A dental injection gun is provided for injecting anesthetics into the periodontal ligament and comprises a frame having a pistol grip portion carrying a sleeve holder to which is connected a syringe holder, a pusher rod being received in the sleeve holder and being provided with ridges acted upon by an apertured member when the latter is moved by an actuator to eject step-by-step an anesthesia from the gun occasioned by interaction of the apertured member with the ridges on the pusher rod.

4 Claims, 2 Drawing Figures
DENTAL INJECTION GUN

This invention relates to a dental injection gun.

Various authors have established the value of intra-ligamentary anesthesia in dentistry, but in practice it is not generally applied for lack of simple and effective instruments suitable for carrying it out.

It is therefore an object of the present invention to provide a dental injection gun into which a dental syringe can be inserted and conveniently actuated by a dentist to inject an anesthetic into the periodental ligament.

More particularly the invention provides a dental injection gun which comprises handle means similar to the handle of a gun and easily to be gripped by one hand syringe holding means in the upper portion of said handle means, pusher means mounted on said handle means adjacent said syringe holding means rearwardly in the longitudinal extension thereof for movement longitudinally of said syringe said pusher means being arranged to act upon a piston in said syringe and control lever means pivotally mounted on said handle means and pivotally connected to said pusher means for imparting said longitudinal movement thereto.

A preferred embodiment of the invention will now be described with reference to the accompanying drawing in which FIG. 1 is a schematic side view of the dental injection gun; and FIG. 2 is an axial part cross-section taken along line II--II of FIG. 1.

Referring to the drawing, the dental injection gun shown therein has a syringe holder comprising a slotted sleeve 2 secured to a sleeve holder 3 by means of a bayonet or screw coupling, and adapted to receive a syringe 1. The sleeve holder 3 is an integral part of the frame of the gun, the frame being shaped to provide a pistol grip as hereinafter more fully disclosed. The syringe 1 has a piston (not shown) actutable by a pusher rod 6 provided with equally spaced transverse grooves defined between ridges on the rod and longitudinally shiftably mounted in an axial bore provided in the sleeve holder 3 rearwardly in the longitudinal extension of the syringe 1. Mounted on the pusher rod 6 is a lug 5 having a hole therein slightly larger than the diameter of the pusher rod 6 which extends through this hole. A double-armed bracket 9 having an arm on either side of the pusher rod 6 has one end pivotally connected at 10 to a forked end 11 of a control lever 12 in the form of a trigger which is mounted for swinging movement about a pivot 13. The other end of the bracket 9 is pivotally connected at 7 to the bottom end of the lug 5. The rear end of the pusher rod 6 is provided with a countersunk knob 8 to prevent the lug 5 from slipping off the pusher rod 6 and permit the lug 5 to be longitudinally adjusted in its position on the pusher rod 6. A torsion spring 25 surrounds the pivot 7 and is supported with one end against the lug 5 and the other end against the bracket 9 whereby to normally incline the lug 5 in the direction shown in FIG. 1 in the non-actuated position of lever 12. A blade spring 14 is fixed laterally on the sleeve holder 3 and has a pin 15 at one end engaging on the ridges on the pusher rod 6. A similar blade spring is provided on the other side of the sleeve holder 3 as shown in FIG. 2. It will be appreciated that by virtue of the torsion spring 25 and the pivotal mounting of lug 5 about pivot 7, the lug may be moved into an oppositely inclined position relative to that shown in FIG. 1 through an intermediate perpendicular position.

The pusher rod 6 with its control lever 12 is mounted on a handle 16 in the form of a pistol grip. On the side adjacent the control lever 12 the handle 16 has a projection 23 and therebelow a pair of recesses 24 suitably shaped to receive a finger in each of them. An elongated leaf spring 17 is located within and extends longitudinally of the handle 16 and is fixed at one end by means of a screw 18 to an interior lower wall of the handle 16. The other free end 19 of the leaf spring 17 is provided with a hole through which extends a rod 20 provided with a collar 21 engaging the leaf spring 17 adjacent the hole at the free end 19 thereof, the diameter of the collar 21 being larger than that of the hole in the leaf spring 17. The rod 20 is mounted within the handle 16 but has a free end projecting therefrom and engaging the rear side of the control lever 12. So the leaf spring 17 urges the rod 20 against the control lever 12 to keep the latter in its rest position in which the pusher rod 6 does not act upon the piston of the syringe 1.

The operation of the dental injection gun is as follows:

The pusher rod 6 is pushed back as far as it will go by pulling the knob 8 while keeping the lug 5 lightly pressed forward with a finger, thus allowing the lug to ride over the ridges of the pusher rod 6. In this position of the pusher rod 6 the syringe 1 can be easily inserted in the syringe holder 2, 3 after the coupling 4 has been unscrewed or released. The syringe 1 complete with injection needle is then locked in the syringe holder 2, 3 by means of the coupling 4. Then the gun is ready for the injection operation.

For the injection operation itself the injection gun is held by the handle 16 in one hand with the thumb on one side thereof and the small finger and the ring finger on the other side in the recesses 24 below the projection 23 and the control lever 12 is pulled rearwardly by the forefinger and the middle finger of the same hand placed in front of the lever 12 above the projection 23. Thereby the pusher rod 6 is moved stepwise forwardly and as the front end of the pusher rod 6 acts on the rear of the piston in the syringe 1, the syringe piston is moved forwardly and injects the anesthetic from the syringe 1 into the periodental ligament. Each actuation of the control lever 12 causes the pusher rod 6 to advance by one step the length of the steps being determined by the length of travel of the lug 5. After each pull exerted on the control lever 12 the latter is returned to its forward position by the leaf spring 17, the lug 5 riding over the ridges under the action of the portion spring 25. In this manner a gradual injection operation is ensured. The blade spring 14 essentially have the purpose of frictionally resisting the movement of the pusher 6 by virtue of engagement of pin 15 with the ridges on the pusher rod 6, whereas the torsion spring surrounding the pivot 7 ensures that the lug 5 will engage the ridges of the pusher rod 6 during the forward movement of the control lever. The slots in the sleeve 2 permit to observe the movement of the syringe piston. However, the end of the stroke of the syringe piston can also be checked by observing the degree of movement of the knob 8 relative to sleeve holder 3.

When it has thus been established that the syringe piston has reached the forward end of its stroke, the injection operation is completed. The syringe is withdrawn from the mouth of the patient and the syringe can be
removed from the injection gun by unlocking the coupling as described above.

Although a preferred embodiment of the invention has been described herein in detail and illustrated in the accompanying drawing it is to be understood that the invention is not limited to this precise embodiment and that numerous changes and modifications obvious to one skilled in the art may be made therein without departing from the scope and spirit of the invention.

I claim:

1. A dental injection gun comprising a frame having a portion thereof shaped to provide a pistol grip, an elongate sleeve holder integral with the frame and being oriented substantially perpendicularly relative to the pistol grip portion of the frame, an elongate sleeve adapted to hold a syringe and being detachably connected to said sleeve holder for axial alignment therewith and extension therefrom, an elongate rod received in said sleeve holder for movement relative thereto and being adapted to act at one end thereof on a charge of anesthetic in said sleeve when moved in a predetermined direction relative to said sleeve holder, said rod being formed with a plurality of ridges on its outer surface which ridges extend generally transverse to the axis of the elongate rod and terminating in an enlarged head at that end of the rod opposite said one end thereof, actuating means for actuating said rod and comprising lever arms one of which is a trigger arm extending in the general direction of said pistol grip and being pivotally mounted to said frame with one end thereof proximate said rod and its opposite free end normally urged in a direction away from the pistol grip portion of the frame, said lever arms including a double arm bracket pivotally mounted at one end thereof to said one end of said trigger arm, a lug disposed generally transversely to the axis of the rod and being mounted to the opposite end of the bracket for pivotal movement about an axis transverse to the axis of the rod, said lug being formed with a hole of a diameter slightly larger than the largest diameter of the ridges on said rod, the latter passing through said hole in said lug, and torsion spring means for normally urging said lug into an inclined position in a direction opposite to the direction of advancement of said rod by said actuating means and in which position of the lug the surface defining said hole being in gripping engagement with the ridges on the rod, said lug being movable into an oppositely inclined position through an intermediate perpendicular position.

2. The dental injection gun according to claim 1, wherein the spring means biasing the apertured member is a torsion spring.

3. The dental injection gun according to claim 1, wherein the piston grip is formed with a projection providing multiple finger engaging surfaces.

4. The dental injection gun according to claim 1, there being included means on the sleeve holder acting on said ridges for frictionally holding the rod in the position in which it is moved.

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