sleeve 14 and an inner sleeve 16 disposed in spaced relation within the outer sleeve 14. The inner sleeve 16 is designed to retain a cosmetic 18 such as lipstick, for example. The inner sleeve 16 is inwardly spaced from the outer sleeve 14 and the inner sleeve 16 extends the full length of the outer sleeve 14 to form a cylindrical space 20 to receive the second tubular element 12.

The second tubular element 12 is comprised of a sleeve 22 on which a mirror 24 is mounted on the surface of the sleeve 22. It may be preferable to mount the mirror 24 in a recess 26 to provide additional protection to the surface thereof. When the second element 12 is telescopically inserted into the first element 10, the sleeve 22 is received in the cylindrical space 20 between the outer sleeve 14 and the inner sleeve 16. By recessing the mirror 24, there is less likelihood that the surface of the mirror 24 will be scratched or damaged when the second element 12 is inserted into or withdrawn from the cylindrical space 20 of the first element 10 The sleeve 22 is adapted to fit into the cylindrical space 20 in such a fashion that the mirror 24 is completely protected. Alternative means, such as slide rails 27 shown in FIG. 4, may be used instead of the recess 26 to maintain a spaced relationship between the mirror 24 and the outer sleeve 14.

The first element 10 is open at one end to permit the cosmetic 18 to be axially extended when in use and for receiving the second element 12 when in storage. A grasping portion 28 is mounted on the opposite end of the first element 10. The peripheral surface of the grasping portion 28 extends radially beyond the outer surface of the outer sleeve 14 to provide a convenient means of gripping the first element 10 to enable the second element 12 to be withdrawn therefrom.

A grasping portion 30 is also mounted on the end of the second element 12. The peripheral surface of the grasping portion 30 on the second element 12 extends radially beyond the outer surface of the sleeve 22. When in the storage position, the peripheral surface of the grasping portion 30 also extends radially beyond the outer sleeve 14 to provide a convenient means of gripping the second element 12.

When the second element 12 is received by the first element 10 in the storage position, the outer sleeve 14 encloses the mirror 24 and the sleeve 22 contains the cosmetic 18 in the inner sleeve 16. In the preferred embodiment, the edge of the outer sleeve 14 abuts the inner surface of grasping portion 30 in the storage position. The cosmetic 18 and the mirror 24 are enclosed and protected from dirt and other damaging materials.

Several different types of mechanical means can be used to axially extend the cosmetic 18 in the inner sleeve 16. In FIGS. 2 and 3, there is disclosed a helical style rotational system. The inner sleeve 16 has a full-length, rotatable liner 32 affixed to the grasping portion 28, which is also rotatable. The rotatable liner 32 has a cosmetic driver 34 with integral pins 36 adapted to extend through longitudinal slots 38 in the rotatable liner 32 and thence into helical grooves 40 on the inner surface of the inner sleeve 16. When the grasping portion 28 is manually rotated relative to the outer sleeve 14, the liner 32 is caused to rotate causing the cosmetic driver 34 to extend or retract the cosmetic 18, as the case may be, in the liner 32 of inner sleeve 16 The helical system is used in many cosmetic applicators

and is ideally suited for extending and retracting the cosmetic 18 when the first element 10 is separated from the second element 12. Other mechanical systems may also be used to axially extend the cosmetic 18.

In accordance with the provisions of the patent statutes, the present invention has been described in what is considered to represent its preferred embodiment. However, it should be noted that the invention can be practiced otherwise than as specifically illustrated and described without departing from its spirit or scope.

A cosmetic dispenser which has a first tubular element, including a cosmetic holder for dispensing cosmetics, and a second associated tubular element, including a mirror for observing the application of the cosmetics. The first tubular element has a cylindrical space between an outer sleeve and an inner sleeve for telescopically receiving the second tubular element. The mirror is carried in a protective mounting on the second tubular element to reduce the possibility of damaging the mirror when sliding the second tubular element into or out of the first tubular element. When the two elements are combined for storage purposes, the surface of the mirror is protected by the outer sleeve of the first tubular element.

This invention pertains to a cosmetic dispenser, and more particularly, to an improved cosmetic dispenser with two separable elements, one containing a cosmetic applicator and the other a mirror.

The object of the present invention is to provide a new, improved cosmetic dispenser having a means for storing a mirror inside an outer sleeve of the cosmetic applicator when not in use. A person carrying a cosmetic dispenser often desires to apply cosmetics, such as lipstick, when no mirror is available to assist in the application of the cosmetics. The cosmetic dispenser of the present invention provides a cosmetic applicator in one element and a mirror in a second element. By combining these two elements into one convenient cosmetic dispenser, a person desiring to apply lipstick or other cosmetics does not need to carry a separate mirror or find a facility with a mirror.

In the prior art, there have been successful attempts to produce structures which combine a cosmetic dispenser with a mirror. U.S. Pat. No. 2,039,323 describes a mirror hinged to a corner of a lipstick holder having a spring means for pivotally moving the mirror with respect to a cover on the side of the lipstick holder. U.S. Pat. No. 2,121,221 discloses a structure including a mirror mounted on one side of a cover of a lipstick receptacle whereby the mirror is protected by a cover plate mounted on an end plate of the lipstick receptacle. The cover plate slides directly over the mirror when the lipstick receptacle is inserted into or withdrawn from the cover, placing the mirrored surface in jeopardy of being scratched or damaged when inserting or withdrawing the lipstick receptacle from the cover.

The combined cosmetic holder and mirror shown in U.S. Pat. No. 2,458,020 includes a mirror attached by a spring hinge to a cover of a cosmetic holder. The spring hinged mirror is difficult to hold and achieve the desired viewing angle when applying cosmetics. U.S. Pat. No. 2,512,476 discloses a lipstick holder having a mirror hingedly mounted on a cover in which the mirror is moved from a position of storage to a position of use by a separate operating mechanism.

Figures:

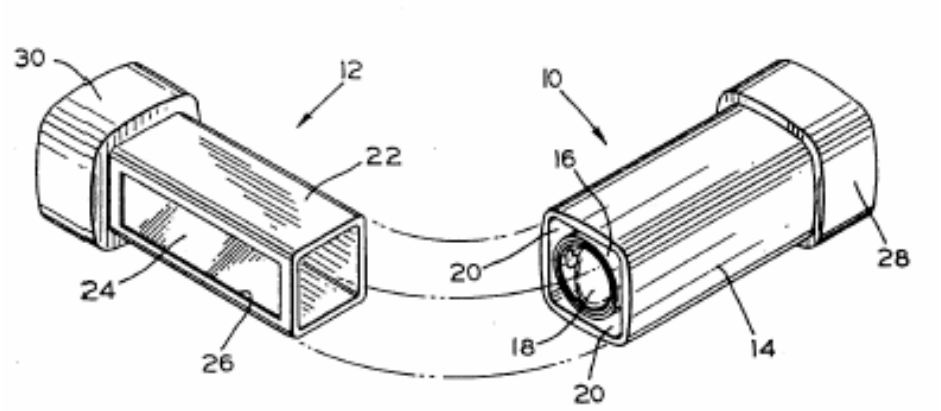


FIG. 1

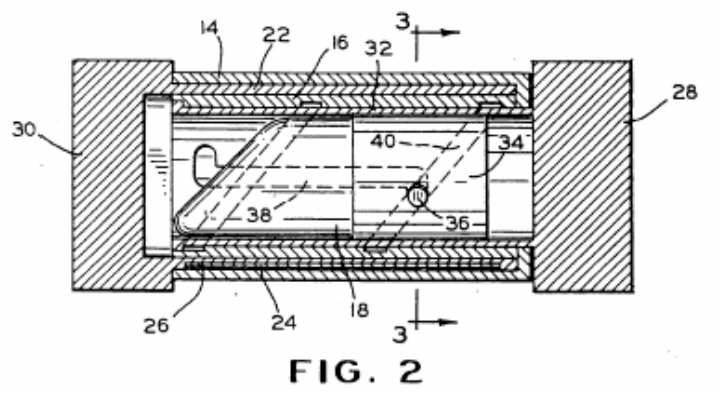


FIG. 2

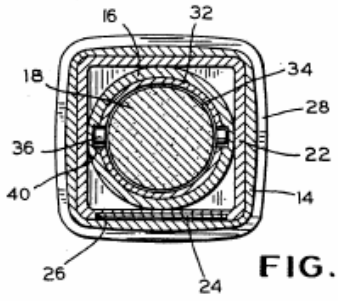


FIG. 3

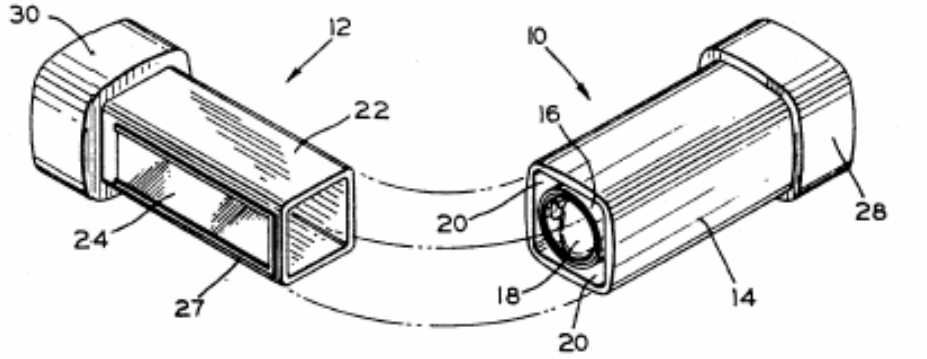


FIG. 4