

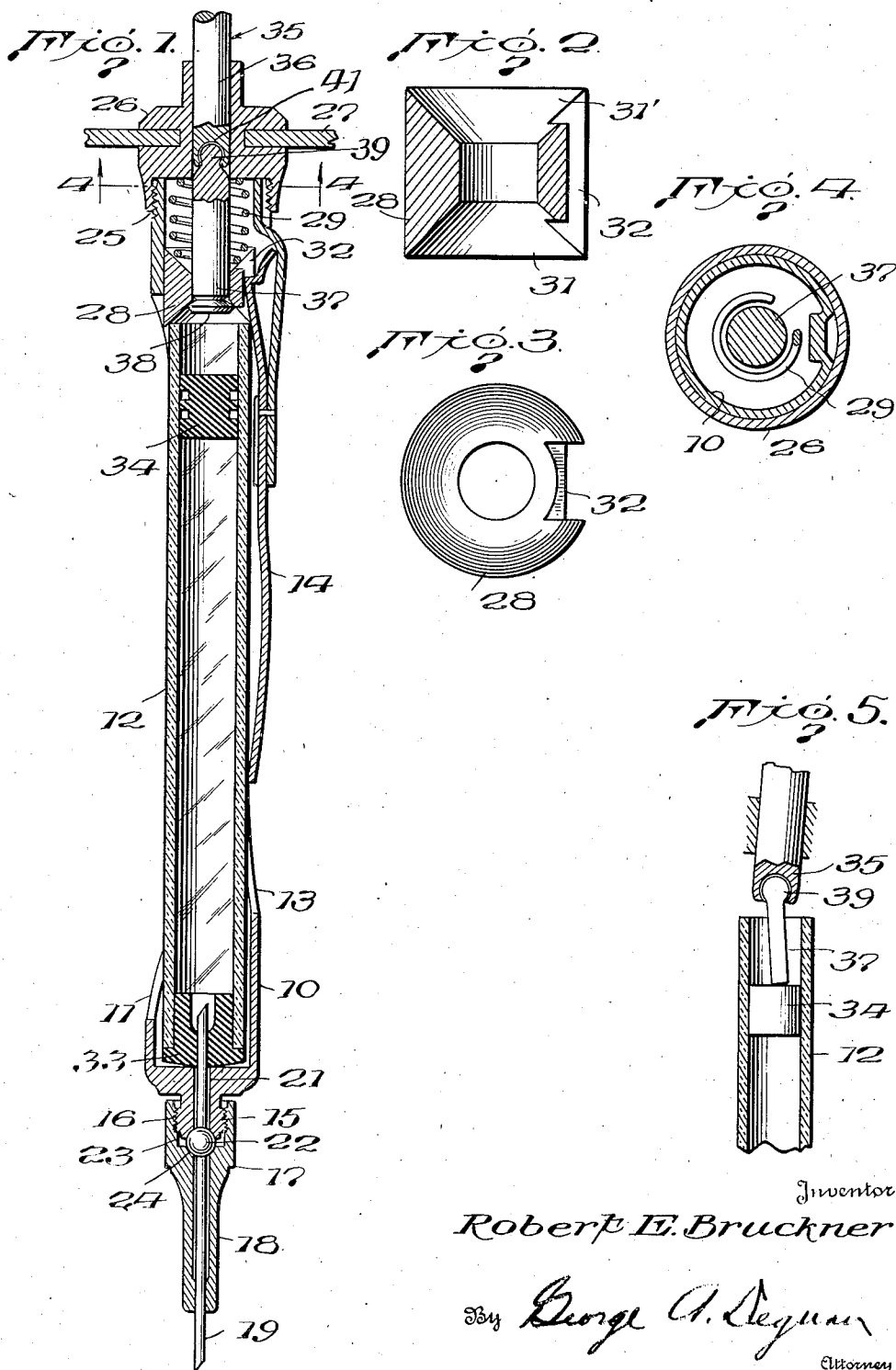
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DENTAL SYRINGE

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DENTAL SYRINGE

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The present invention relates to dental syringes, and is a continuation-in-part of my copending application, Serial No. 412,510, filed September 26, 1941. More particularly the invention pertains to a novel form of plunger and piston assembly, designed to prevent the disruptive wedging forces occurring with axial misalignment of the plunger and barrel of a syringe.

Certain types of syringes are so constructed that they accommodate insertable glass vials having a rubber plug closure at each end of the vial. The discharge end of the syringe is provided with a hollow needle which punctures one of the plugs, while the opposite end of the syringe is provided with a finger grip and plunger, the latter being slidable axially of the vial and engageable with the other of the plugs, said other plug then acting as a piston to eject fluid from the vial. The conventional plunger employed is made of one piece and at times, because of a loose fit in its bearing or because the bearing is misaligned with respect to the vial, exerts wedging action resulting in a radial pressure against the wall of the glass vial sufficient to break the vial.

One of the objects of this invention is to provide a plunger for a syringe of the type referred to which permits self-adjustment of the plunger head with respect to the vial and piston and thus eliminates those side thrusts or strains on the vial walls, due to this wedging action.

Another object of the invention is to provide a plunger made in two parts and having a swivel connection between the two parts. Since the plunger head is free to swivel slightly relative to the piston, there results a three link kinematic chain, comprising the piston and the two parts of the plunger, in contrast with the self jamming of the two link trains of the prior art.

Other objects will be apparent from the following description of the syringe, reference being made to the accompanying drawing in which

Fig. 1 is a longitudinal section of a syringe embodying the invention;

Fig. 2 is an enlarged section through the sleeve used to clamp the vial in the syringe barrel;

Fig. 3 is a top plan view of the clamping sleeve;

Fig. 4 is an enlarged transverse section taken on line 4-4 of Fig. 1;

Fig. 5 is a diagrammatic illustration of the plunger embodied in the present invention showing its relation to a vial and piston therein, constituting a three link kinematic train.

In the drawing, the barrel 10 is provided with an opening 11 on one side thereof to permit insertion of the vial 12, and is cut away on its op-

posite side at 13 to accommodate a spring finger 14 bearing against the vial. The lower end of the barrel is reduced as at 15 and threaded at 16 to receive cap 17, the latter having a bore 18 to accommodate a hollow needle 19. The needle also passes through bore 21 in the reduced portion 15 and has a partially spherical medial portion 22 bearing against seats 23 and 24 in the ends of the reduced barrel portion and cap, respectively, so that it is clamped therebetween. The upper end of the barrel is threaded at 25 to permit attachment of threaded cap 26 having a finger grip 27 thereon. An annular sleeve 28 is axially slidable in the upper part of the barrel, being normally urged into engaging relation with vial 12 by spring 29 bearing at one end against the sleeve and at its other end against cap 26. The sleeve thus clamps the vial in the barrel. It is to be noted that the sleeve is conically beveled at 31, 31' so that it is reversible and accommodates itself to the vial as well as to the spring. The sleeve is furthermore provided with a longitudinal recess 32 to receive the upper end of spring 14.

The vial, before its insertion in the syringe barrel, is closed at its ends by plugs 33, 34. Plug 33 at the discharge end of the syringe is adapted to be pierced by needle 19 to permit flow of liquid from the vial through the needle. Plug 34 acts as a piston to eject liquid from the vial and is adapted to be moved axially in the vial by plunger 35 consisting of a plunger rod 36 slidable in cap 26 and plunger head 37 swiveled thereto, the head being flared at 38 and adapted to engage piston 34 to force the latter toward the discharge end of the vial. The flared end of the plunger head is also engageable in one position thereof with sleeve 28 to elevate the sleeve against spring 29 and permit insertion of the vial in the syringe barrel. The diameters of head 37 and flared portion 38 are both somewhat less than that of piston 34 and the internal diameter of vial 12. The end surface of the head is smooth and in contact with the piston 34 when transmitting axial thrust but is free to slide or swivel relative to the piston. When adjusting itself to misalignment the smooth end surface 38 of the plunger head is free to slide on the face of the plug piston 34, then permitting the plunger head to center itself with respect to the piston and the vial so that lateral thrusts on the piston are greatly reduced or entirely removed. This eliminates the disruptive wedging forces due to possible angular misalignment of the paths of travel of the rod 36 and the piston 34, leaving only the very small lateral component of the thrust to be withstood by the glass vial 12.

As will be seen from Fig. 1, the upper end of the plunger head is provided with a reduced spherical end portion 39. Rod 36 is provided with a spherical recess 41. The dimensions of the spherical end 39 and the recess 41 are such that the head fits somewhat snugly in the recess, but with sufficient clearance to permit the head to move freely with respect to the plunger rod. Preferably the end of the plunger rod is spun around the spherical end of the head to form the swivel connection between the two parts of the plunger. Thus, regardless of whether the plunger rod is somewhat canted or axially misaligned with the vial, the plunger head, the diameter of which is less than that of the vial, is permitted some free laterally slidable movement with respect to the plunger to compensate for axial misalignment. The piston 34 being made from resilient material, such as rubber, absorbs small lateral displacements transmitted thereto, but even if the plug be made of a more or less rigid material, the three link kinematic train would permit the head to adjust itself laterally without self-jamming or wedging action against the wall of the vial. This is not possible with the one link or two link trains of the prior art. Hence, the tendency for the end of the plunger to exert a disruptive wedging side thrust against the walls of the vial is obviated and breakage of the vial prevented.

From Fig. 5, which illustrates the present invention, it will be seen that the head 37 is swiveled at 39 to the end of the plunger 35 and is separate from but bears against piston 34 and that its diameter is less than that of the vial. Hence the assembly constitutes a three link kinematic train which is free to run down through the vial without any self jamming or locking or wedging action.

While a preferred form of the invention has been described and illustrated, it is not intended that the invention be limited to the exact details shown. The two-part plunger may obviously be used with other types of syringes and the manner of connecting the parts of the plunger changed if desired.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. A dental syringe or the like, comprising a container for a liquid, a piston in said container, a plunger separate from said piston and adapted to move said piston longitudinally of the container to eject liquid therefrom, said plunger comprising a two-part rod, the diameter of said plunger being less than that of said container, and a swivel connection between the parts of the rod.
2. A dental syringe or the like, comprising a container for a liquid, a piston in said container, a plunger separate from said piston and adapted to move said piston longitudinally of the container to eject liquid therefrom, said plunger comprising a two-part rod, the diameter of said plunger being less than that of said container, and a ball and socket connection between the parts of the rod.
3. A dental syringe or the like, comprising a container for a liquid, a piston in said container, said piston being formed of resilient material, a plunger separate from said piston and adapted to move said piston longitudinally of the container to eject liquid therefrom, said plunger comprising a two-part rod, the diameter of said plunger being less than that of said container, and a swivel connection between the parts of the rod.
4. A dental syringe or the like, comprising a container for a liquid, a piston in said container, said piston being formed of resilient material, a plunger separate from said piston and adapted to move said piston longitudinally of the container to eject liquid therefrom, said plunger having a diameter less than that of said container and comprising a two-part rod, one portion of the rod having a substantially spherical end, the other portion of said rod having a substantially spherical recess, said recessed end and said spherical end cooperating to form a ball and socket connection between said portions.

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