mouthpiece or nosepiece (b) when the inhalator is not in use.

It is also preferred that the inhalator has a single capsule chamber, preferably generally centrally disposed on a central longitudinal axis of the inhalator. This single chamber must be emptied and reloaded with a capsule between each use.

In particular, it is preferred that the inhalator does not comprise a revolver-type magazine of the type described in WO-A-91/02558, wherein two or more – for example 6 – chambers can be loaded with up to that number of capsules in advance and each one aligned with the capsule opening device for each successive inhalation procedure up to the maximum of the number of capsules in the inhalator.

The capsule is preferably a conventional pharmaceutical capsule containing powdered medicament. Capsules of any suitable physiologically acceptable capsule material may be used, for example capsules derived from animal proteins (e.g. gelatine) or plant polysaccharides (e.g. gums, starch and cellulose). Suitable capsules include those formed from gelatin, hydroxypropylmethyl cellulose or hydroxypropyl cellulose. The expression "capsule" used herein shall be understood broadly, to refer to all closed containers holding the powdered medicament or drug preparation to be inhaled, and openable for said inhalation using the inhalator of the present invention.

The parts of the rigid outer shell of the inhalator are hollow and each has a circumferential rim defining an open mouth of the part. It is preferred that the outer shell of the inhalator is arranged so that the contours of the rim of one shell part match the contours of the rim of the other completely or at least substantially circumferentially around the rims when the shell is in the closed condition. The expression "match the contours" used herein in relation to the rims of the outer shell parts means particularly that the rims in the closed condition of the shell are either touching or are within about 10mm, for example within about 5mm, of each other over all of the circumferential portion of the rims not occupied by the hinge between the shell parts. In one embodiment, the rim of each shell part matches the rim of the other shell completely and one is not cut away, e.g. in the manner of the prior art discussed above.

In the first aspect~~a preferred embodiment~~ of the invention, therefore, the lower shell part of the outer shell is tapered inwardly in the downward direction away from a top opening defined by its rim, the assembly (a) of the first hinged unit correspondingly tapers inwardly in the downward direction so that it can be received in the lower shell part, and the finger-operable actuator for

the capsule opening device protrudes through an opening in the lower shell part below the rim of the lower shell part, whereby the rim of the lower shell part is complete ~~and~~. The first hinged unit may ~~can~~ be removed from the lower shell part by passing up and through the top opening defined by the rim of the lower shell part.

This arrangement has the technical advantage that the two shell parts are more rigid and robust than the arrangement of the prior art, in which the rim of the lower shell part was cut away.

In a second aspect of the present invention there is provided an inhalator for the inhalation of powdered drug preparations from capsules which contain the powdered preparations, the inhalator comprising:

(a) an assembly comprising:
a capsule holder comprising a capsule chamber for receiving a capsule containing the powdered preparation, the capsule chamber having an air inlet opening and an air outlet opening;
a capsule opening device associated with the capsule chamber for opening a capsule within the chamber;
a finger-operable actuator for the capsule opening device; and

(b) a mouthpiece or nosepiece;

whereby the user can suck air through the air inlet opening, into the capsule chamber to entrain powder from the opened capsule, and then out of the chamber through the air outlet opening and the mouthpiece or nosepiece, and thence into the user's lungs;

wherein the assembly (a) and the mouthpiece or nosepiece (b) are mutually hinged so that the mouthpiece or nosepiece can pivot between an open condition in which the mouthpiece or nosepiece is spaced apart from the air outlet opening of the capsule chamber for loading the capsule into the capsule chamber and a closed condition in which the mouthpiece or nosepiece is disposed in airflow communication with the air outlet opening of the capsule chamber for use;

and wherein the inhalator further comprises:

(c) a rigid outer shell comprising a lower shell part hinged to an upper shell part so that the shell is openable and closable;

characterized in that

the assembly (a) and the mouthpiece or nosepiece (b) are disposed within the outer shell, each of the upper and lower shell parts has a circumferential rim defining a mouth of the part and the contours of the rim of each shell part match the contours of the rim of the other substantially completely around the rims when the shell is in the closed condition.

The expression "match the contours" used in relation to the second aspect of the present invention is to be understood in the same sense as defined above in relation to the first aspect of the present invention.

Further, in~~In a preferred embodiment of~~ the second aspect of the present invention, the lower shell part of the outer shell is tapered inwardly in the downward direction away from a top opening defined by its rim, the assembly (a) (e.g. the assembly (a) of the first hinged unit) correspondingly tapers inwardly in the downward direction so that it can be received in the lower shell part, and the finger-operable actuator for the capsule opening device protrudes through an opening in the lower shell part below the rim of the lower shell part, whereby the rim of the lower shell part is complete~~and~~. Tthe assembly (a) (e.g. the first hinged unit) maycan be removed from the lower shell part by passing up and through the top opening defined by the rim of the lower shell part.

This arrangement has the technical advantage that the two shell parts are more rigid and robust than the arrangement of the prior art, in which the rim of the lower shell part was cut away.

It is preferred that the assembly (a) and the mouthpiece or nosepiece (b) define a first hinged unit and the outer shell (c) defines a second hinged unit, the first hinged unit being received in the second hinged unit for use such that the first hinged unit can be removed as such from the second hinged unit as such. The arrangement is particularly characterized in that the hinges of the two units are separate from one another. In particular, the hinge of the first unit is separate and operates independently of the hinge of the second unit. The first unit can be removed from the second unit without affecting the construction or operation of either hinge.

In a preferred embodiment of the third aspect of the present invention, the mouthpiece or nosepiece (b) is disposed within the upper part of the outer shell, each of the upper and lower shell parts has a circumferential rim defining a mouth of the part and the contours of the rim of each shell part match the contours of the rim of the other substantially completely around the rims when the shell is in the closed condition.

The expression "match the contours" used in relation to the third aspect of the present invention is to be understood in the same sense as defined above in relation to the first aspect of the present invention.

Further, in~~In a preferred embodiment of~~ the third aspect of the present invention, the lower shell part of the outer shell is tapered inwardly in the downward direction away from a top opening defined by its rim, the assembly (a) correspondingly tapers inwardly in the downward direction so that it can be received in the lower shell part to be retained therein, and the finger-operable actuator for the capsule opening device protrudes through an opening in the lower shell part below the rim of the lower shell part, whereby the rim of the lower shell part is complete.

This arrangement has the technical advantage that the two shell parts are more rigid and robust than the arrangement of the prior art, in which the rim of the lower shell part was cut away. The retention of the assembly (a) in the lower shell part has the advantage that the hinge system and its manufacture can be simplified, in that only the upper shell part and the mouthpiece or nosepiece need to be made pivotable with respect to the lower shell part.

Means can be provided for releasably securing the upper shell part to the mouthpiece or nosepiece (b), whereby both the upper shell part and the mouthpiece or nosepiece can be manually opened simultaneously in one manual action. This has the effect that the upper shell part and the mouthpiece or nosepiece housed within it can be hinged as a unit away from the lower shell part and the assembly (a) housed within it. This enables the capsule chamber to be exposed for loading a capsule into the chamber or for emptying or cleaning the chamber, without the user needing to touch the mouthpiece or nosepiece. The upper shell part and the mouthpiece or nosepiece can then be closed as a unit onto the lower shell part and the assembly (a) housed within it. After manually releasing the securement between the upper shell part and the mouthpiece or nosepiece, the upper shell part can then be opened on its hinge again, but this time independently of the mouthpiece or nosepiece which stays in