Jan. 5, 1971 R. S. CRAPANZANO 3,552,019

SUB-BRACKET FOR DENTAL ATTACHMENTS

Filed April 29, 1966 7 Sheets-Sheet 1

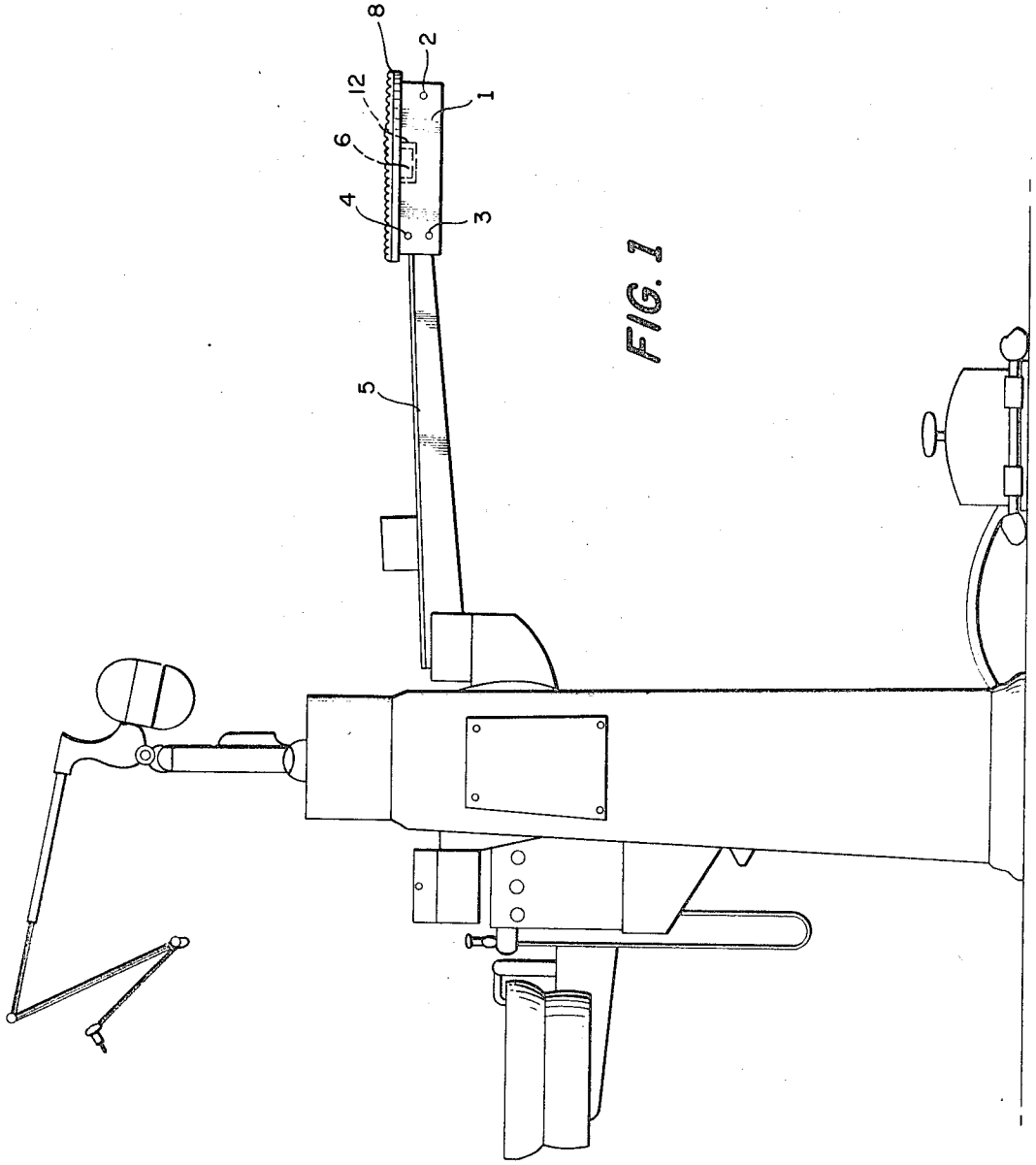

FIG. 1

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Filed April 29, 1966 7 Sheets-Sheet 2

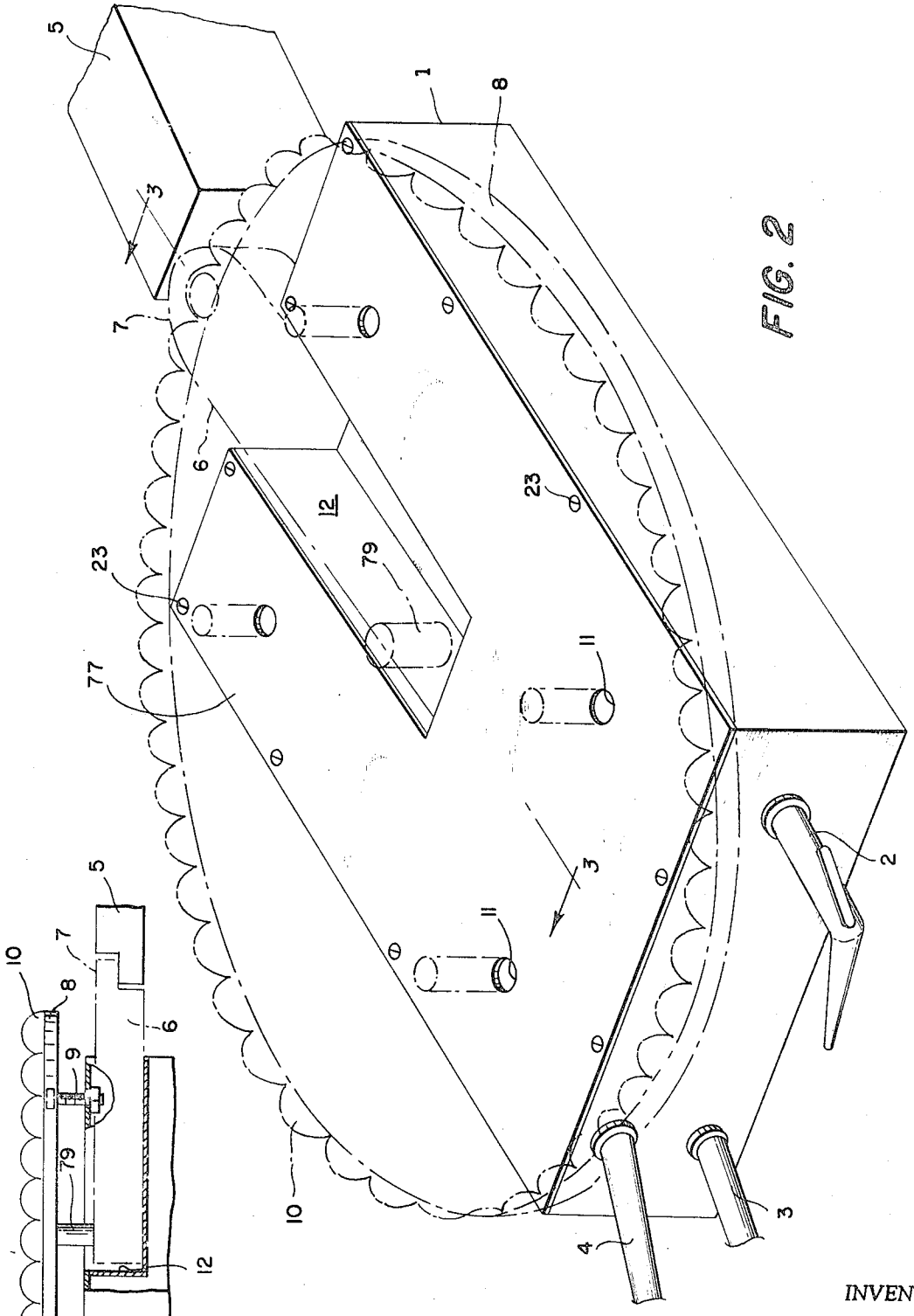

FIG. 2

FIG. 3

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Filed April 29, 1966

7 Sheets-Sheet 3

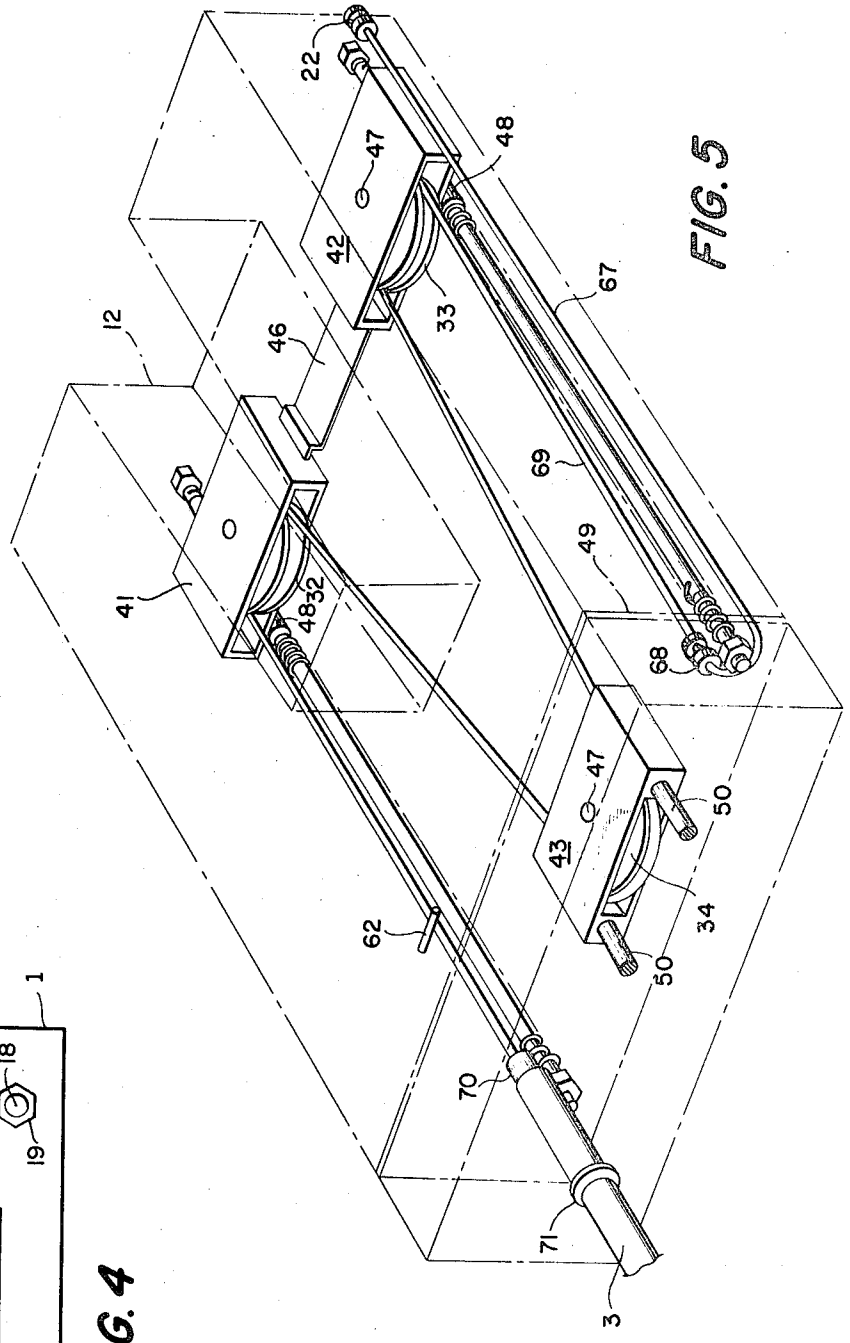

FIG. 5

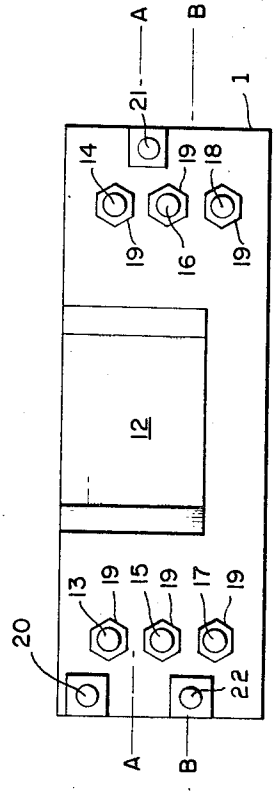

FIG. 4

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Filed April 29, 1966 7 Sheets-Sheet 4

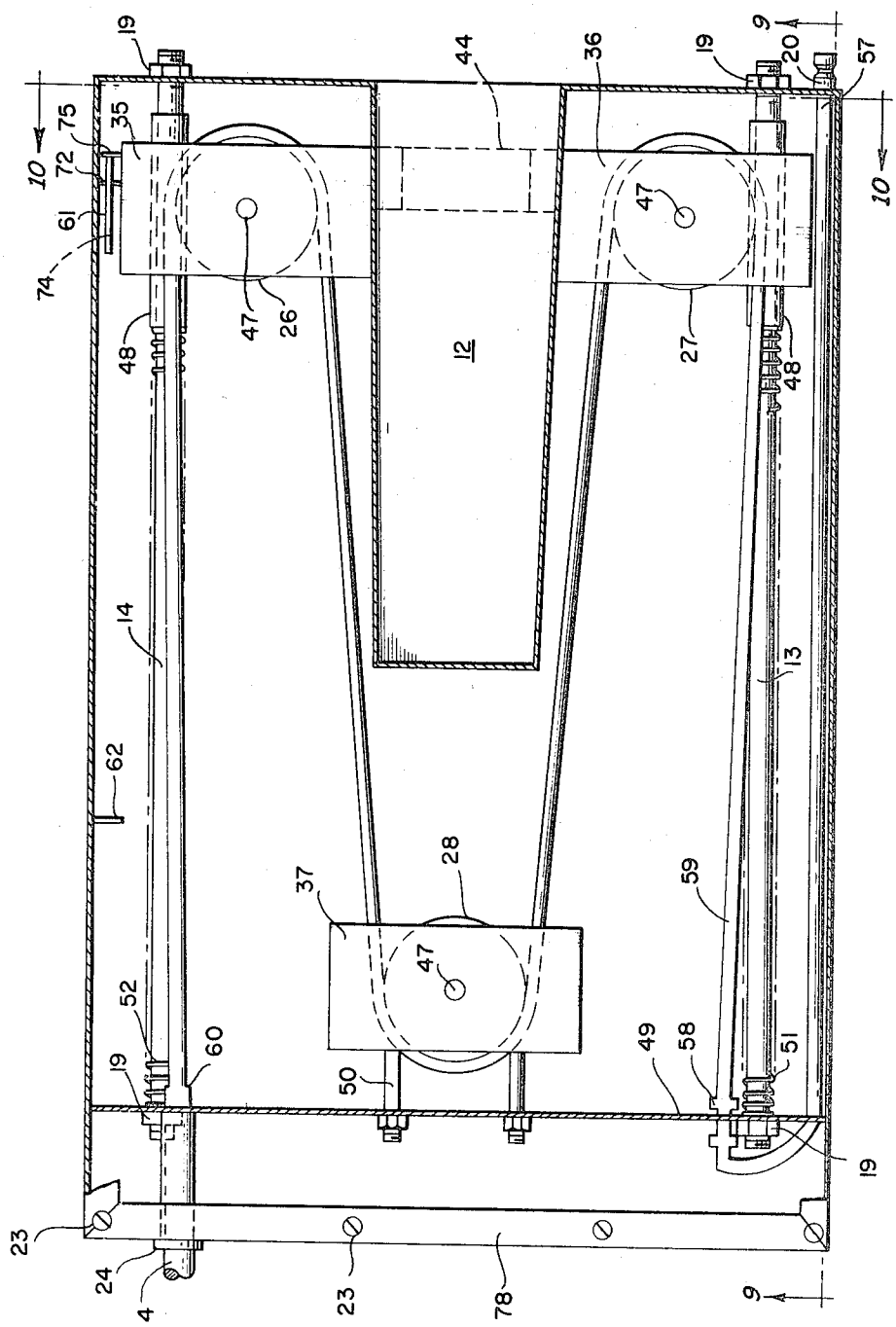

FIG. 6

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Filed April 29, 1966 7 Sheets-Sheet 5

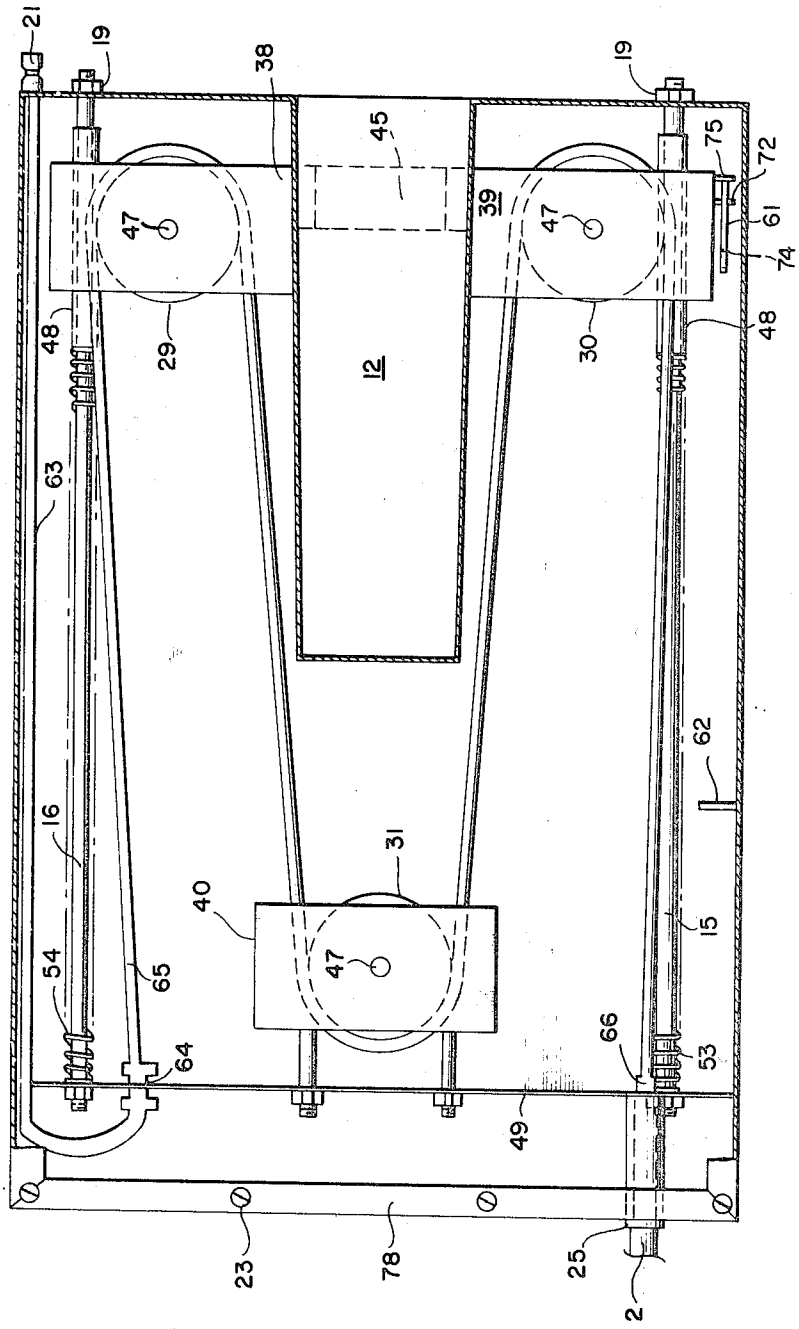

FIG. 7

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SUB-BRACKET FOR DENTAL ATTACHMENTS

Filed April 29, 1966 7 Sheets-Sheet 6

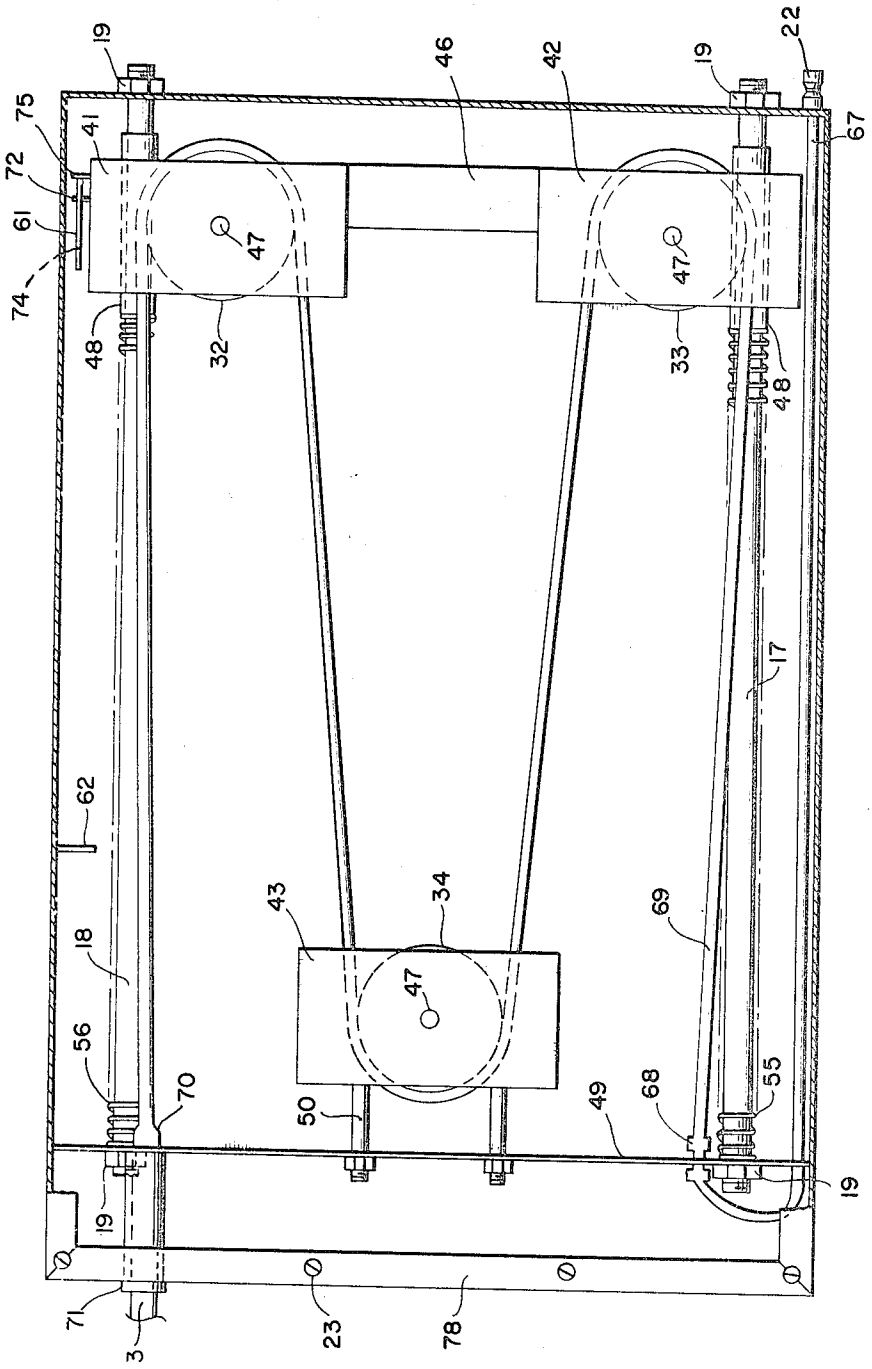

FIG. 8

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SUB-BRACKET FOR DENTAL ATTACHMENTS

Filed April 29, 1966 7 Sheets-Sheet 7

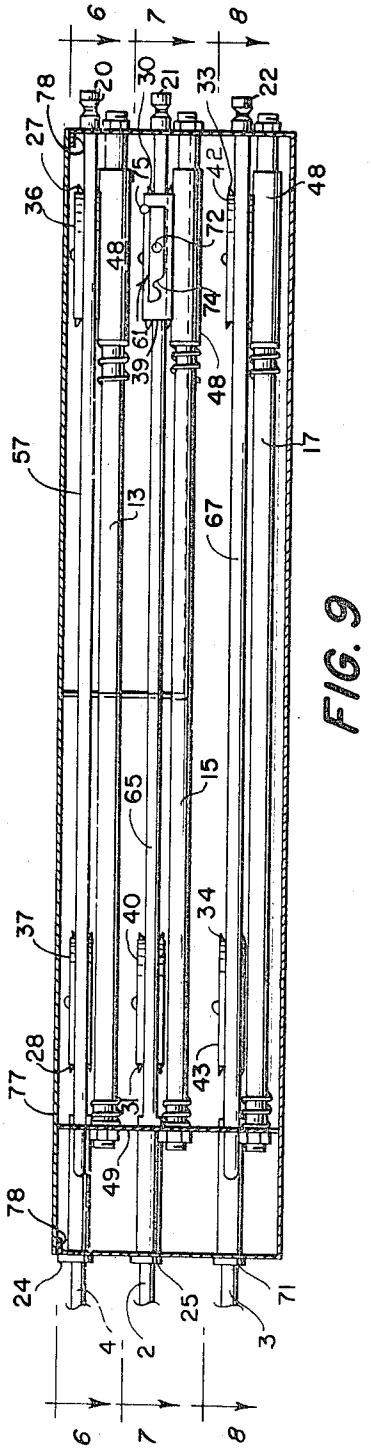

FIG. 9

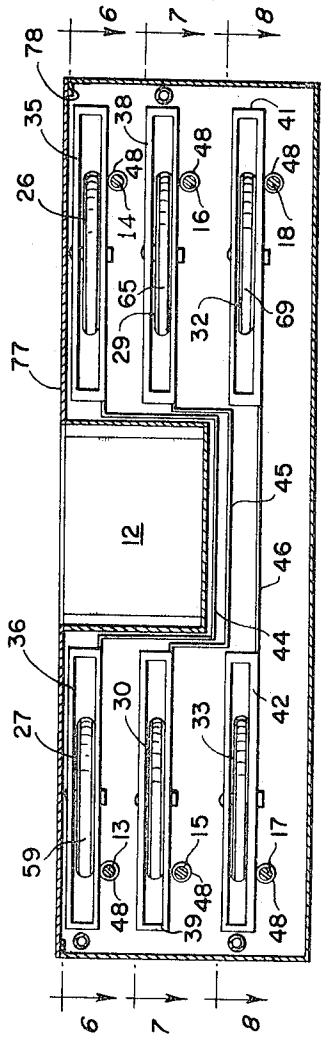

FIG. 10

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United States Patent Office 3,552,019 Patented Jan. 5, 1971

3,552,019

SUB-BRACKET FOR DENTAL ATTACHMENTS

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Filed Apr. 29, 1966, Ser. No. 546,230
Int. Cl. A61c 19/02
U.S. Cl. 32—22 15 Claims

ABSTRACT OF THE DISCLOSURE

A sub-bracket assembly for positioning one or a plurality of line type dental attachments at a convenient location on a conventional dental operatory unit. Each attachment has associated therewith a pulley and spring arrangement for permitting the line of the attachment to be pulled outwardly for use and to be returned by spring means after usage. When used for a plurality of line type dental attachments, each attachment has its own pulley and spring arrangement, the plurality of arrangements being mounted in stacked relationship to each other within the sub-bracket.

This invention relates to a sub-bracket for dental units, and in particular to a sub-bracket mountable on a commonly used dental operatory unit for positioning in a more favorable working position, basic dental attachments of the type requiring lines such as fluid hoses or electrical wires extending from the attachment to a source of fluid, such as air, or electrical power. For convenience, these attachments will be referred to hereinafter as "line dental attachments," or "line type dental attachments."

The prime consideration of the dentist is to work in the mouth of the patient. Any movement of the dentist away from the mouth of the patient represents wasted motion. Thus when the dentist must walk, scan his operating area with his eyes and head, or reach for his instruments, the dentist is being detracted from his main work and the efficiency of his work is thereby reduced.

The most efficient operating conditions are obtained when the dentist has each and every one of his instruments and dental attachments at his fingertips and available for instant use whenever he needs them without tangled cords or other complications. Operating conditions are also enhanced when the lines leading to the attachments are either out of sight or otherwise so positioned as to not interfere with the dentist's operating procedure.

The goal of maximizing the efficiency of a dental operatory unit so that the attachments are positioned to require minimal unnecessary movement has been recognized in the past. Several very expensive and complicated dental units have been designed which have had for their purpose simplification of the dentist's operating procedure. These units may be satisfactory for dentists first opening a new office or able to abandon their present equipment for a new complicated and expensive unit. However, the great majority of dentists now employ the traditional dental operatory units which were not designed to allow efficient movement by the dentist. Most dentists began their practice in an office designed along traditional lines and have made additions according to needs and work habits acquired over the years. Often these additions fail to increase efficiency, and quite often present a rather hodge-podge appearance to the patient. More importantly, the basic traditional unit, together with the additions, has often resulted in a less efficient rather than a more efficient dental operatory unit. For this large majority of dentists it would not be feasible to completely abandon their present equipment and replace it with a new complex, expensive dental operatory unit in

which the basic dental attachments were positioned for more efficient operation.

It is a basic object of the present invention to provide a sub-bracket for dental attachments which may be mounted on the conventional or traditional units and in which the basic line type dental attachments may be mounted in a convenient and efficient manner. The sub-bracket will allow dentists to eliminate the hodge-podge now present where the older traditional operatory units are in use. Thus these traditional units may be modernized, saving time and energy of the dentist, and improving the appearance of the traditional dental unit. More importantly, the present invention allows such modernization at a minimal expense and with utilization of much of the equipment presently used in the traditional dental unit. The attachment is compact and neat and can be manufactured at a low cost. Maintenance costs are minimal and maintenance can easily be accomplished by the dentist himself since little mechanical skill will be required.

The present invention comprises a sub-bracket for dental attachments which is mountable at the outer end of the bracket arm of the common dental unit. The attachments are positioned adjacent the front side (the side facing the patient) of the sub-bracket. A plurality of holes are provided on the front side of the sub-bracket for connecting the line dental attachments to lines within the sub-bracket. The attachments may be, for example, an electrically operated apparatus, an air syringe, a water syringe, an air rotor hand piece, etc. Holes on the back side of the sub-bracket (the side away from the patient) are provided for connecting the lines within the sub-bracket to a source of fluid or electricity. Positioned between the rear holes and the front holes are lines connecting the source to the attachment and mounted in conjunction with a novel pulley arrangement which allows the dentist to pull from the front side of the sub-bracket only that dental attachment which he desires to use at any given moment. The pulley system includes spring biased means to maintain the dental attachments not being used flush against the front side of the sub-bracket.

When a given attachment is selected for use, a means is provided for locking the attachment in its outward position so that the dentist need not contend with the spring bias returning force while using that particular attachment.

The sub-bracket is designed to be attached to and mounted immediately below the support table on which the dentist normally places his instrument tray. Thus, this invention allows the dentist to place the line dental attachments in close proximity to his instruments and to the patient.

Although others have previously attempted to reposition line dental attachment of traditional dental units in the vicinity of the support table, the previous designs have merely provided a holder in the vicinity of the support table while the spring and pulley line return system (if any) was located in the main body of the dental operatory unit itself. To my knowledge no one has designed a compact sub-bracket assembly such as that of the present invention which includes its own self-contained pulley and spring line return system. By providing a self-contained line return system within my sub-bracket I have made it possible to design a sub-bracket which could be easily mounted at a convenient operating position below the support table of any known traditional dental operatory unit commonly in use.

The present invention employs a novel and compact pulley system mounted within the sub-bracket which provides the compact self-contained line return mechanism.

Each of the line dental attachments projecting outwardly from the front side of the sub-bracket is positioned at a different horizontal level and has associated there-

with a separate pulley and spring return system located substantially in the horizontal plane containing the particular dental attachment. Thus the individual return systems may be described as being stacked vertically in layers within the sub-bracket, each stack or system being associated with a single line type dental attachment. The only substantial deviation from this "stacked" concept is that certain connecting pieces at the rear side of some of the return systems of the sub-bracket are bent downwardly protruding into the adjacent layer of the stack to provide a recess at the rear of the sub-bracket for facilitating mounting of the sub-bracket onto the bracket arm of the dental operatory unit.

Each pulley and spring return system or "stack" comprises a pair of pulleys mounted at opposite sides of the sub-bracket and normally positioned at the rear of the sub-bracket, each pulley being mounted for rotating movement on a carriage for example, the carriage may comprise two pulley cages, one for each of the two pulleys, normally located at the rear of the sub-bracket and rigidly connected together by a pulley assembly conductor. The carriage is mounted on a track. This arrangement allows forward movement of the carriage towards the front of the sub-bracket. Springs are provided on the tracks for urging the rear pulley cages rearwardly. Mounted near the front center of the sub-bracket in each system is an intermediate, generally stationary member. In a preferred form of the invention this takes the form of a fixed pulley cage having a pulley mounted therein for rotary movement. The fixed pulley cage is connected to a partition which extends parallel to the front and back sides and is spaced from the front side but forward of the fixed pulley cage. The fluid or electrical supply source for the attachment associated with a given stack is connected to the sub-bracket at the back side thereof. A tube member extends from that connection through the said partition, turns 180° in the stack, and is connected at a second connection in the partition with its end opened rearwardly. A line, such as an electrical wire or a rubber hose is connected to the tube at the second connection and extends rearwardly. The hose passes around one of the rear pulleys of the system, then around the fixed front pulley of the system, then around the second rear pulley of the system from which the hose passes horizontally along the side of the sub-bracket opposite from that of the tube member through the partition and beyond the front side of the sub-bracket where it is joined to a line type dental attachment.

As the dentist pulls the attachment outwardly for use on a patient, the line pulls the rear pulley cages forward. They ride forward on their tracks, being spring biased to the rearward position at all times. When the line has been pulled outwardly the desired length a locking means may be provided to lock the spring mechanism, rendering the same inoperative. When the dentist has completed using the attachment he unlatches the lock mechanism allowing the spring to return the rear pulley cages to their rearward position, thereby withdrawing the line of the attachment into the sub-bracket and the attachment itself flush against the front side of the sub-bracket.

Each pulley system is independent of the others and accordingly it should be evident that any number of stacks, and thus any number of attachments, may be employed in the sub-bracket assembly.

Accordingly, it is an object of this invention to provide a sub-bracket mountable on a commonly used traditional dental operatory unit for allowing line type dental attachments to be placed in a more favorable operating position.

It is another object of this invention to provide a sub-bracket assembly for a line dental attachment which is mountable at a convenient location on a traditional dental operatory unit and in particular, mountable at the outer end of the bracket arm of a traditional dental operatory unit.

It is still another object of this invention to provide a sub-bracket assembly for line dental attachments having a compact self-contained spring and pulley return system for returning the line attachments to their initial positions when they are not in use.

It is still another object of this invention to provide a substantially horizontal and planar pulley and spring return system suitable for mounting in a vertically stacked relationship, each system or stack comprising movable pulley cages mounted on tracks and a fixed pulley cage which cooperates with the movable pulley cages.

Other objects and advantages of this invention will become apparent in the detailed description together with the accompanying drawings in which:

FIG. 1 is a perspective view of a dental unit with the sub-bracket mounted thereon.

FIG. 2 is a perspective view of the sub-bracket of this invention showing the position of the sub-bracket with respect to the instrument tray and support table.

FIG. 3 is a partial sectional view taken on line 3—3 of FIG. 2 but reduced in size.

FIG. 4 is an elevational view of the back side of the sub-bracket.

FIG. 5 is a partial perspective view showing the bottom pulley system of the sub-bracket of the invention.

FIG. 6 is a plan view taken on lines 6—6 of FIGS. 9 and 10 showing the top pulley system of the sub-bracket.

FIG. 7 is a plan view taken on lines 7—7 of FIGS. 9 and 10 showing the middle pulley system of the sub-bracket.

FIG. 8 is a plan view taken on lines 8—8 of FIGS. 9 and 10 showing the bottom pulley system of the sub-bracket.

FIG. 9 is a side section view of the sub-bracket of the invention taken on line 9—9 of FIG. 6.

FIG. 10 is a back section view of the sub-bracket of the invention taken on line 10—10 of FIG. 6.

FIG. 1 shows the manner in which the sub-bracket assembly of the present invention may be employed on a traditional dental operatory unit. Here it is shown mounted on the bracket arm extension **6** of the dental operatory unit. The front side of the sub-bracket **1** is shown with three line type dental attachments indicated thereon. For purposes of illustration the line attachments of FIG. 1 will be assumed to be an air syringe **2**, a water syringe **3** and an air rotor hand piece **4**. It is to be understood, however, that any attachment requiring a line such as a fluid hose or an electrical wire may be mounted on the sub-bracket of this invention.

A movable joint **7** (see FIGS. 2 and 3) connects the bracket arm **5** to a bracket arm extension **6**, the end of which is shown in dotted lines in FIG. 1. The extension **6** is shown also in FIGS. 2 and 3 extending into the recess **12** formed in the top plate of the sub-bracket **1** at the rear thereof. The bracket arm extension **6** normally has connected thereto an upwardly projecting support stem **79** to which an instrument support table **8** is connected. According to the present invention the sub-bracket is attached to the support table **8** by means of the bolts **9** passing through the support table **8** and engaging a screw hole **11** in the upper surface of the sub-bracket **1**. In the present embodiment, four bolts are employed. Four bolt holes **11** in the top plate of the sub-bracket **1** are visible in FIG. 2 and two bolts **9** and bolt holes **11** are visible in FIG. 3. After the sub-bracket attachment has been rigidly attached to the support table **8** the instrument tray **10** may be easily placed over the support table **8** in the usual manner. Once the sub-bracket attachment is mounted, circular movement of the support table **8** about stem **79** will be restricted, but movement of the arm extension **6** about joint **7** will be normal. In this manner the sub-bracket of the present assembly may be mounted compactly and conveniently on the bracket arm of a traditional dental operatory unit.

The top plate 77 of the sub-bracket, which has the recess 12 formed therein, is attached to the remainder of the sub-bracket 1 by bolts 23 which connect the top plate 77 to the flanges 78 extending inwardly from the sides of the sub-bracket 1 (see FIGS. 2 and 6).

FIG. 4 shows a rear view of the sub-bracket assembly. The rear ends of tracks 13–18, which tracks will be discussed in more detail below, are shown projecting through the rear wall of the sub-bracket assembly and held thereto by nuts 19. Union joints 20, 21 and 22, shown at the rear of the sub-bracket assembly are each adapted to receive fluid or electrical energy from a source line for delivery to the tube and line within the sub-bracket which is associated with a given pulley system for delivery to a given attachment. In the present embodiment the union joint 20 receives air to be delivered to the air rotor hand piece 4; the union 21 receives air to be delivered to the air syringe 2; a union joint 22 receives water to be delivered to the water syringe 3. Comparing FIGS. 2 and 4 it can be seen that the union joints at the rear of the sub-bracket are positioned laterally, on the opposite side of the sub-bracket from the position of the corresponding line dental attachment at the front of the sub-bracket. It should be noted also that each of the union joints has associated therewith, two tracks. Lines A—A and B—B in FIG. 4 separate the three "stacks," or the three spring and pulley return systems. Joint 20 is associated with tracks 13 and 14 and attachment 4; joint 21 is associated with tracks 15 and 16 and attachment 2; and joint 22 is associated with 17 and 18 and attachment 3. This illustrates the stacked arrangement of the return systems within the sub-bracket as discussed above, and as will be discussed in more detail below. Bolts 23 positioned around the periphery of the upper plate of the sub-bracket 1 hold the upper plate 77 to the flange 78 of the side walls of the sub-bracket assembly (see FIGS. 2, and 6–8).

FIG. 5 shows, in perspective, the positioning of one complete spring and pulley return system or "stack," in this case the bottom stack system or "stack," within the sub-bracket 1. FIGS. 6–8 show, in plan view, each of the three stacks or systems in the present embodiment of the invention.

Referring to FIG. 6 there is shown the top spring and pulley return system having rear pulleys 26 and 27 mounted on a carriage. In the preferred embodiment of the invention the carriage takes the form of pulley cages 35 and 36. An intermediate, generally stationary member is located at the front of the assembly. In the preferred embodiment of the invention, this takes the form of front pulley 28 within pulley cage 37. A connector 44 rigidly connects rear pulley cages 35 and 36. Similarly, FIG. 7 shows the intermediate or center spring and pulley return system or stack comprising pulleys 29, 30 and 31 and pulley cages 38, 39 and 40 and rigid connector 45. Finally FIG. 8 shows the bottom return system or stack comprising pulleys 32, 33 and 34, pulley cages 41, 42 and 43 and connector 46. The only deviation from the stacked arrangement of the return systems is that the upper connectors 44 and 45 are bent downwardly to provide a space for the recess 12 in the upper plate 77 of the sub-bracket assembly 1 into which the bracket arm extension 6 of the bracket arm 5 is placed. The front pulley cage in each system is rigidly fixed to a partition on wall 49 extending across the sub-bracket housing, while the rear pulley cages of each system, which are rigidly connected to each other, are mounted to move forwardly on tracks. Shafts 47 are provided for rotably connecting each pulley to its respective pulley cage. Thus each pulley is rotatably mounted in its respective pulley cage.

Referring now to FIGS. 5 and 8 there is shown the complete bottom stack or pulley system which is associated with the attachment 3. A partition wall 49 extends transversely across the interior of the sub-bracket near the front thereof. The water for attachment 3 enters the system at union joint 22 into a tube member 67. The tube member 67 which may be, for example, a copper tube, extends along one side of the sub-bracket from the joint 22 through the partition 49. Between partition 49 and the front side of the sub-bracket tube curves back 180° and connects with a joint 68 mounted in the partition 49. The joint 68 extends through the partition 49 and is connected on the rear side of the partition 49 to a flexible hose 69. Hose 69 extends from the joint 68 to and around the rear pulley 33 in rear pulley cage 42 which is on the side of the sub-bracket closest to the tube member 67. The flexible hose then extends forwardly to and around the front pulley 34 in the fixed cage 43. The cage 43 is rigidly connectod to a partition 49 by bolts 50. The hose 69 then goes to and around the other rear pulley 32 in cage 41 from which it extends forwardly along the side of the sub-bracket opposite from that of the tube member 67, through the partition 49 and connects to attachment 3 by a joint 70 at the front of the sub-bracket. Rear pulley cages 42 and 41 are slidably mounted on longitudinal tracks 17 and 18 respectively by means of bushings 48. Springs 55 and 56 surround the tracks 17 and 18 respectively between partition 49 and the pulley cages and urge the rear pulley cages rearwardly. In the embodiment of the invention illustrated herein, the rearward movement of the rear pulley cages is limited by engagement of flange 71 of attachment 3 with the front of the sub-bracket 1. Connector bar 46 rigidly connects pulley cages 41 and 42.

When the dentist wishes to use the attachment 3 he simply takes hold of the attachment 3 pulls it outwardly. The rearward pulleys, or more precisely the rearward pulley cages 42 and 41, move forwardly on tracks 17 and 18 while the fixed front pulley cage 43 remains stationary. When the attachment 3 and the line connected thereto have been extended to a predetermined length a notch 74 in a pulley lock 61 on the cage 41 engages a lock pin 62, attached to the side wall of the sub-bracket, to hold the rear pulley cages, and thus the water syringe attachment 3, in the desired operative position. The lock 61 and notch 74 of the middle stack can be seen in elevation view in FIG. 9. However the locks 61 and notch 74 (as well as pins 72 and 75 which will be discussed in more detail below) of the top and bottom stacks are identical to those of the middle stack except for their location on the opposite side of the sub-bracket. To release the lock 61 a forward thrust of the attachment will disengage the notch 74 of pulley lock 61 from the pin 62 and the compression of the springs 55 and 56 will return the pulley cages 41 and 42 to their normal rearward position, thereby retracting the attachment 3 until it enters sleeve 71, which allows for proper positioning of the attachment. Guide bushings 48 are attached to the pulley cages over the tracks thereby aiding in the proper movement of the cages along the tracks.

The pulley lock 61 is shown in FIGS. 6, 7, 8 and 9. Referring to FIG. 9 the pulley lock 61 associated with the pulley cage 39 is mounted on a shaft 72 extending outwardly from the pulley cage 39. When the rear pulley cages are pulled forwardly to the locked pin 62, the pulley lock 61 is elevated slightly thereby engaging the locked pin 62 in notch 74 in the pulley lock 61. A forward thrust will disengage the lock, and the compression of the springs 53 and 54 will retract the rear pulley cages and the hoses to their normal rest position. A rod 75 holds the lock in normal position when not in use.

FIGS. 6 and 8 show the top and bottom pulley systems associated with attachments 4 and 3 respectively. The top pulley system of FIG. 6 is identical to the bottom system with the exception that the connector bar 44, unlike the connector 46, is bent downwardly to provide a space for the recess 12. In FIG. 6 air for the air rotor handpiece enters a tube member 57 through union joint 20 then passes through joint 58 to hose 59. The hose then passes aroound the rear pulley 27, front pulley 28, and to the other rear pulley 26 and then to the connection 60

with attachment 4. The rear pulley cages 35 and 36 ride on tracks 14 and 13 and are urged rearwardly by springs 52 and 51 respectivetly until the attachment 4 enters the sleeve 24, which allows for proper positioning of the attachment.

FIG. 7 shows the middle pulley system associated with air syringe attachment 2. This system is identical to the top and bottom systems in all respects except that it is reversed, laterally. That is, the joint 21 and the tube member 63 are located on the side of the sub-bracket opposite from the joints 20 and 22, or tube members 57 and 67 of the upper and lower pulley return systems. In FIG. 7 air for the air syringe 2 enters the tube member 63 through union joint 21 and then passes through joint 64 to hose 65. The hose then passes around the rear pulley 29, front pulley 31, and the other rear pulley 30 from which it extends to the connection 66 with the attachment 2. The rear pulley cages 38 and 39 ride on tracks 16 and 15 and are urged rearwardly by springs 54 and 53 respectively until the attachment 2 enters the sleeve 25, which allows for proper positioning of the attachment.

If a fourth stack, or pulley system were added to the present embodiment above the top or below the bottom stack it would be identical to the system of FIG. 7. By reversing the orientation of alternate stacks it is possible to place more stacks in a given vertical space. This is because the portions of each system which extend above or below the horizontal space occupied by the pulley cages and tracks, as for example the attachments themselves, are given room to extend up and down into the horizontal space occupied by the adjacent stacks. For example as seen in FIGS 1 and 2 the attachment 2 overlaps vertically with attachments 3 and 4. Thus if 2 were vertically aligned with attachments 3 and 4, then the stacks associated with 3 and 4 would have to be moved vertically from the stack of attachment 2.

FIG. 9 is a side view of the sub-bracket attachment 1. Since a detailed explanation of the apparatus has already been given, only the following need be pointed out here. The three rear pulley cages on the left side (when facing from the back towards the front of the sub-bracket) 36, 39 and 42 are shown. Also the three front fixed pulley cages 37, 40 and 43 are also shown. The guide bushings 48 are visible in FIG. 9 on the tracks 13, 15 and 17 on the left side of the sub-bracket.

FIG. 10 is a rear view of the sub-bracket showing the rear pulleys and pulley cages of the three systems and the connector bars 44–46.

FIGS. 9 and 10 illustrate quite clearly the concept underlining the arrangement of the pulleys within the sub-bracket wherein each pulley system is independent of the other and each system defines a "stack." The only deviation from this stack concept are the connector bars 44 and 45 which, as seen in FIG. 10, are bent downwardly to provide a recess for the bracket arm extension 6.

Thus, there is provided by the present invention a compact sub-bracket having a self-contained line return system for a line type dental attachment and which may be mounted on any traditional, commonly used dental operatory unit. A unique pulley system within sub-bracket provides the attachment return mechanism of the present invention.

While we have shown a specific embodiment of the present invention it should be clear that many deviations and modifications are possible without deviating from the spirit and scope of the invention. For instance, any number of layers, or stacks of pulley systems may be provided. The attachments in any given stack may be located on either side. In the present invention attachments 3 and 4 are loctaed on one side and attachment 2 on the other side merely for convenience. Similarly, while we have shown a specific means for attaching the sub-bracket to the support table 8 at the end of the bracket arm extension 6 by allowing the extension arm 6 within the recess 12, it would not be a departure from the scope of the

invention to locate the novel and self-contained sub-bracket at any other convenient position on the dental unit. Attachment to support table 8 in the area below the bracket arm extension 6 was chosen because of convenience and because the hoses from the source to the sub-bracket could than be hidden behind bracket arm 5. Also, it is desirable to place the sub-bracket adjacent to the instrument table 10. Also, while I have shown the sub-bracket with attachments for an air syringe, water syringe and an air rotor hand piece, any other hose or cord attachment may be placed here. Optional components such as an electrical attachment for an air rotor hand piece, controls, electrical controls for filling water cups, water control of the cuspidor, etc. may be included in the sub-bracket attachment.

Having now particularly described my invention, what I desire to secure by Letters Patent of the United States and what I claim is:

1. A sub-bracket assembly for mounting a line type dental attachment onto a conventional dental operatory unit comprising, a first wall with at least one access opening formed therein and a second wall with at least one source opening formed therein, a line within said sub-bracket extending from said access opening to said source opening, the end of the said line in the vicinity of the access opening being connected to a line type dental attachment, resilient means within said sub-bracket for allowing the said dental attachment to be pulled outwardly away from said sub-bracket means while urging the said dental attachment back towards the said sub-bracket, said resilient means including at least one stationary member mounted in said assembly, at least a portion of the periphery of said stationary member being generally cylindrical, the axis of which cylindrical portion is generally stationary, a carriage mounted in said assembly, at least one movable pulley connected to said carriage for rotational movement about an axis and for movement with the carriage, spring biassed means for urging said carriage into a rest position away from said stationary member, said carriage being mounted on track means for back and forth movement toward and away from said stationary member, said line encircling at least a portion of said stationary member and a portion of said movable pulley, whereby, when the said attachment is pulled outwardly away from the sub-bracket, the carriage moves along the track means, opposing the spring bias acting thereon, away from said rest position toward the said stationary member.

2. A sub-bracket assembly according to claim 1 wherein said stationary member is a stationary pulley mounted for rotational movement about the said axis of its cylindrical periphery.

3. A sub-bracket assembly according to claim 1 including a second movable pulley mounted on said carriage for rotation about an axis and for movement with said carriage, said line encircling, in sequence, at least a portion of one of said movable pulleys, and then said stationary member, and then the other of said movable pulleys.

4. A sub-bracket assembly according to claim 3 wherein said track means comprises a pair of generally parallel tracks, said carriage extending between and engaging both of said tracks, said stationary member also mounted between said tracks, whereby when the said attachment is pulled outwardly, the carriage rides along said track towards said stationary member.

5. A sub-bracket assembly according to claim 4 wherein said stationary member is a stationary pulley mounted for rotational movement about said axis of the said cylindrical portion of the periphery.

6. A sub-bracket assembly according to claim 4 including a locking element mounted on said carriage and movable therewith, a catch element non-movably mounted in said assembly at a position which the carriage reaches when the attachment is pulled outwardly, such that when

the attachment is pulled outwardly, the locking element engages the said catch element thereby rendering the resilient means incapable of moving the attachment towards the said rest position.

7. A sub-bracket assembly for mounting a plurality of line type dental attachments onto a conventional dental operatory unit which comprises a plurality of lines, each line extending from a source opening to an access opening, the access opening of each line being located in a common wall of the assembly, the end of each line in the vicinity of the access opening being connected to a dental attachment, a separate resilient means operatively associated with each said line and located within the assembly, the said separate resilient means being arranged in stacked relationship to each other, wherein each resilient means is operable in a layer of the stack generally parallel to the layer or layers of the other resilient means, each separate resilient means including: at least one stationary member mounted in said assembly, at least a portion of the periphery of the stationary member being generally cylindrical, the axis of said cylindrical portion being generally stationary, a carriage mounted in said assembly, at least one movable pulley connected to said carriage for rotational movement about an axis and for movement with the carriage, spring biassed means for urging said carriage to a rest position away from said stationary member, said carriage being mounted on said track means for back and forth movement towards and away from said stationary member, the line associated with the said resilient means encircling at least a portion of said stationary member and a portion of said movable pulley, whereby when the attachment associated with that resilient means is pulled outwardly away from the sub-bracket, the carriage moves along the track means, opposing the spring bias acting thereon, away from said rest position towards the said stationary member.

8. A sub-bracket assembly according to claim 7 whereing the said stationary member of each resilient means is a stationary pulley mounted for rotational movement about the axis of its cylindrical portion.

9. A sub-bracket assembly according to claim 7 wherein each resilient means further includes a second movable pulley mounted on its respective carriage for rotational movement about an axis and for movement with its respective carriage, its respective line encircling, in sequence, at least a portion of one of its respective movable pulleys, and then its respective stationary member, and then the other of its movable pulleys.

10. A sub-bracket assembly according to claim 25 wherein the said stationary member of each resilient means is a stationary pulley mounted for rotational movement about the axis of its cylindrical portion.

11. A sub-bracket assembly according to claim 10 wherein the track means of each resilient means comprises a pair of generally parallel tracks, each carriage extending between and engaging both of its respective tracks, each

stationary member also mounted between its associated tracks, whereby when an attachment is pulled outwardly, its respective carriage rides along its tracks towards its respective stationary members.

12. A sub-bracket assembly according to claim 10 including a locking element mounted on each said carriage and movable therewith, a catch element associated with each resilient means and non-movably mounted in said assembly at a position which its associated carriage reaches when that attachment is pulled outwardly, such that when that attachment is pulled outwardly the locking element engages its catch element thereby rendering that resilient means incapable of moving that attachment towards its said rest position.

13. A sub-bracket assembly for mounting a line type dental attachment onto a conventional dental operatory unit comprising, a housing having a first wall with at least one access opening formed therein, a second wall with at least one source opening formed therein, a line within said housing and extending from said access opening to said source opening, the end of said line in the vicinity of the access opening being connected to a line type dental attachment, a pair of generally parallel tracks in said housing, a carriage located between and movable longitudinally along said tracks, a pair of pulleys mounted on said carriage for rotational movement therewith, spring means urging the carriage to a rest position, an intermediate member located in said housing and spaced from the carriage at least when the latter is in the rest position, said line encircling, in sequence, at least a portion of (a) one of said movable pulleys, (b) said intermediate member and (c) the other of said movable pulleys, whereby when the said attachment is pulled outwardly, the carriage moves along the tracks, opposing the spring bias acting thereon, away from said rest position.

14. A sub-bracket assembly according to claim 13 wherein the intermediate member is a pulley mounted for rotational movement about a generally stationary axis.

15. A sub-bracket assembly according to claim 14 including a locking element mounted on said carriage and movable therewith, a catch element non-movably mounted in said assembly at a position which the carriage reaches when the attachment is pulled outwardly, such that when the attachment is pulled outwardly, the locking element engages the said catch element thereby rendering the resilient means incapable of moving the attachment towards the said rest position.

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ROBERT PESHOCK, Primary Examiner

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,552,019 Dated January 5, 1971

Inventor(s) Russell S. Crapanzano

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 9, line 49, please change "25" to --9--.

Signed and sealed this 24th day of August 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents