Feb. 25, 1969 T. L. SHARP ET AL 3,429,516

DENTAL EQUIPMENT

Filed March 21, 1966 Sheet 1 of 2

Fig. 1.

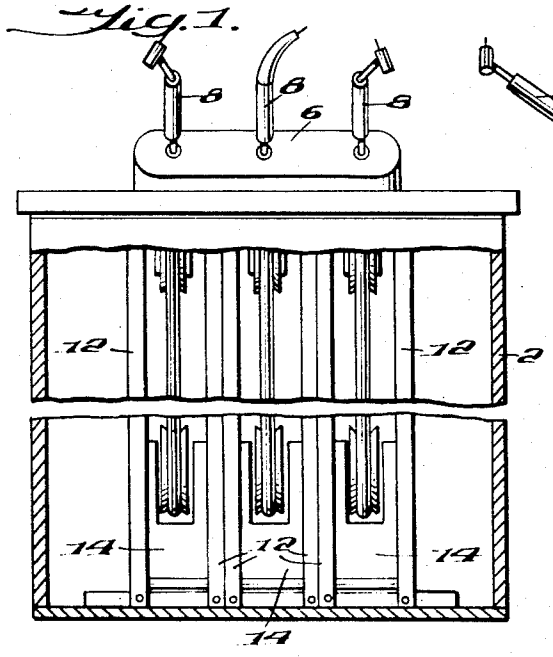


Fig. 2.

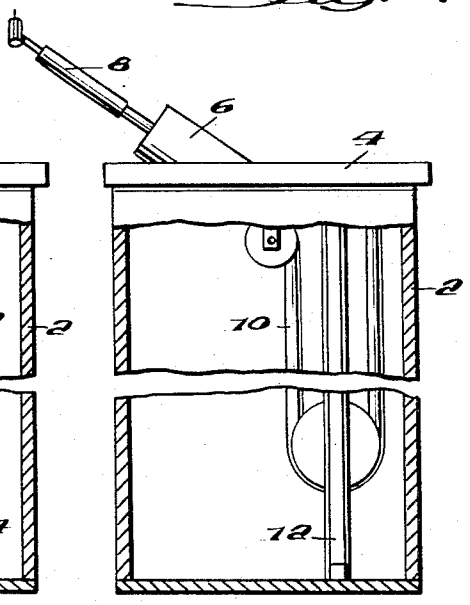


Fig. 6.

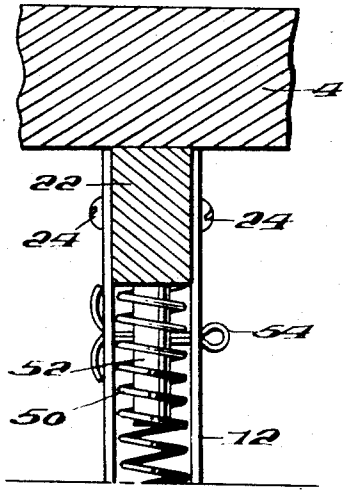


Fig. 8.

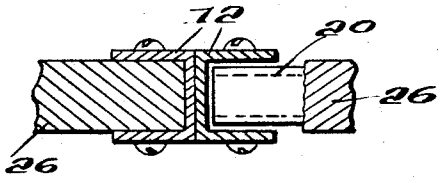


Fig. 9.

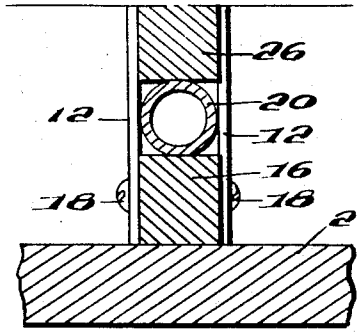
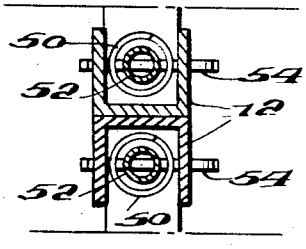


Fig. 7.



INVENTORS
TILMON L. SHARP,
KENNETH C. SHARP,

BY Burns, Doane, Benedict, Swecker & Mathis
ATTORNEYS

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DENTAL EQUIPMENT

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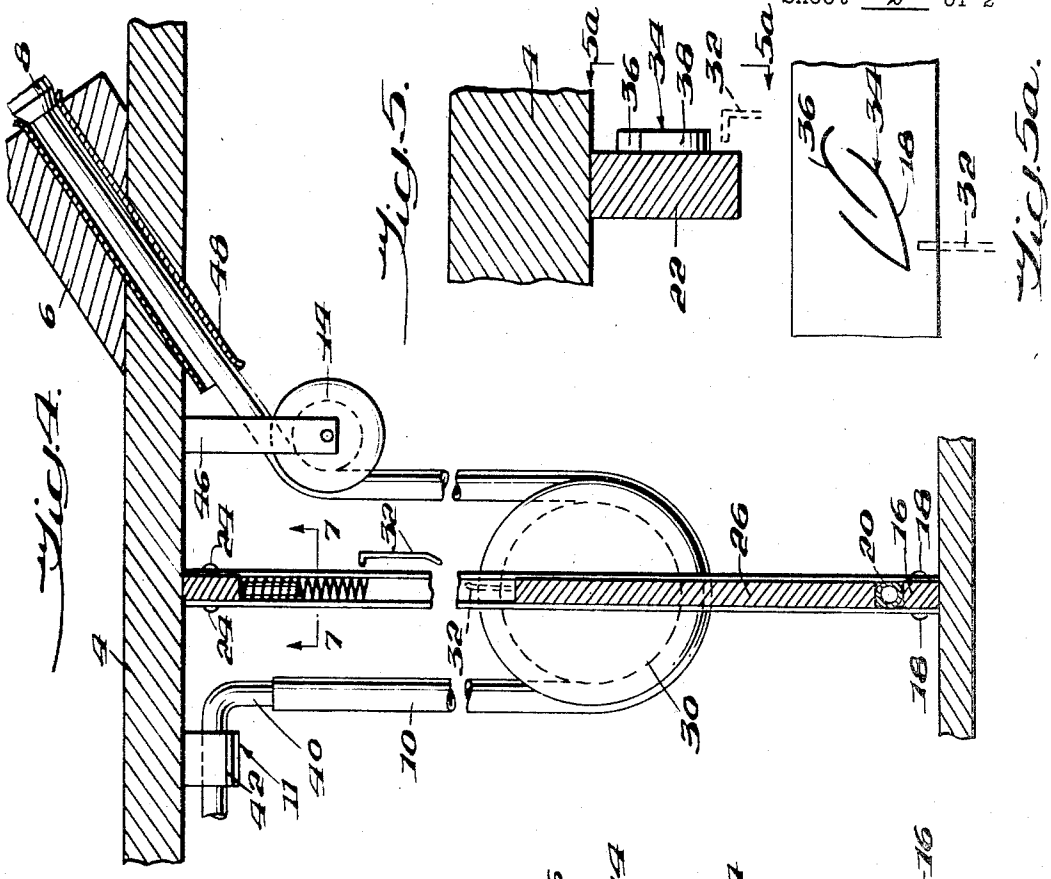


Fig. 4.

Fig. 5.

Fig. 5a.

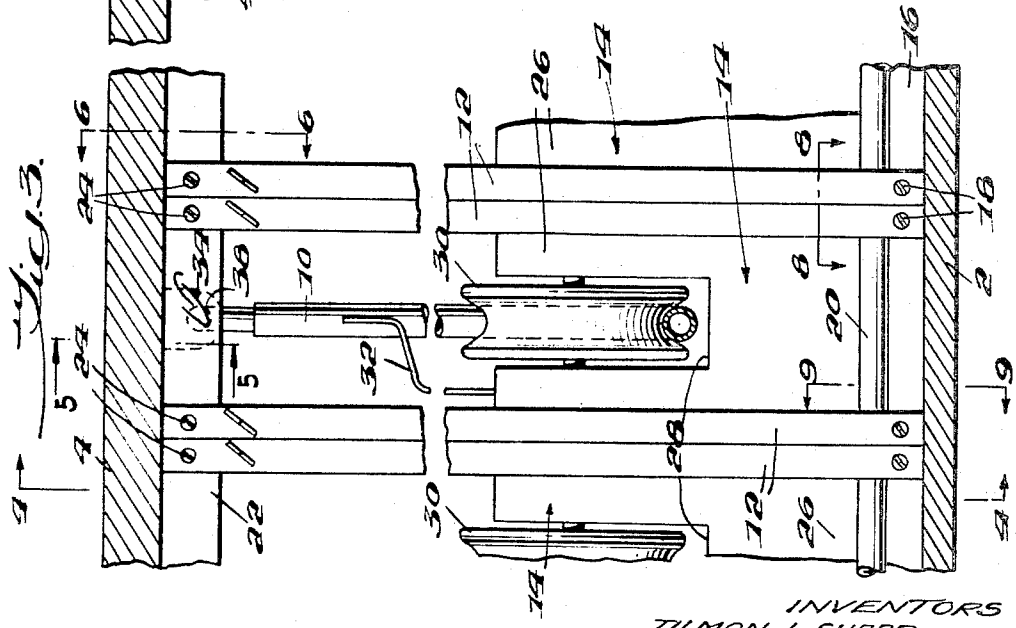


Fig. 3.

INVENTORS
TILMON L. SHARP,
KENNETH C. SHARP,

BY Burns, Doane, Benedict, Swecker & Mathis
ATTORNEYS

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DENTAL EQUIPMENT

Tilmon L. Sharp and Kenneth C. Sharp, both of Box 144, Knoxville, Tenn. 37901

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U.S. Cl. 242—47.5 5 Claims
Int. Cl. B65h 51/20; A61c 19/00

ABSTRACT OF THE DISCLOSURE

A support for dental equipment of the type that has a flexible hose connected at end with a dental drill or other hand instrument and at the opposite end with a source of fluid, such as air, water or vacuum source. The hose is suspended in a loop between a pair of upright guides. A weighted pulley rides in the loop of the hose and is supported by the upright guides. The pulley assembly applies tension to the hose to draw the instrument end of the hose into the cabinet where the support is mounted. The instrument end of the hose passes through a tube at the top of the cabinet and the outer end of the tube supports the instrument in position for being grasped by the dentist. A catch mechanism on the pulley assembly latches the pulley assembly temporarily at the top of the guides to relieve the tension in the hose. The catch may be readily unlatched by pulling on the instrument end of the hose. The weight of the pulley assembly then draws the instrument end of the hose into the cabinet.

This invention relates to dental equipment and more particularly to apparatus supporting flexible tubing that is connected to dental instruments.

It has become customary for a dentist to use a drill which is powered by an air turbine. The air is supplied to the drill through a hose or flexible tubing which is connected with a source of compressed air. The drill is held in the dentist's hand while he is drilling a patient's teeth. Consequently, the hose that is attached to the drill is relatively long in order to reach from the stationary air connection to the patient's mouth.

When the drill is not in use, it is customarily supported on a bracket adjacent to the patient's chair. When it is supported on the bracket, the air hose merely hangs down from the drill in a loop. This arrangement not only produces a cluttered appearance around the patient's chair, but the exposed length of hose may interfere with the use of the drill because the hose may become hooked on a portion of the patient's chair or on their projections when the drill is being used by the dentist.

Other hand instruments that have attached hoses are used by a dentist. These instruments include a water injector, an air injector, and a salvia ejector. Each of these instruments requires a separate hose and when all the hoses are merely suspended from a bracket, they present an unsightly appearance.

Accordingly, it is an object of this invention to provide an improved mounting arrangement for dental instruments that have attached hoses.

It is a further object of this invention to provide apparatus for supporting a plurality of dental instrument hoses in a manner that presents a neat and uncluttered appearance.

It is a still further object of this invention to provide apparatus for supporting dental instruments and their attached hoses for convenient use by the dentist.

These objects are accomplished in accordance with a preferred embodiment of this invention by individually mounting the hoses for each of the instruments in an enclosed cabinet. Each hose is looped over a pulley which is movable vertically in the cabinet. One end of the hose

is fastened to a stationary connection and the opposite end is fastened to the instrument on the outside of the cabinet. The pulley is movable vertically between tracks by pulling the movable end of the hose through an opening in the top of the cabinet. The hose pulley may be latched temporarily in its uppermost position, while the instrucent attached to the end of the hose is being used by the dentist. The pulley assembly may be unlatched readily by pulling on the movable end of the hose. The only force that is required to operate the latch is an axial force on the movable end of the hose. Thus, the hose may be latched and unlatched with a minimum of effort.

This preferred embodiment is illustrated in the accompanying drawings, in which:

FIGURE 1 is a front elevational view, partially in cross section, of a cabinet having hoses mounted therein in accordance with this invention;

FIGURE 2 is a side elevational, partially sectional view of the cabinet;

FIGURE 3 is an enlarged cross-sectional view of the cabinet showing the pulley assembly and guides;

FIGURE 4 is a cross-sectional view of the cabinet along the line 4—4 in FIGURE 3;

FIGURE 5 is an enlarged cross-sectional view of the cabinet along the line 5—5 in FIGURE 3, showing the latch bracket;

FIGURE 5A is a cross-sectional view of the cabinet along the line 5A—5A in FIGURE 5;

FIGURE 6 is an enlarged cross-sectional view of the cabinet along the line 6—6 in FIGURE 3;

FIGURE 7 is an enlarged cross-sectional view of the pulley guides along the line 7—7 of FIGURE 4;

FIGURE 8 is an enlarged cross-sectional view of the pulley guides along the line 8—8 in FIGURE 3; and

FIGURE 9 is an enlarged cross-sectional view of the pulley assembly and cabinet along the line 9—9 in FIGURE 3.

A cabinet **2** in which the hoses are supported has a top **4** positioned at a convenient height and an adapter **6** projects outwardly from the top **4** for supporting various dental instruments **8**. The instruments **8** are merely shown schematically and may include a drill which is operated by compressed air, a water injector, and a saliva ejector which is vacuum operated. The cabinet **2** is positioned adjacent the patient's chair and may include storage space, and it may enclose auxiliary equipment.

Inside the cabinet **2**, a flexible hose **10** is attached at one end to a stationary fluid connection **11** (FIG. 4) and at the opposite end to the instrument **8**. The hose is suspended in the cabinet in a loop which passes between a pair of upright guides **12** and which supports a pulley assembly **14**. The pulley assembly **14** is mounted between the guides **12** and is movable vertically along the guides **12**. As shown in FIGS. 1 and 3, a plurality of pulley assemblies **14** and guides **12** are mounted side-by-side in the cabinet **2**.

The guides **12**, as shown in FIGS. 3, 4, 8 and 9, are secured at their lower end to a bar **16** which is fastened to the bottom of the cabinet **2**. The guides **12** are in the form of channels and have a slot formed in the end to receive the bar **16** between the opposite sides of each guide **12**. Screws **18** extend through the sides of the guides **12** to anchor the guides to the bar **16**. A length of flexible tubing **20** extends across the top of the bar **16** between each pair of guides **12**. The top of each guide **12** is secured to a bar **22** that is fastened to the top of the cabinet **2**. Each guide has a slot formed in the end to receive the bar **22** between the opposite sides of the guide. The guides are secured to the bar **22** by screws **24**.

The pulley assembly **14** includes a block **26** having a slot **28** formed in one end. A pulley **30** is mounted in the slot **28** for rotation relative to the block **26**. The block

26 slides freely along the guides 12, and it is retained between the opposite sides of the guides, as shown in FIG. 8. The block 26 is preferably made of a heavy metal in order to draw the hose 10 down into the cabinet when the instrument 8 is not being used. The guides 12 are also preferably formed of metal. In order to minimize the friction between the block 26 and the guides 12, plastic tape may be applied along the edges of the block where it engages the guides 12. The use of tape on the block also reduces the noise as the block moves relative to the guide. Of course, other friction reducing materials may be used instead of tape.

A hook 32 is secured at one end in the block 26 and extends upwardly from the block and terminates in an end portion positioned approximately midway between the guides 12. As shown in FIGS. 3, 5 and 5A, a latch bracket 34 projects outwardly from the bar 22. The bracket 34 includes an upper guide member 36 and a lower guide member 38. The hook 32 normally travels along a straight path as the pulley assembly 14 moves along the guides 12 and is moved toward the bracket 34 while in the position shown in dotted lines in FIGS. 5 and 5A. However, when the hook 32 engages the lower member 38, the end portion is deflected toward the right, as viewed in FIG. 5A, until it passes over the end of the lower member 38.

The inherent resilience in the hook 32 causes the end portion to spring back toward its normal position after passing over the end of the lower member 38. In doing so, the end portion engages the upper member 36. When the pulley assembly 14 moves downwardly, the end portion of the hook engages the inside edge of the lower member 38, and the hook is latched in the lower left-hand end of the lower member 38. When it is in this position, the hook 32 supports the pulley assembly 14 at the top of the guides 12.

In order to release the hook 32 from the bracket 34, the pulley assembly is initially displaced upwardly to cause the end portion of the hook 32 to slide along the upper leg of the member 38. Consequently, the end portion is deflected toward the right, as viewed in FIG. 5A. When the end portion passes over the upper end of the lower member 38, the hook 32 is released and it springs back to its normal position and the pulley assembly 14 is free to move downwardly along the guides 12.

One end of the hose 10 is secured at the fluid connection 11 on a rigid pipe fitting 40, which is fastened by a bracket 42 to the top 4. On the opposite side of the guides 12 from the fluid connection 11 is an idler pulley 44, which is suspended from the cabinet top 4 by a bracket 46. A tube 48 extends through the adapter 6 and through the top 4, and is substantially aligned with the pulley 44, as shown in FIG. 4. The lower end of the tube 48 is flared in order to reduce the frictional drag of the tube 48 on the flexible hose 10. The end of the hose 10 is secured in the instrument 8 in accordance with conventional practice. Since the hose 10 passes over the pulley 30, it is apparent that when the end of the hose 10, which is attached to the instrument 8, is pulled out of the tube 48, the pulley assembly 14 will be lifted as the loop of hose that is supported between the fluid connection 11, and the pulley 44 is progressively shortened. Conversely, when the hose 10 is allowed to move back into the tube 48, the pulley assembly 14 moves downwardly along the guides 12. The flexible tube 20 which is positioned at the lower end of the guides 12 forms a cushion for the block 26.

In order to limit the upward travel of the pulley assembly 14, and to facilitate operation of the latch 34, a spring 50 is mounted at the top of each of the guides 12. As shown in FIGS. 4, 6 and 7, the spring 50 extends downwardly from the bar 22. A tube 52 is mounted in the spring 50 and a cotter pin 54 extends through the spring 50 and through the tube 52, and through aligned holes in the sides of the guides 12. By means of the cotter pin 54, the positions of the tube 52 and the spring 50 are fixed relative to the guides 12.

As shown in FIGS. 4 and 6, the free end of the spring 50 extends beyond the end of the tube 52. When the block 26 moves upwardly along the guides 12, the upper end of the block 26 engages first the spring 50. Further upward movement of the block 26 compresses the spring 50 until the block engages the end of the tube 52. Preferably, the tube is formed of a semi-rigid elastomeric material, in order to absorb the shock of impact of the block 26. The lower end of the tube 52 is located approximately the same distance below the uppermost portion of the lower member 38 than the end portion of the hook 32 is spaced from the upper end of the block 26. Thus, the block 26 engages the end of the tube 52 as the end portion of the hook 32 passes over the right-hand end of the lower member 38 and again as it passes over the opposite end of the member 38. In this manner, the tube 52 protects the latch 34 and the hook 32 from the full force of the pulley assembly 14 as it is displaced upwardly by the hose 10.

In operation, the pulley assemblies 14 and the instruments 8 are initially in the positions shown in FIGS. 1 and 2. When the dentist selects one of the instruments 8, he pulls the instrument away from the adapter 6, thereby imposing an axial force on the hose 10. As the hose moves outwardly through the tube 48, the loop of hose which supports the pulley 30 is progressively shortened, thereby raising the block 26. When a sufficient length of hose has been drawn out of the tube 48, the pulley assembly 14 is lifted to the top of the guides 12 and the upper end of the block 26 engages the springs 50 which are mounted in the guides 12 and the end portion of the hook 32 moves into engagement with the lower member 38 of the latch bracket 34. Continued upward movement of the pulley assembly 14 by pulling on the hose 10 causes the end portion of the hook 32 to pass over the upper end of the lower member 38 and to engage the upper member 36. At the same time, the block 26 engages the end of the tube 52 which limits the upward travel of the block. When the pulling force on the end of the flexible hose 10 is released, the weight of the block 26 and the force of the springs 50 cause the pulley assembly 14 to move downwardly, but the end portion of the hook 32 is engaged in the latch bracket 34 which prevents downward movement of the pulley assembly 14.

When it is desired to retract the hose into the cabinet 2, an axial pulling force is applied to the end of the hose 10 to lift the pulley assembly 14 until the end portion of the hook 32 passes over the upper end of the lower members 38. The tube 52 restricts further upward movement of the pulley assembly 14 and when the free end of the hose 10 is released, the weight of the block 26 and the spring 50 urge the pulley assembly 14 downwardly, thereby drawing the hose 10 back into the tube 48 as the pulley assembly 14 is lowered along the guides 12. When the block 26 reaches the bottom of guides 12, its motion is stopped by the cushion tube 20 and the instrument 8 is positioned at the outer end of the tube 48.

The apparatus of this invention conceals flexible hoses that are conventionally used with dental instruments while the instruments are not being used, but does not hinder the dentist in the use of his instruments. The cabinet conceals the hose and presents an uncluttered appearance. Since the tube 48 is substantially aligned with the pulley 44, there is a minimum of frictional drag on the hose 10 as it is being pulled out through the tube 48. There is also very little wear imposed on the hose 10 as it moves in and out through the tube 48. The pulley assembly 14 is freely movable along the guides 12 and is readily latched in its uppermost position and unlatched merely by pulling on the end of the hose 10. Furthermore, the force applied to the hose to operate the latch mechanism is an axial force, and thus the latch is easily operated by the dentist from a location away from the cabinet 2.

While this invention has been illustrated and described in one embodiment, it is recognized that variations and changes may be made therein without departing from the invention as set forth in the claims.

We claim:

1. Apparatus for accumulating slack in a flexible hose, comprising a pair of upright guides, a pulley, mounting means for the pulley extending in the guides, said hose extending around the pulley in a loop and having ends on opposite sides of the pulley one of which ends is anchored and the other end movable axially, said pulley mounting means being movable along the guides in response to axial movement of the hose, and means for limiting the movement of the pulley mounting means at a predetermined position relative to the guides whereby the position of the pulley is controlled by the length of the loop of the hose, said limiting means comprising a helical spring and an elongated member mounted axially in one of the guides, said spring having a greater length than the elongated member.

2. The apparatus according to claim 1 including means for temporarily latching said mounting means against movement relative to said guides, said latching means having cooperating elements on said guides and on said pulley mounting means, said elements being positioned to latch said mounting means and said guides together with said mounting means in engagement with said spring.

3. The apparatus according to claim 1 wherein each of said guides is in the form of a channel having spaced opposite sides, said mounting means including a blocking extending between said channels, said spring and elongated member being mounted in one of said guides in position for engaging said block.

4. The apparatus according to claim 3 including a cushion tube extending between said channels and having opposite ends thereof received between said channel opposite sides.

5. The apparatus according to claim 3 including latching means comprising a hook on said block and a latch bracket rigidly supported between said guides, said elongated member being spaced below said bracket and said hooks projecting upwardly from said block a distance greater than the distance that the lower end of said elongated member is spaced below said bracket.

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STANLEY N. GILREATH, *Primary Examiner.*

U.S. Cl. X.R.

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