United States Patent

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[54] DENTAL HANDPIECE CONTROL

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[52] **U.S. Cl.** **32/22**
[51] **Int. Cl.** **A61c 9/00**
[58] **Field of Search** 32/22

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[57] **ABSTRACT**

A plurality of module control block assemblies individually control to a plurality of dental handpieces the supplies of drive air to the handpiece motors, and air and water coolants, and also supply drive air pressure to a gauge. The control block assemblies are clamped in series between distributing end blocks. A hanger assembly normally adapted to actuate a control block assembly when a handpiece is lifted from the hanger assembly has a manually operable lockout lever which prevents such actuation to permit changing of burrs of the handpiece or to inactivate that control block assembly.

21 Claims, 6 Drawing Figures

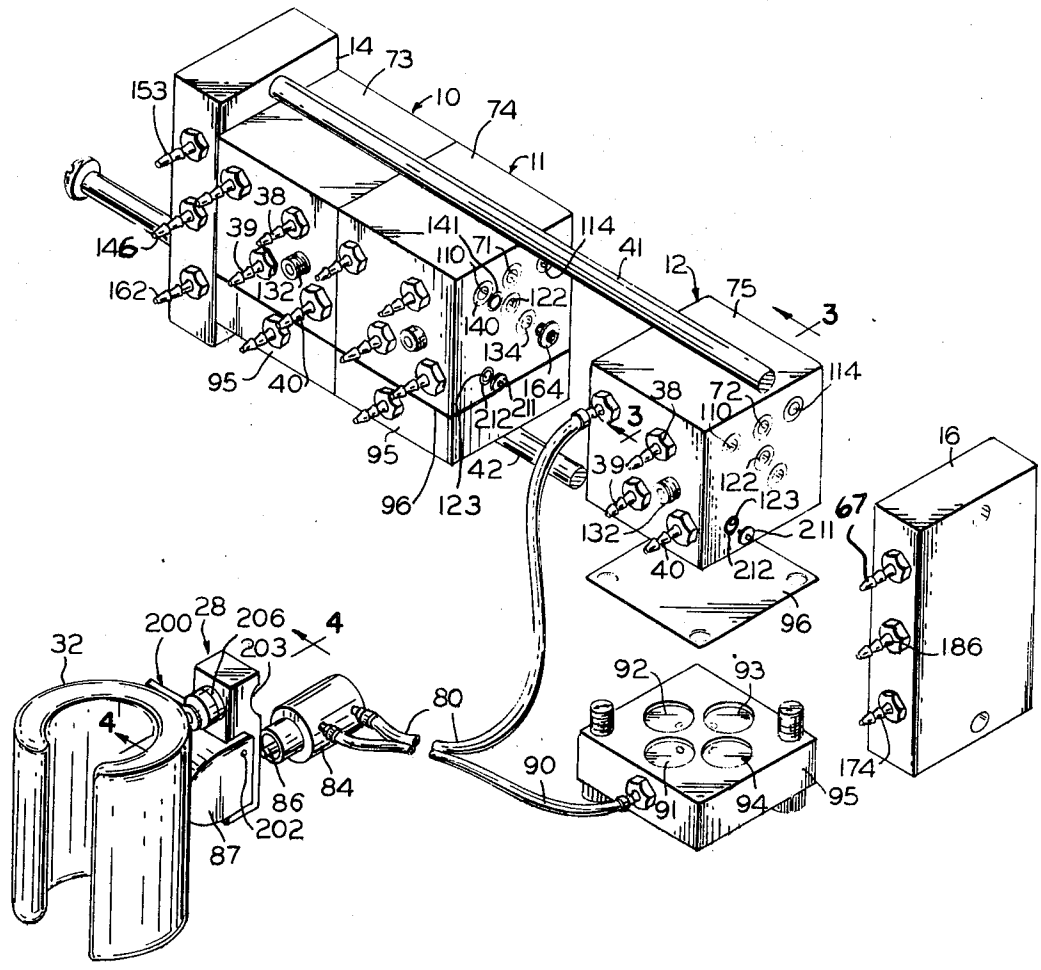
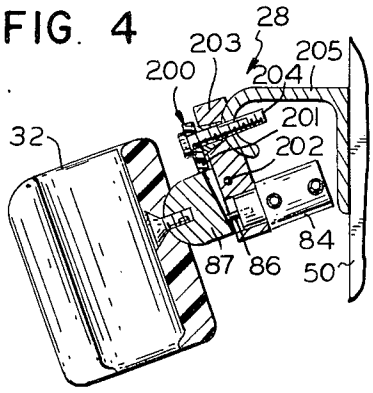


FIG. 4



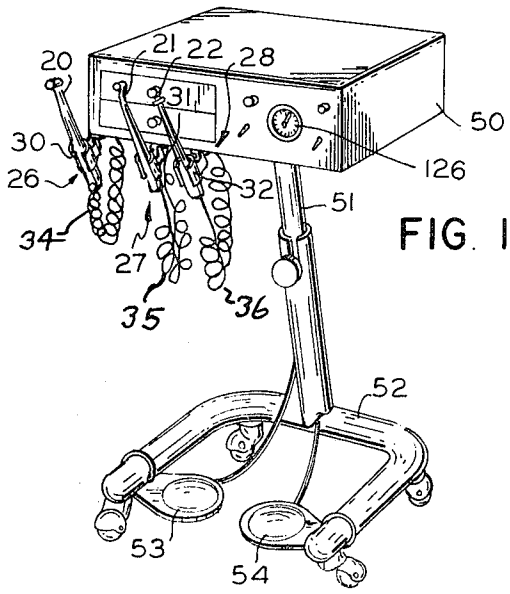


FIG. 1

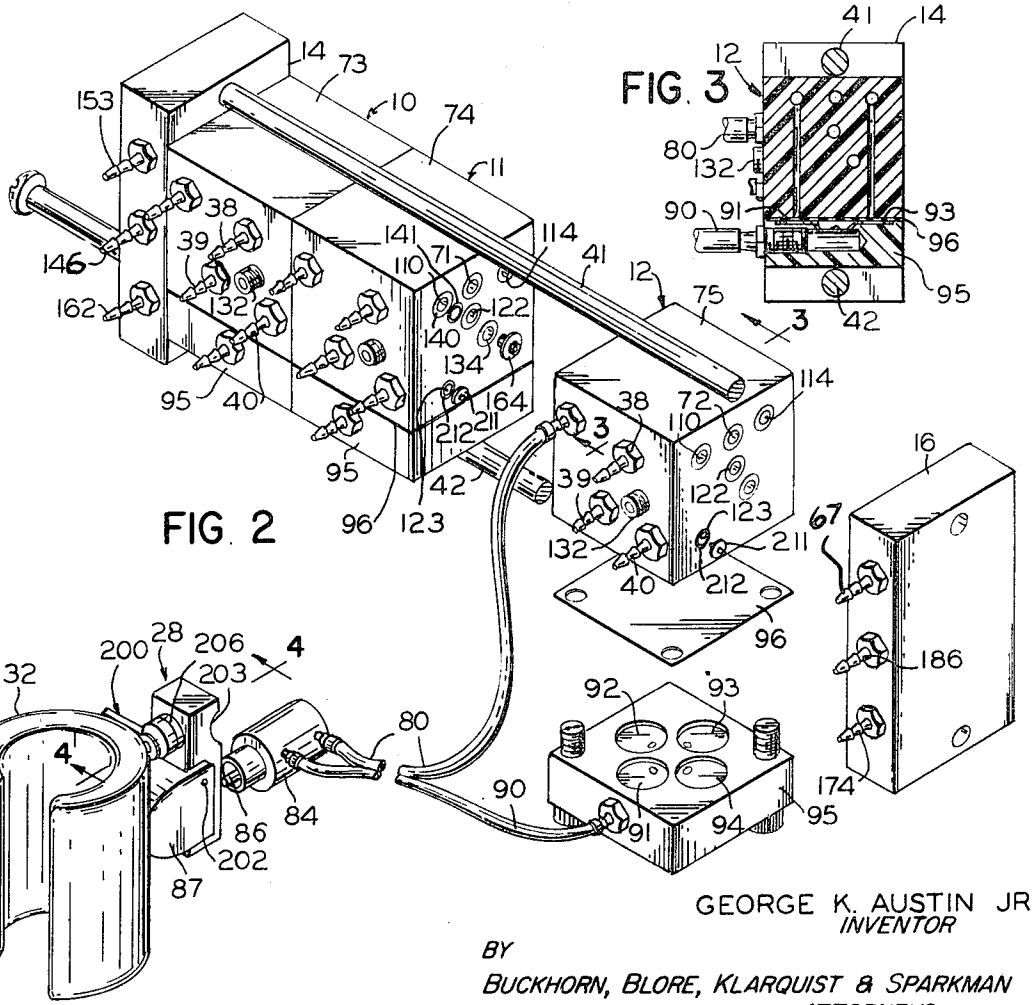


FIG. 2

FIG. 3

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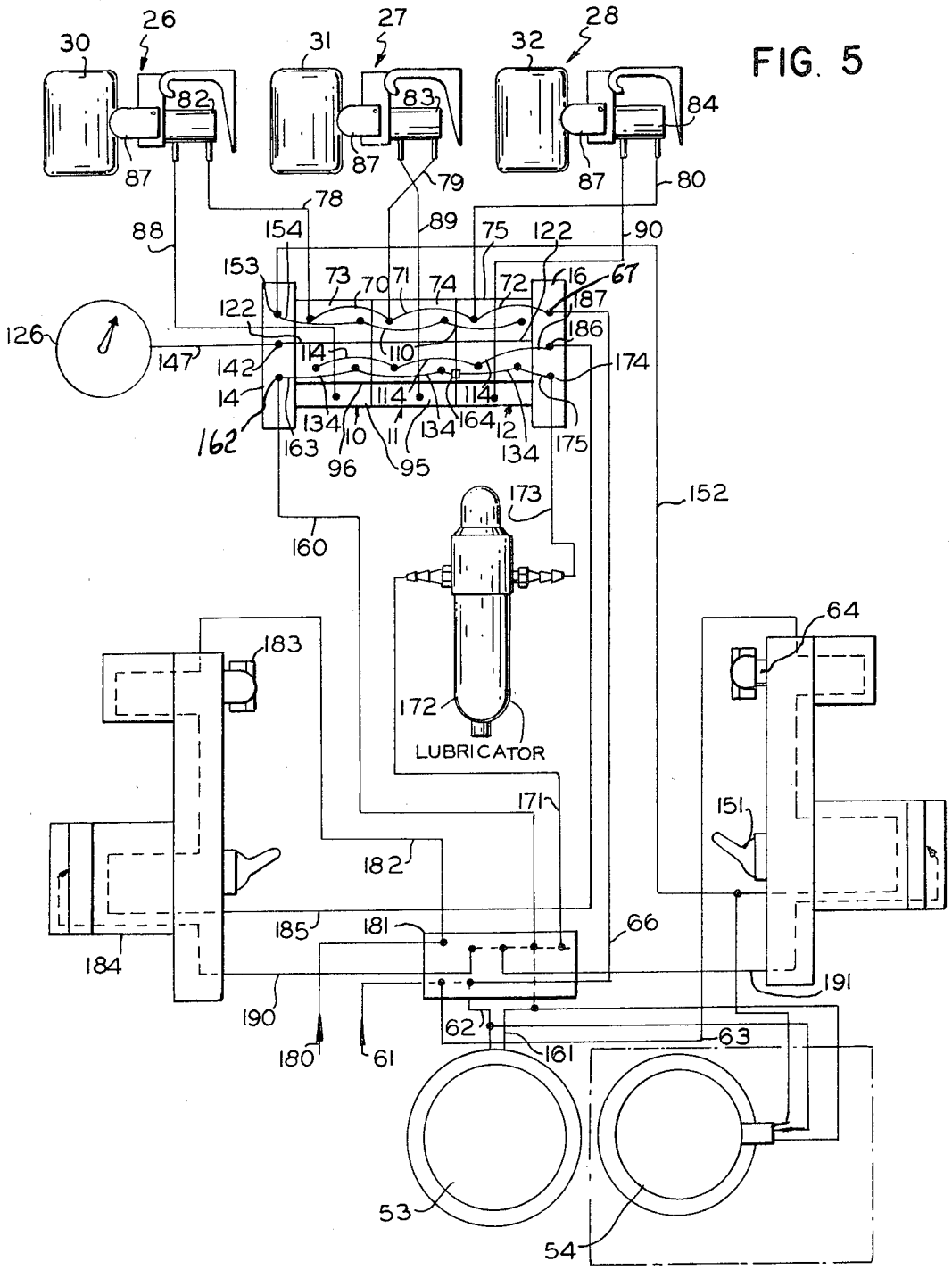
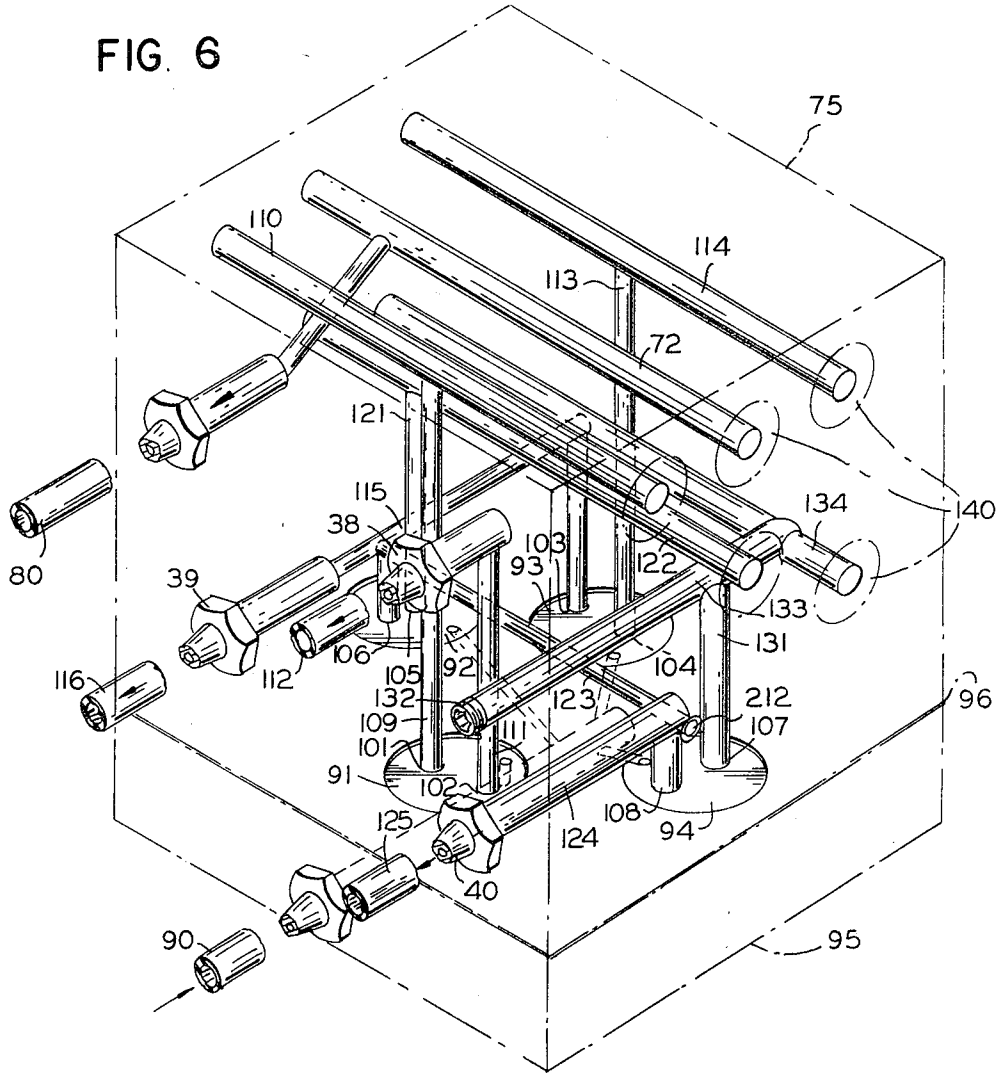


FIG. 5

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FIG. 6



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DENTAL HANDPIECE CONTROL

DESCRIPTION

This invention relates to a dental handpiece control, and more particularly to a module type dental handpiece control.

An object of the invention is to provide a new and improved dental handpiece control.

Another object of the invention is to provide a module type dental handpiece control.

A further object of the invention is to provide a simplified dental handpiece control.

Another object is to provide a dental handpiece control in which a plurality of control block assemblies positioned in a building block arrangement each serves to control drive air and coolants to one of a plurality of dental handpieces, it being possible to add additional control blocks to the arrangement or to subtract one or more control blocks from the arrangement.

Another object of the invention is to provide a control block assembly in which supply and discharge passages open on one face of a control block and a diaphragm sheet on said face may be selectively actuated to close the passage or to open passages to each other.

Another object of the invention is to provide a dental handpiece control having a control block assembly adapted to close or open lines of drive air and coolants to a dental handpiece under the control of a hanger assembly adapted to store the handpiece when not in use.

Another object of the invention is to provide a dental handpiece hanger assembly adapted to control the supplies of drive air and coolants and adapted to be locked out when desired.

In the drawings:

FIG. 1 is a perspective view of a dental cart having a dental handpiece control forming one embodiment of the invention;

FIG. 2 is an enlarged perspective view of the handpiece control of FIG. 1;

FIG. 3 is an enlarged vertical sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is an enlarged vertical sectional view taken along line 4—4 of FIG. 2;

FIG. 5 is a schematic view of the control circuitry of the dental handpiece control of FIG. 1; and

FIG. 6 is a perspective, schematic view of a block assembly of the dental handpiece control of FIG. 1.

Referring now in detail to the drawings, there is shown therein a dental handpiece control forming one embodiment of the invention and including module control blocks **10**, **11** and **12** (FIG. 2) mounted in series between end blocks **14** and **16** and serving to control the supply of drive air, cooling air and cooling water to handpieces **20**, **21** and **22** in cooperation with hanger assemblies **26**, **27** and **28**, which include hangers **30**, **31** and **32** for the handpieces and also serve as actuators to cause the control block assemblies to supply air and/or water to the handpieces when the handpieces are lifted from the hangers and to cause the control block assemblies to shut off air and water from the handpieces when the handpieces are stored in the hangers. Multipassage, retractible, flexible conduits **34**, **35** and **36** each lead from connectors **38**, **39** and **40** of the control block assemblies. Tie rods **41** and **42** clamp the assemblies **10**, **11**, **12**, **14** and **15** together into a unit, which is mounted inside a desk or tray **50** supported by a cart post **51** carried by a wheeled cart base **52** carrying foot controls **53** and **54**. The hanger assemblies **28**, **29** and **30** are mounted on the front of the desk **50**. The handpieces are well known and include selectively operable valves for the drive air, cooling water and cooling air.

The circuitry of the dental handpiece control is shown in FIG. **5**, and includes an air supply line **61** leading from a source of air under pressure (not shown) to a line **62** to the foot control **53**, a line **63** leading to an adjustable needle valve **64** and to a line **66** to a connector **67** of the end block **16**. The line **66** and connector **67** supply air to series connected passages **70**, **71** and **72** in blocks **73**, **74** and **75**, which are connected to hoses **78**, **79** and **80** leading to known hanger valve assemblies **82**, **83** and **84**. Valve stems **86** (FIG. 4) of the hanger valve assemblies are engaged and pushed in or actuated by hinge blocks **87** when the handpieces are resting in the hangers **30**, **31** and **32** and push out to released positions when the handpieces are removed from the hangers. When any one of the handpieces is removed from the hanger, the valve assembly **82**, **83** or **85** blocks off the hose **78**, **79** or **80** from a hose **88**, **89** or **90** and relieves air pressure in the hoses **88**, **89** or **90** to relieve air pressure in diaphragm chambers **91**, **92**, **93** and **94** in control block covers **95** of the control block assemblies **10**, **11** and **12**. This permits diaphragm portions of a flexible sheet **96** serving to seal the covers **95** to the blocks **73**, **74** and **75**, which are identical, to permit flow of fluids between the two ports of each pair of pairs of ports **101** and **102**, **103** and **104**, **105** and **106**, and **107** and **108**. The port **101** then supplies air coolant from passages **109** and **110** in the block **75** to the port **102**, a passage **111** in the block **75**, the connector **38** and a hose **112** to the handpiece associated with that control block assembly. The port **104** then supplies water coolant from passages **113** and **114** in the block **75** to passage **115**, the connector **39**, which is screwed into the outlet of passage **115**, and hose **116** leading to the handpiece. The port **105** leads to gauge air passages **121** and **122** in the block **75**, and receives drive air from the port **106**, from passages **123** and **124** in the clock **75**, the connector **40** and a hose **125** leading to the handpiece so that a gauge **126** connected to the passages **122**, which are in series, gives the drive air pressure. The port **107** supplies drive air from a passage **131**, a needle valve **132** threadedly adjustable from the front of the block **75**, and drive air passages **133** and **134** in the block **75**.

The right-hand ends of the blocks **14** and the blocks **73**, **74** and **75**, which are identical, as viewed in FIG. **2**, have shallow counterbores **140** in which O-rings **141** seat. When the clocks are clamped together, the O-rings seal the junctures of the aligned passages **110**, the aligned passages **70**, **71** and **72**, the aligned passages **114**, the aligned passages **122** and the aligned passages **134**, the left-hand ends of the blocks **73**, **74** and **75** and the block **16** being planar and compressing the O-rings Similar seals (not shown) are provided between the end blocks **14** and **16** and the blocks **73** and **75**. An L-shaped passage **142** (FIG. 5), a connector **146** (FIG. 2) and a hose **147** (FIG. 5) connect the passages **122** to the air gauge **126**.

The hose **63** (FIG. 5) supplies the coolant air to the needle valve **64** and the air through a manually operable, toggle-type, shutoff valve **151** to a hose **152** leading to a connector **153**, an L-shaped passage **154** in end block **14** and the air coolant passages **110**. A hose **160** connected to drive air outlet hose **161** of the foot control **53** is connected by a connector **162** and an L-shaped passage **163** to the passages **134** in the blocks **73** and **74**, a plastic plug **164** being positioned between and blocking the adjacent ends of the passages **134** in the blocks **74** and **75** to supply nonlubricated air to the handpieces **20** and **21**. Lubricated air is supplied to the handpiece **22** (FIG. **1**) from the hose **161** (FIG. 5), a hose **171**, a lubricator **172**, a hose **173**, a connector **174** of the block **16**, an L-shaped passage **175** in the block **16** and the passage **134** in the block **75**.

Coolant water is supplied from a source under pressure (not shown) through hose **180**, distributor block **181**, hose **182**, manually adjustable needle valve **183**, toggle-type shutoff valve **184**, hose **185**, connector **186**, L-shaped passage **187** in the end block **16**, and the coolant water passages **114** in the blocks **73**, **74** and **75**. The valves **151** and **184** are relay-type valves with operating force being supplied by air hoses **190** and **191** connected to the hose **161**. The control **54** is provided to supply coolant air to the handpieces without supplying drive air thereto.

In order to lock the hinge blocks **87** down, a lockout lever **200** (FIGS. 2 and 4) having an eccentric or cam portion **201** may be swung from an upright, retracted position to a horizontal, locking position preventing upward movement of the hinge block. The hinge block is mounted on a pin **202** carried

by hanger block **203** fixed by screw **204** to bracket **205** fastened to the desk **50**. The screw holds bushing **206** in a countersunk hole in the block and presses the block tightly against the bracket, the screw being screwed into a tapped bore in the bracket. The lockout lever **200** is of plastic and frictionally engages the screw to remain in adjusted position, the lever being mounted rotatably on the screw.

Plugs **211** are pressed into bores **123** and shallow counterbores **212** to seal off the ends of the bores or passages **104**. These ends of the bores are open at the right-hand faces of the blocks **73**, **74** and **75**, as viewed in FIG. **2**, to permit the passages **123** to be formed by boring.

I claim:

1. In a dental handpiece control,

a solid control block having a drive air passage therethrough having an inlet and an outlet and a cooling fluid passage extending therethrough having an inlet and an outlet,

a diaphragm sheet positioned on a first face of the control block,

cover means secured to the outer face of the diaphragm sheet and the first face of the control block and having a pair of diaphragm actuating chambers therein,

the drive air passage having a pair of ports intermediate the inlet and outlet thereof and opening into one of the diaphragm chambers and adapted to be closed by the diaphragm sheet,

the cooling fluid passage having a pair of ports intermediate the inlet and the outlet thereof and opening into the other of the diaphragm chambers and adapted to be closed by the diaphragm sheet,

an air driven dental handpiece,

air supply means supplying drive air under pressure to the inlet of the drive air passage,

cooling fluid supply means supplying a cooling fluid under pressure to the inlet of the cooling fluid passage,

air conduit means connecting the outlet of the drive air passage to the handpiece,

cooling fluid conduit means connecting the outlet of the cooling fluid passage to the handpiece,

hanger means serving to releasably support the handpiece and operable by the weight of the handpiece to close the valves and operable to open the valves when the handpiece is lifted therefrom,

and means under the control of the hanger means for supplying fluid under pressure to the diaphragm chambers.

2. The dental handpiece control of claim **1** wherein the inlets open on a second face of the block and the outlets open on a third face of the block.

3. The dental handpiece control of claim **2** wherein the portions of the inlet passages on the inlet sides of the diaphragm sheet each is T-shaped with the stem of the T leading to the diaphragm sheet and the other portion leading from the second face of the block to a fourth face of the block.

4. The dental handpiece control of claim **1** wherein the hanger means includes a pivotal hanger adapted to hold the handpiece and pivotal downwardly to a storage position from the weight of the handpiece, means urging the hanger to an upper released position when the handpiece is out of the hanger, valve means operable by the hanger when in its storage position for supplying fluid under pressure to the diaphragm chambers and to exhaust the diaphragm chambers when the hanger is in its released position, and manually operable means for locking the hanger in its storage position.

5. The handpiece control of claim **4** wherein the manually operable means is a lockout lever having a cam portion adapted to hold the hanger in its storage position.

6. The dental handpiece of claim **5** wherein the hanger means includes a mounting bracket, a mounting block mounting the hanger pivotally and a screw securing the mounting block to the bracket and pivotally mounting the lockout lever, the mounting block serving to support the valve means.

7. In a dental handpiece control,

a plurality of dental handpieces,

a plurality of valving assemblies one for each handpiece,

means mounting the valving assemblies together in a stack,

the valving assemblies each including a plurality of fluid supply passages connected in series to corresponding fluid supply passages in the valving assemblies stacked adjacent thereto for supplying fluid to the valving assemblies,

means for supplying a plurality of fluids to each of the valving assemblies,

and a plurality of conduit means connecting each valving assembly to one of the handpieces for supplying fluids to the handpieces.

8. The dental handpiece control of claim **7** wherein each valving assembly includes a block in which the supply passages are straight bores aligned with the bores in the immediately adjacent blocks,

the blocks being mounted in face-to-face relationship with the bores aligned.

9. The dental handpiece of claim **8** wherein the blocks have shallow counterbores at the ends of the supply passages,

and O-ring seals mounted in and compressed in the counterbores.

10. The dental handpiece of claim **8** including plug means positioned in the adjacent ends of two of the supply passages.

11. The dental handpiece control of claim **7** including an end block having L-shaped fluid passages therein having one end of each connected to the supply passages of the control blocks immediately adjacent thereto.

12. In a control,

a control block having a first fluid passage having a bore extending from a first face to a port at a second face and a branch extending from the bore to a third face,

the control block also having a second fluid passage having a drive air bore extending from the first face to the second face and a second fluid branch extending from the drive air bore to a port at the third face,

the control block also including a first fluid outlet passage leading from a port at the third face near the port of the branch of the first fluid passage,

the control block also including a second fluid outlet passage leading from a port at the third face near the port of the branch of the second fluid passage,

flexible diaphragm means covering the ports in the third face and movable under pressure away from the ports,

diaphragm chamber means defining a first diaphragm chamber opposite the ports of the fluid branch and the first fluid outlet passage and covering a first portion of the flexible diaphragm means and also defining a second diaphragm chamber opposite the ports of the branch of the second fluid passage and the second fluid outlet passage and covering a second portion of the flexible diaphragm means,

and selectively operable means for supplying fluid under pressure to the diaphragm chambers to press the diaphragm means against the ports and close the ports from each other.

13. The control of claim **12** wherein the first face and the second face are at opposite sides of the block.

14. The control of claim **12** wherein the diaphragm chamber means is a cover adapted to cover the third face of the block and having recesses in the face thereof adjacent the diaphragm means and defining the diaphragm chambers.

15. The control of claim **14** wherein the cover is a block member having blind bores defining the recesses and including control fluid passage means to the bores.

16. The control of claim **15** wherein the control fluid passage means includes a main passage leading from one face of the block member and branch passages leading from the main passage to the blind bores.

17. In a control, a block having a fluid supply passage and a fluid discharge passage therethrough, the passages having adjacent ports at one face of the block,

flexible diaphragm means covering the adjacent ports,

and diaphragm cover means defining a diaphragm chamber opposite the adjacent ports and adapted to selectively

receive fluid under pressure to press the diaphragm means to a position closing the ports.

18. The control of claim **17** wherein the diaphragm means comprises a sheet of flexible material.

19. The control of claim **18** wherein the diaphragm cover means comprises a diaphragm block having the diaphragm chamber therein.

20. In a control,

a plurality of solid control blocks secured together in face-to-face relationship,

each of the control blocks having first passages opening into passages in an immediately adjacent one of the control blocks,

gasket means between the blocks sealing the areas around the junctures of the passages.

a plurality of diaphragm means mounted on the blocks,

the first passages having laterally extending branches having ports opening to the diaphragm means,

and a plurality of additional passages in the blocks having ports adjacent the ports of the first passages and opening to the diaphragm means,

each diaphragm means being adapted when in one position to press against the adjacent ports and close them from each other and wherein a second position to permit flow from one of the last-mentioned ports to the other.

21. The control of claim **20** including end blocks secured to the control blocks and including passages communicating with the first passages.

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