SUMMARY

Embodiments of the present~~Our~~ invention solve~~s~~ these problems by using guideposts, pins, pegs, followers or the like structures that protrude outwardly from the proximal end of a piston rod and are designed to interact with a corresponding groove in a drive sleeve to transmit forces from a drive mechanism to the piston rod. These and other advantages will become evident from the following more detailed description of the invention.

According to an exemplary embodiment, a drug delivery device comprises a device housing and a medicament contained in the device housing. A drive mechanism is positioned in the housing for transmitting axial and/or rotational force to a piston rod comprising an elongated member having a distal end and a proximal end. The shape of rod is not critical to our invention, likewise the material of construction is not important, except that the rod must be able to drive or push a rubber stopper or bung in a cartridge of medicament towards the distal end during injection of a set dose. Preferably, the proximal end of the piston rod should be made of low friction type plastics so that the transfer of forces from the drive member is not dissipated by friction losses.

A preferred shape of the improved piston rod of our invention is generally circular and is fabricated from a polymeric material through molding or machining. A metallic material may also be used to fabricate all or part of the piston rod. The proximal end of the piston rod interacts with a drive sleeve and has at least one guidepost extending outwardly from the elongated member and is configured to engage a cooperating or corresponding groove in a drive member and for transmitting axial or rotational forces from the drive member. When multiple guideposts are used, the orientation of the

sleeve member. Preferably the groove(s) in the drive member are a square or buttress type design.

In an alternative embodiment~~arrangement~~, a pen type drug delivery device comprises a device housing having a distal end for mounting a needle assembly and a proximal end comprising a dose dial grip. A cartridge is contained in the housing, which contains a medication and a stopper. The improved piston rod of our invention acts upon the stopper to expel medication from the cartridge during dose delivery. Preferably, the proximal end of the piston rod and/or the groove(s) in the drive member are made using materials exhibiting low friction qualities.

In one aspect of the present invention, there is provided a piston rod for a device, especially a pen-type injector, comprising an elongated member having a distal end and a proximal end characterized in that the proximal end has at least two sets of guideposts, where at least one set has at least two guideposts that are in axial alignment with each other and are configured for transmitting axial and rotational forces from a drive member having at least one internal groove with a pitch P.

These as well as other advantages of various aspects of Applicants' proposed drug delivery device will become apparent to those of ordinary skill in the art by reading the following detailed description, with appropriate reference to the accompanying drawings.

The term ,,medication", as used herein, means a pharmaceutical formulation containing at least one pharmaceutically active compound,

wherein in one embodiment the pharmaceutically active compound has a molecular weight up to 1500 Da and/or is a peptide, a proteine, a polysaccharide, a vaccine, a DNA, a RNA, a antibody, an enzyme, an antibody, a hormone or an oligonucleotide, or a mixture of the above-mentioned pharmaceutically active compound,

wherein in a further embodiment the pharmaceutically active compound is useful for the treatment and/or prophylaxis of diabetes mellitus or complications associated with diabetes mellitus such as diabetic retinopathy, thromboembolism disorders such as deep vein or pulmonary thromboembolism, acute coronary syndrome (ACS), angina, myocardial infarction, cancer, macular degeneration, inflammation, hay fever, atherosclerosis and/or rheumatoid arthritis,