Description

Drug delivery device and method of manufacturing a drug delivery device

The present invention relates to a drug delivery device and a method of manufacturing a drug delivery device. Drug delivery devices are used for the administration of a drug, for example insulin, heparin or growth hormones. Some devices are configured to deliver a plurality of doses. Additionally some devices are configured to allow setting of different dose sizes which are to be delivered. Here it is important that the size of the dose can be precisely set and the set dose can be reliably delivered.

In US 2007/0021718 A1 a syringe is shown having a spring which is arranged between a housing insert and a driving element. The spring may serve as compensation for longitudinal tolerances in order to support a medical container in an injection device.

In US 3,742,948 a syringe is shown having a pressure member constructed as a cup spring. The pressure member includes resilient lugs which bear on the upper edge of the liquid container with their free end.

Further medication delivery devices are known from the documents WO 2005/032449 A1 and DE 10 2004 053529 A1.

One aspect~~It is an aim~~ of the present invention ~~to~~ provides for an improved drug delivery device. In particular, a drug delivery device should be provided, which allows for improved operability with respect to dosage control and/or improved reproducibility of the dosage in connection with different cartridges.

For this aim, a drug delivery device comprises a housing with a proximal end and a distal end, a cartridge adapted to accommodate a drug, a cartridge retaining member adapted to retain the cartridge, the cartridge retaining member being secured to the housing, and a spring washer being arranged within the housing so as to exert a force on the cartridge and secure the cartridge against movement with respect to the

cartridge retaining member and, preferably, against movement with respect to the housing. The spring washer is arranged to abut the cartridge on a side of the cartridge that faces the proximal end of the housing.

In a drug delivery device of this kind movement of the cartridge with respect to the housing and/or the cartridge retaining member is reduced or even avoided on account of the spring washer, which exerts the force on the cartridge. The spring washer can reduce play between cartridge and housing and/or between cartridge and cartridge retaining member. This is, for example, particularly advantageous when cartridges with different lengths are to be used in the drug delivery device. Thus, the drug delivery device may be a reusable device. Manufacturing tolerances in cartridge lengths can thus be compensated by means of the spring washer. Consequently, during operation of the drug delivery device, axial movement of the cartridge in the cartridge retaining member can be reduced or even prevented and dose accuracy can be increased. The spring washer allows securing the cartridge within the cartridge retaining member without requiring much space. Consequently a very compact drug delivery device can be formed.

In a further embodiment, the spring washer is arranged so as to abut the cartridge, preferably on a side of the cartridge that faces the proximal end of the housing.

The spring washer may keep the cartridge fixed in the cartridge retaining member by abutting the cartridge, preferably on a side of the cartridge that faces the proximal end of the housing. Accordingly, axial movement of the cartridge with respect to the cartridge retaining member is reduced or even prevented.

The spring washer may exert a force on the cartridge in the distal direction. The spring washer may be loaded or biased so as to exert the force on the cartridge.

In a further embodiment, the spring washer is fixed to the housing. In particular, the spring washer may be secured to the housing so as to prevent relative axial movement between spring washer and housing in that region in which the spring washer is secured to the housing.

In this example, the curvature of the further washer may be adapted to the curvature of spring washer in that region in which the further washer and the spring washer overlap as seen along the axial direction. This allows for a smooth abutment of the spring washer and the further washer.

In one aspect of the invention, a spring washer is used to secure a cartridge which contains a drug in a cartridge retaining member of a drug delivery device against displacement with respect to the cartridge retaining member, the spring washer being arranged so as to abut the cartridge on a side of the cartridge that faces the proximal end of a housing of the drug delivery device.

For the above mentioned aim, a method of manufacturing a drug delivery device comprises the steps of: providing a housing with a proximal end and a distal end, providing a cartridge adapted to accommodate a drug, providing a cartridge retaining member adapted to retain the cartridge, arranging a spring washer within the housing and securing the cartridge retaining member to the housing, thereby loading the spring washer so as to exert a force on the cartridge and to secure the cartridge against displacement, in particular against axial displacement, with respect to the cartridge retaining member. The spring washer is arranged to abut the cartridge on a side of the cartridge that faces the proximal end of the housing.

For the above mentioned aim, a spring washer is used to secure a cartridge which contains a drug in a cartridge retaining member of a drug delivery device against displacement, preferably against axial displacement, with respect to the cartridge retaining member.

Other features will become apparent from the following detailed description when considered in conjunction with the accompanying drawings.

In the drawings:

Figure 1 schematically shows a simplified cross sectional side view of a drug delivery device according to an embodiment;

Figure 2 schematically shows an exploded perspective view of a drug delivery device according to an embodiment;

Figure 3 schematically shows a detailed cross sectional side view of a part of a drug delivery device according to an embodiment;