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Fleer et al.

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[54] **HOLDING AND PULLING DEVICE FOR DENTAL INSTRUMENTS**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **32/22**

[51] **Int. Cl.** **A61c 19/02**

[58] **Field of Search** 268/276, 282, 284, 268/43, 104; 32/22, 23

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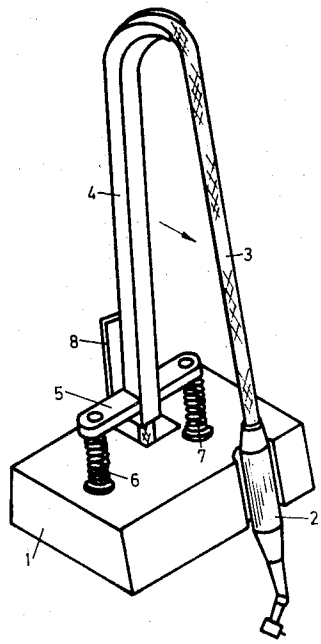
[57] **ABSTRACT**

A device is provided for holding and pulling back hand operated dental instruments connected with tubes and cables, such as drills and syringes. The device has a swinging arm carrying a part of the conduit and used for the delivery of the instrument. An end of the arm is swingably connected with a support and is subject to a release force in such manner that when the instrument is grasped the arm can be inclined in the working direction and sidewise thereto opposite the action of the force. The present invention is particularly characterized in that by suitably selecting the support and/or the releasing members the release force has a component which in case of a side deviation is greater than in case of inclination in the working direction.

12 Claims, 7 Drawing Figures



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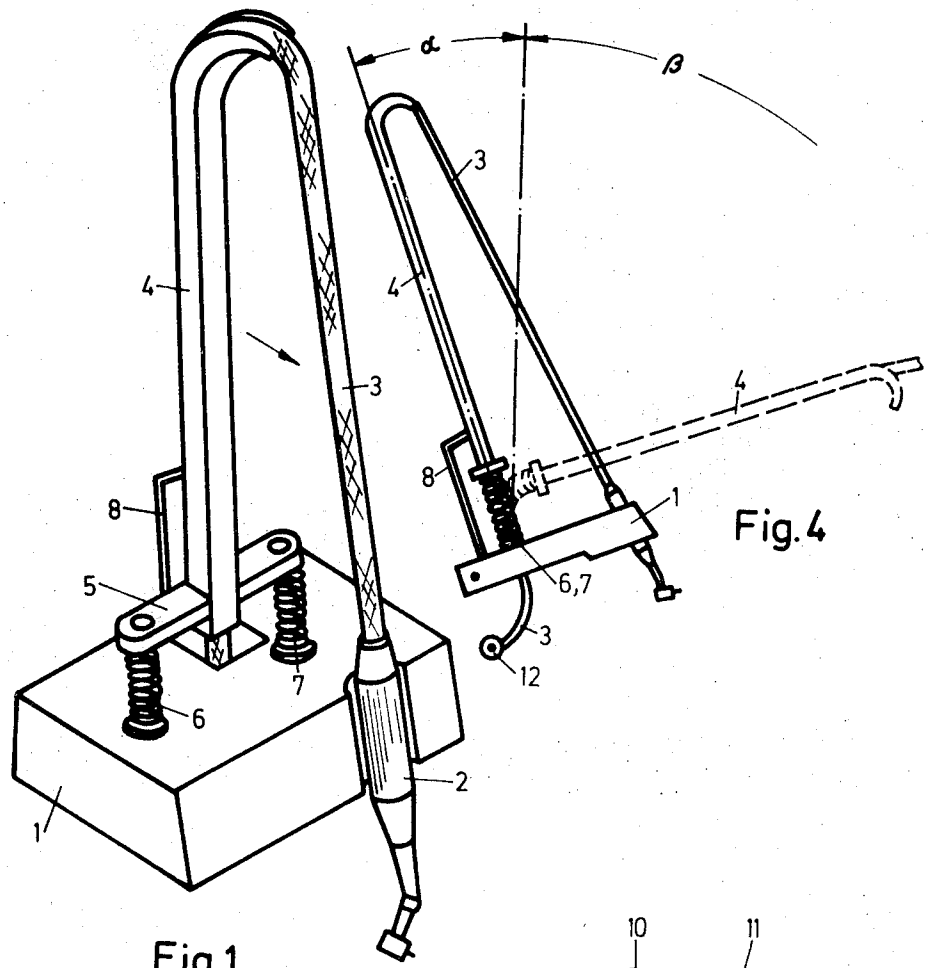

Fig.4

Fig.1

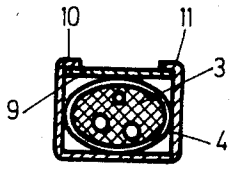

Fig.3

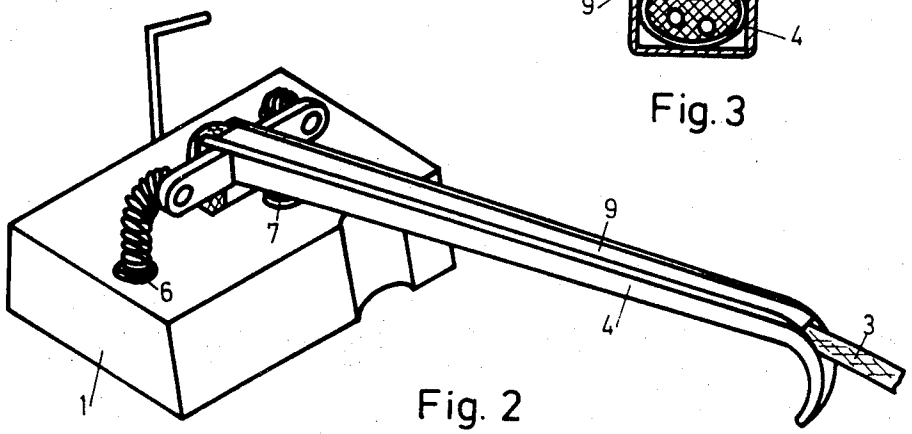

Fig. 2

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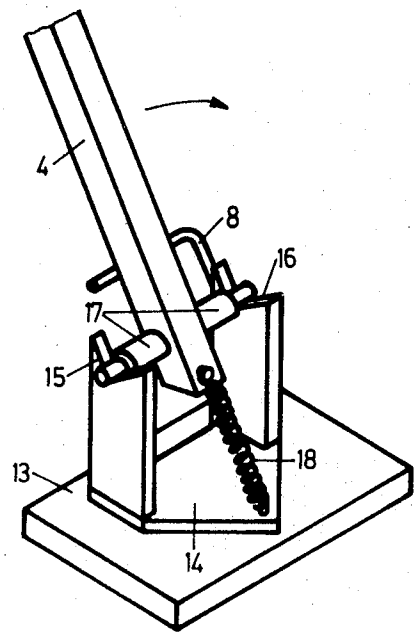

Fig.5

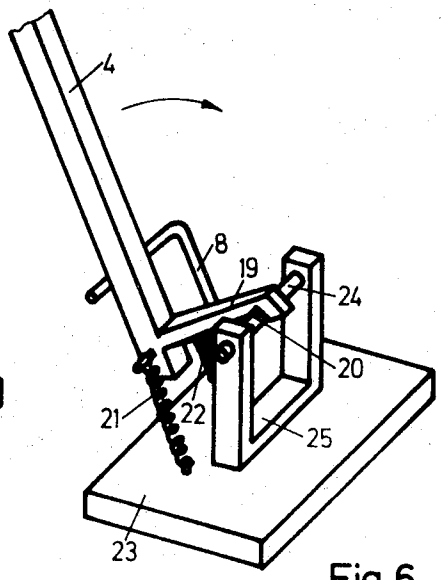

Fig.6

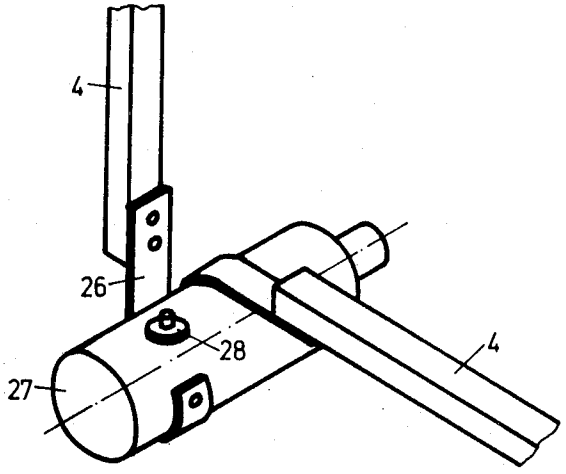

Fig.7

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HOLDING AND PULLING DEVICE FOR DENTAL INSTRUMENTS

DESCRIPTION OF THE INVENTION

This invention relates to a device for holding and pulling back dental handpieces, such as drills and syringes which are connected with tubes and cables. This invention refers more particularly to a device of this type having a swinging arm carrying a part of the connection and used for the delivery of the instrument, whereby an end of the arm is swingably connected to a support and is subject to a release force in such manner that when the instrument is grasped by hand the arm can be inclined in the working direction and sidewise thereto against the action of the release force.

Hand operated instruments, such as drills, syringes or suckers connected with tubes or cables, have comparatively long supply conduits corresponding to the requirements of the practice. The expression "devices holding and pulling back dental instruments" is used in the specification and claims to describe devices which are used to supply the instruments with the conduits attached thereto easily and quickly to the working location and also to quickly remove them when they are not needed from the area in which the doctor is working, without disturbing the doctor and the patient by downwardly hanging tube portions.

Devices are known, wherein a supply conduit extending from a dental instrument container to a manually operated drill is guided and held over a part of its length in or around a coiled spring. The spring is mounted vertically on a support. When the instrument is removed from its rest position the coiled spring is bent. Then a release force is produced acting upon the instrument or the conduit connected therewith, in the direction opposed to the pulling direction so that it tends to pull back the instrument with its conduit into the initial position of rest.

The hanging device for the supply cable of an electrical flat iron is constructed in a similar manner. The device consists substantially in a rigid supporting member variable in height, the upper end of which carries a cable support swingable in all directions, while its lower end is connected by a coiled spring with the ironing table. The electrical cable which is to be held and guided, is relieved from pull in the cable support. The device can be inclined to all sides due to the provision of the spring connection.

A drawback of these known devices, particularly applicable to manually operated dental instruments, is that when the instruments are quickly returned the spring or the supporting member swings beyond its zero position due to the release force and then can hit against the other device parts. This is particularly the case when several instruments are located substantially close to each other in a single supporting unit, as is usual for dental instruments. Then the danger is quite great that the instruments or the conduits connected therewith will hit each other or will get involved one with the other.

This drawback becomes more important due to the fact that the instruments are practically never taken out of their holders in their straight withdrawal direction, but are always removed and put back with a more or less great side deviation.

Besides the "swinging effect" which is provided by a coiled spring, there is the further drawback that a certain release force always acts upon the instrument when it is operated and the release spring is bent. This release force must be always compensated by the doctor by the use of a greater holding force while he is manipulating the instrument.

This has no or little significance in the case of a flat iron of the described type. However, in dental work, for example, when operating a drill, it is necessary to be able to carry out quiet work with the instrument and the conduit attached thereto without additionally straining the hand and arm muscles.

An object of the present invention is to provide a holding and withdrawing device of the described type which will not have the drawbacks of prior art constructions.

Another object is the provision of a device which is so constructed that when the instrument is placed back in its holder, the swinging arm receives a preferential direction extending in the normal working direction, i.e., is opposed to the straight pulling direction. This preferential direction should be independent, however, from the actual pulling direction. A sidewise deviation of the device should also be possible.

Other objects of the present invention will become apparent in the course of the following specification.

In the accomplishment of the objectives of the present invention it was found desirable to provide a swinging arm carrying a supply conduit upon a part of its length. The end of the arm located away from the handpiece is mounted so as to be swingable in all directions, i.e. in the operating direction as well as to the side thereof. The arm is subjected to a release force provided by the specific mountings which has a component extending transverse to the operating direction when the arm is swung to the side. When the handpiece is moved back to the basic inoperative position this component causes the arm to swing immediately from the side position into the plane of the operating position and then back in a direction opposed to the operating direction into the basic position. This component is operative only when the arm is initially swung sideways.

It is advantageous to use as releasing members two resilient members, such as coiled springs, which are spaced and mounted in a support transversely to the working direction and are connected with the swinging arm by a connecting piece or the like.

According to another embodiment of the invention the releasing member consists of a leaf spring which is connected on one side with the swinging arm and on the other with the support. It is advantageous to arrange the leaf spring tangentially to a convex support so that it will spread upon the curved surface when the swinging arm is inclined.

According to a further embodiment of the present invention the holder consists of a V-shaped open bearing bush extending transversely to the working direction which is pressed by spring action against a horizontally directed axle, or the axle is pressed against it.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawings showing by way of example only, preferred embodiments of the inventive idea.

In the Drawings:

FIG. 1 is a perspective view of a device in accordance with the present invention.

FIG. 2 is a perspective view showing the device in the operating position.

FIG. 3 is a section through the swinging arm.

FIG. 4 is a side view of the device in an advantageous normal position.

FIG. 5 is a perspective view of a differently constructed device.

FIG. 6 is a perspective view of yet another embodiment of the present invention.

FIG. 7 is a perspective view illustrating a further embodiment.

The same parts are provided with the same numerals throughout the drawings.

FIG. 1 shows a holding and pulling back device having a support 1 which is attached to an instrument container (not shown) or a part thereof. The support 1 is provided with a recess for receiving a manual drill 2. A supply conduit 3 is connected to the drill 2. A portion of the conduit 3 is guided and held in a tubular swing arm 4. The length of the arm 4 may be, for example, one half of the length of the conduit necessary for operating the instrument. The end of the arm 4 extending toward the instrument is bent in the working direction. This avoids the danger of breaking the conduit. The swinging arm 4 is connected with the support 1 by a plate 5 and two coiled springs 6 and 7. The springs 6 and 7 are used for holding and moving back the arm 4 and the conduit 3 carried by the arm. A stop 8 is used for holding the device in its basic position.

Due to its resilient spring means the device can be moved not only in its normal straight pulling direction (indicated by an arrow in FIG. 10, but also sideways. The illustrated arrangement causes the arm 4 to move in a direction opposed to that of the arrow when the instrument is released. Even in the case of a side deviation the device is always moved back to its end position in the direction opposed to that of the arrow upon release of the instrument. A back and forth swinging of the arm and of the conduits is effectively avoided.

FIG. 2 shows the device in its operative position. The two coiled springs are then bent to such an extent that the spring force compensates substantially the weight of the swing arm and the conduit guided by the arm.

As shown in FIGS. 2 and 3 the arm 4 consists of a rectangular profiled tube. A longitudinal side of the tube is slotted and the slot is covered by a removable plate 9, which is held by flanges 10 and 11. In use the conduit 3 is placed into the tube 4 and then the plate 9 is pushed under the flanges 10 and 11, thereby slightly deforming the cross-section of the conduit 3.

FIG. 4 shows the device is side view in an advantageous basic position. The swinging arm 4 is then inclined relatively to the vertical opposite the working direction to the extent of an angle of about 15° to 20°. The support 1 can be placed directly upon an instrument container in the illustrated position or it can be connected with another supply unit. The connection of the conduit 3 to a generator is indicated by the numeral 12.

In the angular swinging range α the weight of the swinging arm 4 and of the conduit 3 connected therewith supports the release force of the swings 6 and 7. In the angular swinging range β the weight of the arm 4 is compensated more and more by the release force of the two springs 6 and 7, until finally in the end position the weight of the arm 4 and of the conduit 3 connected therewith are completely balanced, so that there is no more noticeable pulling force exerted upon the instrument.

This end position is shown by broken lines in FIG. 4. To move from this position back into the basic position it is sufficient to raise slightly the arm 4. In practice it is carried out by a small short upward movement which is combinated with the return of the instrument into the rest position. If the swinging arm 4 is shifted sideways by mistake or on purpose, then a greater release force than that exerted in the direction of the arrow of FIG. 1 will be applied upon the arm 4 against the side deviation. Thus the arm 4 will be always moved back directly to its end position.

FIGS. 5, 6 and 7 show other embodiments of the present invention wherein the swinging arm can also be swung sideways, while the return of the arm always takes place in the given preferred direction. For clearer illustration, FIGS. 5 to 7 do not show the conduit or the part receiving the instruments.

FIG. 5 shows a support 13 carrying a bracket 14. The two side props of the bracket 14 have V-shaped open bearing bushes 15 and 16. The arm 4 is supported upon these bearing bushes by an axle 17 extending horizontally and transversely to the working direction. To provide a better side guiding of the arm 4 the axle 17 has a smaller diameter at both ends. A pull spring 18 is arranged between the end of the arm 4 and the bracket 14. The spring 18 has the task to press the arm 4 by its axle 17 against the bearing bushes 15 and 16 and also to move the arm after a side swinging back to its basic position.

FIG. 6 illustrates an embodiment of the present invention wherein the swinging arm 4 has a shoulder 19. The shoulder 19 is provided with a V-shaped bearing bush 20. Two pull springs 21 and 22 located between the arm 4 and a support 23, press the bearing bush 20 against the axle 24. The axle 24 is fixed between the legs of a U-shaped stand 25.

FIG. 7 illustrates in basic and operating positions an embodiment of the present invention wherein a leaf spring is used as the release element. The leaf spring 26 is connected at one end with the end of the arm 4 and at the other end with a cylindrical holder 27. The leaf spring 26 has such dimensions that in the working position of the device the weight of the arm 4 and of the conduit connected therewith are compensated. When the arm 4 is swung the leaf spring 26 can unwind upon the surface of the holder 27.

It is advantageous to include a switching device 28, for example, a device for switching on the drill, within the cylindrical holder 27. Preferably, the device is so arranged that the closing of the switch takes place only at a certain swinging angle, for example 30°. This avoids the possibility of an unintentional switching on and starting of the drill when a user touches the swinging arm or, for example, when the device is inclined slightly to exchange the drill.

A switching device dependent upon the swinging of the arm can be also used in the constructions shown in FIGS. 5 and 6.

The present invention is not limited to the illustrated and described embodiments, namely, the two coiled springs shown in FIG. 1 can be replaced by freely swingable spiral springs or by a single rectangularly wound coiled spring. Other constructions of the swinging arm are also possible, for example, a tube with a longitudinal slit with or without a cover. The receiver

for the instruments can be separated from the actual supporting device.

We claim:

1. A device for holding and pulling back a dental handpiece having a conduit attached thereto, said device comprising a swinging arm connected with said conduit and swingable in a working direction and sideways thereto, a support and means supporting said arm upon said support and providing for said arm a release force having a component which is greater in the case of sideways swinging than in the case of swinging in the working direction.

2. A device in accordance with claim 1, wherein said means comprise two springs, said springs being spaced and fixed transversely to the working direction upon said support, said device further comprising a plate carried by said arm and engaging said springs.

3. A device in accordance with claim 1, wherein said means comprise a leaf spring having an end connected with said arm and another end connected with said support.

4. A device in accordance with claim 3, wherein said support has a convex outer surface, said leaf spring unwinding itself upon said convex surface when the arm is inclined.

5. A device in accordance with claim 1, wherein said means comprise at least one bracket having an open bush, an axle engaging said bush and a spring, said spring being connected with said arm and said support.

6. A device in accordance with claim 1, wherein said means substantially compensate in the working position by the release force the weight of said arm and of the conduit attached thereto.

7. A device in accordance with claim 1, comprising a switching device connected with the end of said arm and having a switch operable when said arm is inclined to a predetermined angle.

8. A device in accordance with claim 1, wherein the length of said arm is less or equal to one-half of the free length of said conduit.

9. A device in accordance with claim 1, wherein the end of the arm extending in the working direction is curved.

10. A device in accordance with claim 1, wherein the arm has the shape of a rectangular profiled tube.

11. A device in accordance with claim 10, wherein the arm has a longitudinal slot corresponding to the diameter of the conduit.

12. A device in accordance with claim 11, comprising an elongated plate removably covering said slot.

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