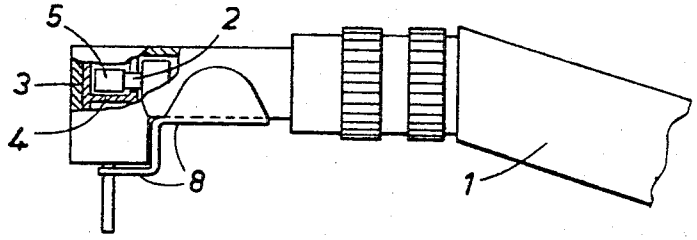
Oct. 21, 1969 G. BERGENDAL 3,473,224

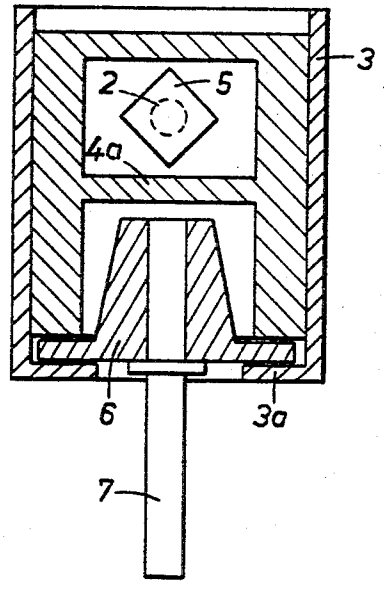
VIBRATORS FOR CONDENSING TOOTH FILLINGS

Filed May 10, 1966 2 Sheets-Sheet 1

PRIOR ART FIG. 1.



PRIOR ART FIG. 2.



PRIOR ART FIG. 3.

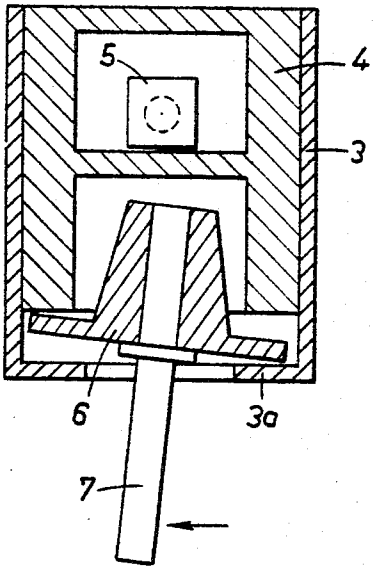


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FIG. 5.

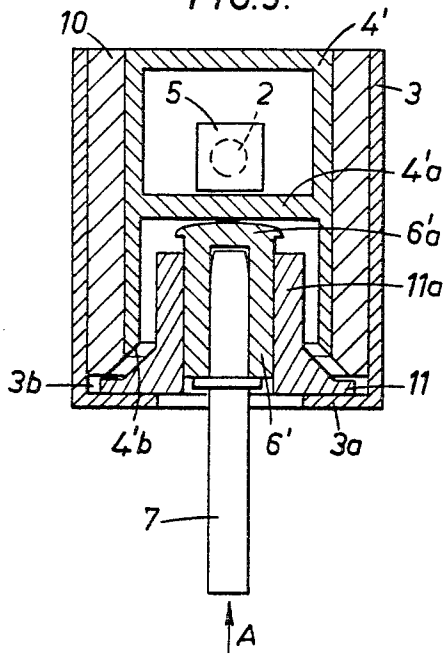
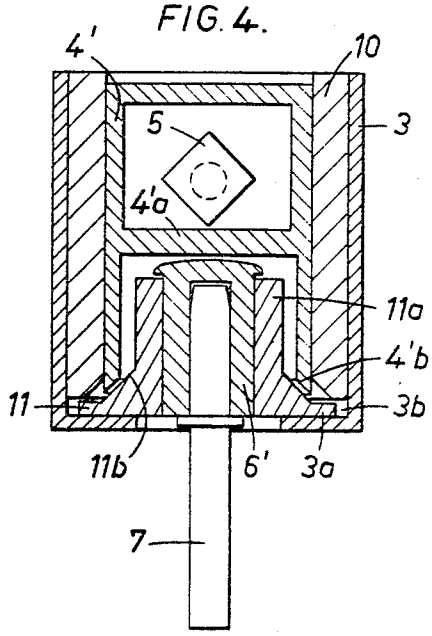


FIG. 4.



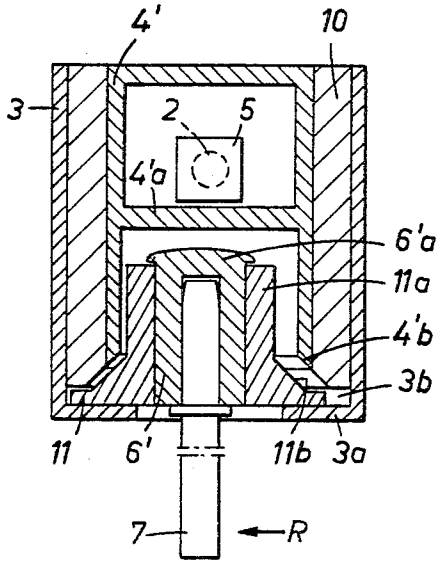


FIG. 6.

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VIBRATORS FOR CONDENSING TOOTH FILLINGS

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Int. Cl. A61c 3/08, B25d 15/00
U.S. Cl. 32—54 4 Claims

ABSTRACT OF THE DISCLOSURE

A vibrator device for condensing or compacting tooth fillings of amalgam or the like, including a workpiece capable of imparting axial and lateral compacting forces against the filling without the necessity of tilting of the workpiece. The vibrator device includes a cylinder defining an annular groove with a member having a portion slideably received in said groove and a holder body including a workpiece slideably received through a bore in said member. The device further includes means for driving said workpiece in a first direction and for driving said member and thereby said workpiece in a direction lateral to said first direction.

The invention relates to vibrators for condensing tooth fillings of amalgam or other corresponding materials.

A usual well-known type of such vibrators is diagrammatically illustrated in the accompanying drawings, in FIGS. 1, 2 and 3, wherein FIG. 1 is a side view of the front portion of the vibrator, in part in a longitudinal central section through the head proper, FIG. 2 is a cross-section on a greater scale along the line II—II in FIG. 1, and FIG. 3 is a cross-section similar to FIG. 2, but with certain movable parts in a different position.

As apparent from FIGS. 1, 2 and 3, said well-known vibrator comprises a shank serving as a handle—a so-called angular handpiece **1** which contains a rotatable driving shaft **2** and is provided with a head in the form of a cylinder **3** for a plunger **4** which is movable transversely to the driving shaft and is operated by a camming body **5** on the end of the driving shaft for performing blows on a body **6** serving as a holder for a working piece **7**, said holder being movable within certain limits in the cylinder, and said working piece being made as a plugging member for the amalgam filling and being attached in the holder by forcing the same into an axial hole in the body of the holder. In order to prevent the working piece from falling out from the attachment, a slidable lock member **8** with a bail-shaped end is provided. The plunger **4** is made as a sleeve having a bottom **4***a* between the ends of the sleeve, said bottom being actuated upon by the camming body **5** of the driving shaft. The blows of the plunger are transferred to the holder **6** over the sleeve-shaped end of the plunger.

According to FIG. 2, the holder **6** is made as a conical sleeve with a disc-shaped flange, but it also can be made as a so-called base plate (substantially according to the Swedish Patent 128,530 or the corresponding United States Patent 2,488,846, British Patent 613,672, French Patent 929,938, and Swiss Patent 51,530), but in any case the holder, when the working piece **7** is subjected to lateral loads, that is during vibration in the lateral direction, will occupy an inclined position in the space between the bottom flange **3***a* of the cylinder **3** and the plunger **4** when the plunger **4** pushed upwards, as shown in FIG. 3. The result of this is that also the working piece **7** is tilted, and on account of this the amplitude of the striking movement will vary in an un-controllable way, so that it can be difficult to effect the condensing of the amalgam filling exactly as wanted.

The object of this invention is to create a vibrator of the type indicated above, in which the working piece cannot occupy an inclined position when subject to lateral loads, a vibration in lateral direction still being possible.

The essential features of the invention appear from the appendant claims and one embodiment of the vibrator according to the invention is by way of example diagrammatically illustrated in FIGS. 4, 5 and 6 of the accompanying drawings, in which:

FIG. 4 is a cross-section through the head of the vibrator according to said embodiment, with the plunger in its lower position;

FIG. 5 is a corresponding cross-section with the plunger in its upper position;

FIG. 6 is a similar cross-section with the plunger in its upper position but the working piece laterally displaced.

In FIGS. 4, 5 and 6, the reference numerals **2**, **3**, **3***a*, **5**, **7** indicate the same parts as in FIGS. 2 and 3, whereas **4'** indicates the sleeve-shaped and thin-wall plunger **4'***a* is the intermediate bottom of the same, and **6'** is the holder for the working piece **7**. In the cylinder **3**, a bush **10** is securely mounted so as to constitute a part of the cylinder **3**, the plunger **4'** being slidable in said bush. The bush **10** does not extend to the bottom flange **3***a* of the cylinder **3** but forms a space therebetween, viz an annular groove **3***b* in the inside of the cylinder wall. In this groove **3***b* a disc **11** is guided for radial sliding movement, always at right angles to the axis of the cylinder **3**. The central portion of the disc **11** is thicker than the remaining portion of the disc and preferably said central portion constitutes a sleeve-shaped lug **11***a* which emerges into the disc **11** through a conical portion **11***b*. The holder **6'** is made as a cylindrical sleeve and is axially slidable in a corresponding hole in the disc **11** and the lug **11***a*. Thus, the unit consisting of the portions **11**, **11***a*, **11***b* is slidable in the radial direction but is not slidable in the axial direction, nor can it be tilted. However, the holder **6'** is slidable in the axial direction but because of its mounting in the unit **11**, **11***a*, **11***b* it is also slidable in the radial direction without being tiltable.

The sleeve-shaped holder **6'** is closed at the end adjacent to the transverse wall or intermediate bottom **4'***a* of the plunger **4'**, and this closed end constitutes a flange-shaped head **6'***a* which during axial loads transfers striking movements from the central portion of the intermediate bottom **4'***a* of the plunger to the holder **6'** and the working piece **7** and also limits the axial movements of the holder **6'**. The plunger **4'** is provided with a lower sleeve portion beneath said transverse wall **4'***a* so as to have its lower sleeve-shaped edge **4'***b* cooperating with the frusto-conical portion **11***b* of the thicker central portion of the disc **11** such that the disc **11** during lateral loads on the working piece **7** is returned to a central position under the influence of a working stroke of the plunger **4'** and forming cooperative means **4'***b* and **11***b* for selectively transferring a force having a lateral component from plunger **4'** to said disc member **11** and thereby to holder **6'** and working piece **7**.

Thus, during axial loads on the working piece **7**, viz when an axial pressure acts on the same, said pressure being indicated by the arrow A in FIG. 5, the holder **6'** with the working piece **7** will vibrate axially in central position under the influence of the blows effected by the intermediate bottom **4'***a* of the plunger **4'** against the head **6'***a* on the holder **6'**, as apparent from a comparison between FIG. 5 and FIG. 4. However, during lateral loads on the working piece **7**, viz when a radial pressure acts on the same, said pressure being indicated by the arrow R in FIG. 6, the unit **11**, **11***a*, **11***b* with the holder body **6'** and the working piece **7** will vibrate laterally un-

der the influence of the blows effected by the sleeve edge 4'*b* of the plunger 4' against the conical portion 11*b*, no tilting movement of the working piece 7 being possible. It should be understood that the unit 11, 11*a*, 11*b* has both a guiding action and a vibration-transfer action.

For illustrative purposes it has been assumed above that the load on the working piece is either pure axial or pure radial, respectively, but in the practice the working piece is generally subjected to an obliquely directed pressure. However, this does not involve any fundamental change of the manner of action, as then both an axial component of pressure and a radial component of pressure exist.

If desired, the holder 6' can consist of a self-lubricating material for facilitating the sliding movement of the same up and down. Also the bush 10 can be made of a self-lubricating material. The provision of the bush 10 has especially the advantage that it allows the formation of the annular groove 3*b* in a simple way.

The bush 10 also renders it possible to mount the device in the head 3 of a vibrator handpiece of already occurring design and dimensions, such as according to FIGS. 1, 2 and 3, so that the pressing tools for the production of vibrator heads must not be changed.

I claim:

1. A vibrator device for condensing tooth fillings of amalgam or the like comprising;

(a) a handpiece,

(b) a cylinder carried by said handpiece, said cylinder having an annular groove,

(c) a member received in said cylinder and moveable radially of said cylinder, said member defining a through bore disposed axially of said cylinder and including a disc portion received in the annular groove of said cylinder, said disc portion having a diameter sufficiently less than the outer diameter of said annular groove that said member is free for radial movement in said cylinder,

(d) a holder body, including a workpiece for striking the filling of a tooth, said holder body being slideably received through said bore in said member,

(e) means in said cylinder for imparting an intermittent driving force,

(f) a plunger slideably received in said cylinder and moveable axially of said cylinder, said plunger having

means in striking engagement with said force imparting means and in striking engagement with the end of said holder body opposite said workpiece for transfer of force in an axial direction from said plunger to said holder body and workpiece,

(g) cooperative means on said plunger and said member for selectively transferring a force having a lateral component to said member and thereby to said holder body and workpiece,

(h) cooperative means on said cylinder, plunger and holder body to prevent tipping of the workpiece thereon when a lateral force is encountered.

2. A device as recited in claim 1 wherein said plunger is comprised of a sleeve element having a transverse wall, said wall being in striking engagement with said force imparting means, and wherein said cooperative means for lateral force transfer includes an inwardly tapering frusto-conical portion of said member and the outer end of the sleeve element, said member being received in said sleeve element on the side of said wall opposite said force imparting means with the end of said sleeve disposed radially of said conical portion and spaced from said conical portion by a distance whereby when the member is centrally located in the cylinder, the wall of the plunger will repeatedly strike the holder body to impart an axially directed vibratory force to the workpiece but when the body member is radially offset from said central position, the end of said sleeve will strike said frusto-conical portion to impart a lateral force to said workpiece.

3. A device as recited in claim 1 wheren the annular groove in said cylinder is defined by an outer flange on said cylinder and the end edge of a bush, said bush being mounted in the cylinder between the cylinder wall and the plunger.

4. A device as recited in claim 1 wherein said force imparting means is comprised of a rotatable shaft rotatably mounted in said device, and an eccentric body carried by said shaft, said body being in striking engagement with said plunger.

References Cited

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ROBERT PESHOCK, Primary Examiner