

Dec. 5, 1950

H. F. BOEGER
GUARD DEVICE FOR SYRINGES FOR USE
WITH HEAT-FLUENT MATERIALS
Filed Dec. 8, 1947

2,532,598

Fig. 1.

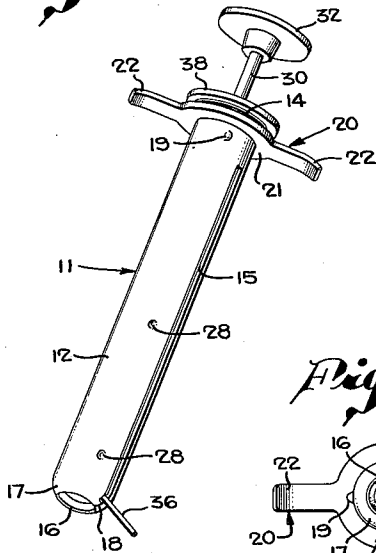


Fig. 3.

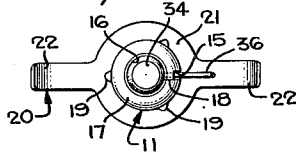


Fig. 7.

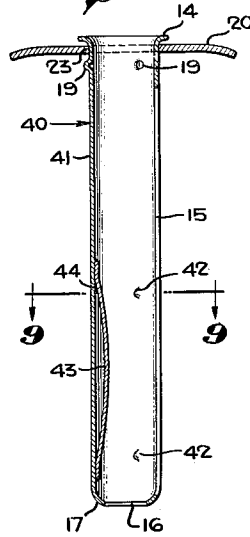


Fig. 2.

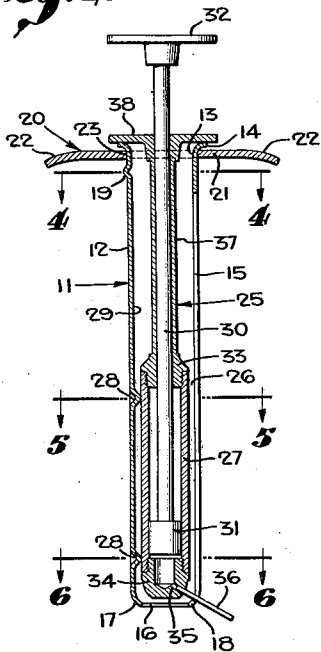


Fig. 8.

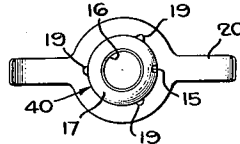


Fig. 4.

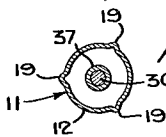


Fig. 9.

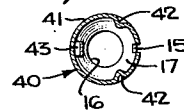


Fig. 5.

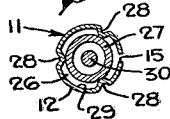
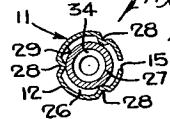


Fig. 6.



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2,532,598

GUARD DEVICE FOR SYRINGES FOR USE
WITH HEAT-FLUENT MATERIALS

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Application December 8, 1947, Serial No. 790,351

5 Claims. (Cl. 128—234)

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This invention relates to a guard device for use with a syringe containing heated materials and pertains particularly to a device suitable for use by a dental technician in conjunction with a syringe for injecting heat-fluent dental impression compositions, such as hydrocolloid compositions of the agar-agar type, into cavities or tooth preparations, as in the technique of producing dental inlays.

These compositions, as is well known, have the characteristic of congealing to a resilient solid condition at a temperature at or near body temperature when cooled to such congealing temperature from a heated, fluent condition. To obtain the desired fluent condition of the composition and at the same time to sterilize the syringe, it is the practice in the dental art to insert fragments or pieces of solidified impression-material into a more-or-less conventional syringe, provided with a hollow discharge needle at one end and adapted to receive a conventional plunger operating in a cylindrical cavity, put the plunger in place so as to close the cylindrical cavity, and place the entire syringe in boiling water and boil it for a sufficient time to render the contained impression-material suitably fluent. When, subsequently, the technician or dentist removes the syringe from the boiling water, it will be understood that the syringe is at a temperature which makes it painful for the dentist to handle and painful for the patient in the not infrequent event that it comes into contact with his mouth tissues.

Such a conventional syringe is usually provided with a discharge needle disposed at an angle to the length of the syringe to afford better access to all parts of the mouth, and with a knob or handle on the outer end of the plunger and a finger-grip on the body portion containing the cylindrical cavity. The finger-grip is usually a small disc rigidly secured to the body portion or to the cylinder head thereof, and is circular so as to provide equal gripping surfaces at all angles and small so as not to obscure the dentist's view of the patient's mouth. The dentist may hold such a syringe with the knob or handle pressed by his thumb or the heel of his hand and the body portion of the cylinder head gripped between two fingers which engage the finger grip. Flexion of the fingers will then press the plunger into the cylindrical cavity. As the instrument is symmetrical with the exception of the angular divergence of the hollow needle, it may be so held that the needle is at any desired angular relation to the dentist's hand, but the construction requires

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that the hot body portion or cylinder head be firmly gripped between two fingers to control the direction of the discharge needle and prevent unnecessary contact of the syringe with the patient's mouth. In these circumstances it is not extraordinary that discomfort to the dentist or practitioner may result in added discomfort to the patient, or that flinching by the patient sets in motion a chain reaction in which he suffers doubly.

Having in mind the above outlined status of the art, it is a particular object of the invention to provide a guard device for a syringe which will enable the dentist or practitioner to handle the syringe without discomfort to himself and to direct the discharge needle of the syringe to a desired location in the patient's mouth without danger of contacting the patient with the heated mass of the syringe body.

It is a further object of the invention to provide a guard device for a syringe as described, which can be manufactured at a nominal cost and which is sturdy, easy to maintain in sanitary condition, and of pleasing appearance.

Another object of the invention is to provide a guard device for a syringe which may be quickly installed thereon and removed therefrom and which affords the practitioner complete control of the plunger action of the syringe as well as directional control of the discharge needle.

The device of the present invention comprises, essentially, a tubular casing adapted to receive and enclose that portion of the syringe extending below the finger-grip of the syringe, provision being made for outward extension of the discharge needle through the wall of the casing. The internal diameter of the casing is such that an annular space may extend around the body of the syringe, between the body and the casing, so that the heated body is space-insulated. Guide means are provided for holding the syringe body centrally within the insulating space, and these guide means are resiliently brought into contact with the syringe body so as frictionally to resist and control lengthwise relative movement of the syringe and the casing. As the fixed finger-grip of the syringe is brought into such proximity with the end of the casing as no longer to serve its original purpose, a finger-grip is provided on the casing which may be rotated thereabout to obtain any desired angle between the fingers of the practitioner and the discharge needle and may be wedged into temporarily fixed relation with the casing when the desired angular relation has been achieved.

The above and other features of this invention will be brought out in the ensuing description of certain preferred embodiments thereof, or will be apparent from such description, having reference to the accompanying drawings, in which:

Fig. 1 is a view in perspective of a guard device embodying the principles of this invention, shown as containing a syringe in operative position;

Fig. 2 is a medial longitudinal sectional view of the guard device and syringe shown in Fig. 1;

Fig. 3 is a bottom plan view;

Figs. 4, 5, and 6 are transverse sectional views taken on the correspondingly numbered lines of Fig. 2, the direction of view being the same in all instances, as indicated by the arrows;

Fig. 7 is a medial longitudinal sectional view of a modified form of guard device, in accordance with this invention;

Fig. 8 is a bottom plan view of the guard device shown in Fig. 7; and

Fig. 9 is a transverse sectional view taken on the line 9-9 of Fig. 7.

Referring to the drawings, and particularly to Figs 1 through 6, the guard device of this invention may comprise a tubular casing 11, formed of metal or of a material of relatively low heat conductivity, such as a synthetic resin but possessing a moderate elasticity or springiness so as not to be brittle when slightly distorted. The casing 11 has a cylindrical wall 12 defining an opening 13 at one end, provided with a flange 14, and has a slot 15 extending from a position adjacent the opening 13 toward the other end of the casing, preferably to a position near said other end. Said other end of the casing preferably has an opening 16 formed with an inwardly turned margin 17. A narrower slot 18 in the margin 17 connects the slot 15 and the opening 16. It will readily be seen that the casing 11 may be easily formed from a tube of metallic or plastic material having its one end spun outwardly to form the flange 14 and its other end spun inwardly to form the margin 17, and with the slots 15 and 18 milled as described.

Disposed between the opening 13 and the adjacent end of the slot 15, the casing 11 has a plurality of outward protuberances 19 which may be punched or pressed in the wall 12 and which form shoulders for retaining a finger-grip 20 between them and the flange 14. The finger-grip 20 is formed with a collar portion 21 fitting, loosely, the casing 11 and provided with laterally and oppositely extending tabs 22 for convenient engagement by the fingers of the practitioner. In the spinning operation of forming the flange 14, the casing 11 is slightly distended or belled between the protuberances 19 and the flange 14 to form a conical bearing 23, upon the narrow end of which the finger-grip 20 is rotatable and upon the wider end of which the finger-grip may be temporarily bound by a slight pressure in that direction.

The casing 11 is internally dimensioned to receive, freely, a syringe 25 through the opening 13 and to afford an annular space 26 between the wall 12 and the body portion 27 of the syringe. A plurality of inward protuberances 28 on the inner surface 29 of the wall 12 extend into the annular space 26 and hold the body portion 27 centrally within the casing 11, so that the annular space 26 encompasses the body portion 27 with substantially uniform space-insulation. As illustrated, the protuberances 28 are grouped in two longitudinally spaced groups,

each of which comprises three protuberances spaced circumferentially at one hundred and twenty degrees. Such grouping of the protuberances 28 provides adequate support and retention of the body portion 27 within the casing 11, with a minimum number of points of contact across the insulating annular space 26, but it will be understood that any arrangement of protuberant members serving the above-stated purpose is within the scope of the invention.

The syringe 25 herein illustrated and described is more or less conventional, and may comprise, in addition to the body portion 27, a plunger 30 provided at one end with a plunger head 31 and at its other end with a handle 32 formed as a disc for convenience either in gripping with the fingers or in pressing with the flat of the hand or the thumb. The plunger 30 extends through a cylinder head 33 into the body portion 27 which is closed at its compression end by a second cylinder head 34 having an opening 35 in which is set a hollow discharge needle 36. At least one of the cylinder heads is threadably secured to the body portion 27 to permit removal thereof for filling the syringe, and in the syringe shown both heads 33 and 34 are so secured. The discharge needle 36 is set at an angle to the axis of the casing 11 and extends outwardly through the slot 15 which is sufficiently wide throughout its length to permit the needle 36 to slide therein.

The cylinder head 33 has an extended hollow shank 37 forming a bearing for the plunger 30 and provided at its free end with an outwardly projecting member or flange 38 rigidly secured thereto, said member being generally disc-shaped. The member 38 is used as a finger-grip in the conventional unguarded syringe in conjunction with the handle 32 as a means of grasping and operating the syringe, and also serves as handle means for unscrewing the cylinder head 33 from the body portion 27 to permit removal of the plunger 30. In the instant construction the member 38 serves the latter purpose and also preferably serves as a stop to limit the entry of the syringe 25 into the casing 11, although other stop means are available, such as contact of the cylinder head 34 with the inwardly turned margin 17, or contact of the needle 36 with the end of the slot 15. The use of the member 38 as a stop is particularly advantageous in order to minimize contact and resulting transfer of heat between the heated syringe and the portion of the guard device that is subject to contact with the patient's mouth.

To use the syringe 25, as protected by the casing 11, for its intended purposes in dentistry, the operator first fills the body portion 27 with masses of solidified heat-fluidizable impression-material, for that purpose removing and then replacing one of the cylinder heads such as head 34, and places the syringe in boiling water. When the contained impression-material has become sufficiently fluent, the syringe is removed from the water and the needle end thereof is inserted in the casing 11 through the opening 13. The syringe is held tilted in relation to the casing during the initial stage of entering it in the casing, to permit the needle 36 to enter the slot 15 past the flange 14 and the upper part of the wall 12. When the needle 36 has been engaged in the slot 15, the syringe is thrust into the casing by pressure applied to the conventional finger-tip

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member 38 in order not to apply pressure prematurely to the plunger 39. When the cylinder head 34 encounters the upper group of protuberances 28, it will receive therefrom frictional resistance to its further entry into the casing, but continued pressure on the finger-tip member 38 will cause the wall 12 to dilate as permitted by its elasticity and the slots 15 and 18 and the opening 16, thus allowing the cylinder head 34 to pass first the upper group of protuberances 28 and then the lower group and to proceed until further entry is stopped by contact of the member 38 with the flange 14. The elasticity of the wall 12 causes the protuberances 28 to grip the body portion 27 so as to prevent the syringe from sliding out of the casing except in consequence of intentionally applied force.

With the heated body portion 27 and cylinder head shank 37 enclosed in the casing 11 as above-described, the casing may be comfortably touched to even the tender membranes of the mouth, due to the space-insulation provided by the annular space 26. Grasping the casing 11 with the hand is not, however, necessary, as the combined unit may be manipulated by means of the finger-grip 20 and the handle 22. The finger-grip 20 may be rotated upon the conical bearing 23 to assume any convenient angle in relation to the discharge needle 36, and when such a convenient angle has been established, the initial flexion of the hand to force the plunger head 31 against the heat-fluent impression material will also draw the finger-grip 20 towards the expanded end of the conical bearing 23 and bind the finger-grip on the bearing at the selected angle. Continued manual pressure against the handle 22 causes the plunger head 31 to exert pressure against the heat-fluidified impression-material and thus to extrude such material through the discharge needle 36.

The syringe 25 may be withdrawn from the casing 11 by grasping either the handle 32 or the member 38 with one hand while the fingers of the other either grasp the wall 12 or are hooked over the upper side of the finger-grip 20. The distance between the flange 14 and the outward protuberances 19 is such that the finger-grip 20 may be retracted from the member 38 sufficiently to permit insertion of the finger tips under the latter. The protuberances 19 serve as shoulders against which the finger-grip may be pressed to exert the force necessary to withdraw the syringe from the grip of the inward protuberances 28, and also serve at all times to bar the finger-grip 20 from the vicinity of the slot 15 and so from contact with the discharge needle 36. It will be appreciated that it is desirable to keep elements handled by the practitioner not only out of contact with the patient's mouth but also out of contact with other parts such as the discharge needle which enter the mouth.

In Figs. 7, 8, and 9 I have illustrated a modified embodiment of my invention in which the casing of the guard device need not be of elastic material, other resilient means being provided for causing the syringe to be gripped by the casing in the desired relative position. A casing 40 has a cylindrical wall 41 provided at its upper end with a flange 14, conical bearing 23 and outward protuberances 19, and at its lower end with an opening 16 and inwardly turned margin 17, and with a slot 15 extending from below the protuberances 19 to the vicinity of the opening 16, as in the preferred embodiment of my invention, but devoid of the narrow slot 18 of the preferred

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embodiment. The opening 16 is not necessary, as no elastic distortion is required of the casing 40, but its inclusion permits the casing to be made of tubing by a simple spinning and milling operation. A finger-grip 20 is carried rotatably upon the conical bearing 23.

Inward protuberances 42 on the inner surface of the wall 41 extend inwardly to engage the body portion of a syringe, the illustration of which is not repeated, the arrangement in the present instance being that of upper and lower groups of two protuberances 42 each, with the protuberant members of each group spaced approximately one hundred and twenty degrees apart circumferentially, and in longitudinal alignment with the members of the other group. A leaf spring 43 is disposed in the place occupied by the third protuberances in my preferred embodiment, this spring substituting not only for the third protuberances of each group but for the elasticity provided by the wall and slot structure of my preferred embodiment. The spring 43 is secured at one end, preferably the upper end, to the wall 41 as by spot welding in the instance of a metallic wall as shown at 44. When a syringe is placed within the casing 40, the spring 43 yields to permit entry of the syringe, the free end of the spring sliding on the wall 41, and then holds the syringe in proper alignment and in spaced relation to the casing 40 to achieve space-insulation between the syringe and the casing, at the same time creating frictional resistance to accidental withdrawal of the syringe. Otherwise the operation and manipulation of this modified embodiment of my invention is substantially identical with that previously described in connection with the preferred embodiment.

Obviously my invention is subject to other modifications and arrangements of parts, hence I do not choose to be limited to the above-described examples, but rather to the scope of the appended claims.

I claim:

1. A guard device for a syringe for use with heat-fluent materials, said syringe having an elongated hollow body for holding said materials, a plunger movable in said body, handle means on said plunger, and a hollow needle forming an outlet from said body inclined at an angle to the longitudinal axis thereof, comprising: a casing for said body having wall means substantially enclosing said body and having an opening at one end for entry of said body thereinto, and having an internal diameter greater than the external diameter of said body; friction means on the interior of said casing engageable with said body so as to resist, while still permitting, longitudinal movement of said body relative to said casing and so arranged as to hold said body annularly spaced from said wall means; and a finger-grip on the exterior of said casing adjacent said opening adapted to cooperate with said handle to form a hand grip; said casing having a slot extending between positions adjacent said finger-grip and adjacent the other end of said casing through which said needle may extend.

2. A guard device for a syringe for use with heat-fluent materials, said syringe having an elongated hollow body for holding said materials, a plunger movable in said body, handle means on said plunger, and a hollow needle forming an outlet from said body inclined at an angle to the longitudinal axis thereof, comprising: a casing for said body having wall means substantially en-

closing said body and having a first opening at its one end for entry of said body thereinto and having an internal diameter greater than the external diameter of said body; said wall means defining a second opening in the other end of said casing and a slot extending from said second opening to a position adjacent said first opening, said slot having a portion capable of allowing passage of said needle therethrough, and said wall means being formed of resilient material and biased to resist lateral expansion of said slot; and protuberances on the inner surface of said wall means adapted by the bias of said wall means to hold said body annularly spaced from said wall means while permitting relative longitudinal movement of said casing and said syringe.

3. A guard device for a syringe for use with heat-fluent materials, said syringe having an elongated hollow body for holding said materials, a plunger movable in said body, handle means on said plunger, and a hollow needle forming an outlet from said body inclined at an angle to the longitudinal axis thereof, comprising: a casing for said body having wall means substantially enclosing said body and having a first opening at its one end for entry of said body thereinto and having an internal diameter greater than the external diameter of said body; said wall means defining a second opening in the other end of said casing and a slot extending from said second opening to a position adjacent said first opening, said slot having a portion capable of allowing passage of said needle therethrough, and said wall means being formed of resilient material and biased to resist lateral expansion of said slot; protuberances on the inner surface of said wall means adapted by the bias of said wall means to hold said body annularly spaced from said wall means while permitting relative longitudinal movement of said casing and said syringe; and a finger-grip member rotatably carried by said casing adjacent said one end, the exterior surface of said wall means there forming a wedge bearing for said member upon which said member may be temporarily bound to prevent relative rotation of said member and said casing.

4. A guard device for a syringe for use with heat-fluent materials, said syringe having an elongated hollow body for holding said materials, a plunger movable in said body, handle means on said plunger, and a hollow needle forming an outlet from said body inclined at an angle to the longitudinal axis thereof, comprising: a casing for said body having wall means substantially enclosing said body and having an opening at its one end for entry of said body thereinto and having an internal diameter greater than the external diameter of said body; protuberances on the inner surface of said wall means spaced circumferentially thereon so as to hold said body spaced from one internal sector of said wall means; a spring disposed within said casing so as to urge said body into contact with said protuberances and out of contact with the remaining internal sector of said wall means; and orifice means for the passage of said needle from the interior to the exterior of said casing.

5. A guard device as set forth in claim 4, in which said orifice means is a slot extending longitudinally of said casing so as to guide said needle in a radial direction relative to said casing; and including additionally a finger-grip member mounted on said casing and rotatable about the longitudinal axis thereof, said casing having an expanded portion adapted to wedge said member to prevent relative movement of said casing and said member; and means barring access of said finger-grip member to the vicinity of said slot.

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