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Beeler et al.

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[54] UTILITY OUTLET FIXTURE WITH SLACK TAKE-UP

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[51] **Int. Cl.**.....**H02g 11/06**, B65h 75/46, B65h 75/48

[58] **Field of Search**.....191/12; 339/9; 174/40, 40.2, 174/45.1, 69; 248/49; 137/344, 355.17, 355.23

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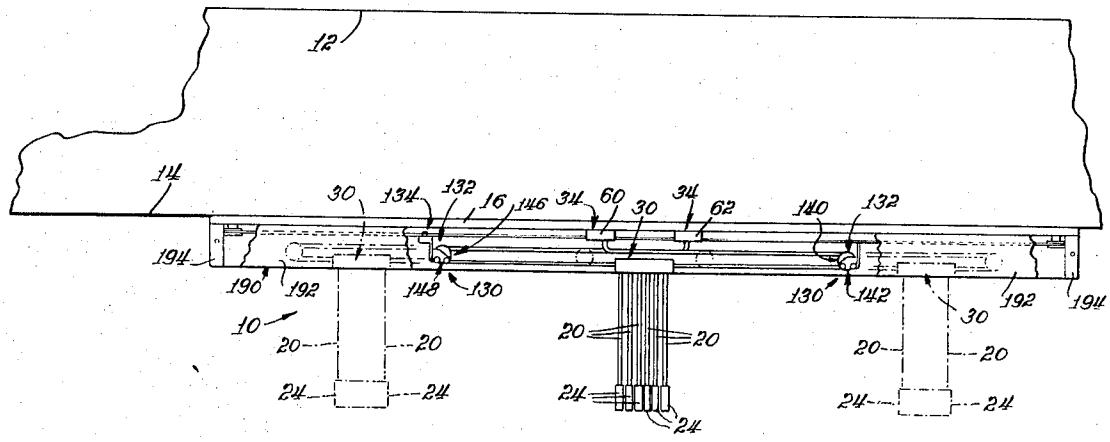
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[57] **ABSTRACT**

A utility outlet fixture, which provides utility access at any position within a predetermined range of positions, is characterized by means for removing slack in elongated flexible utility conduits which are connected at opposite ends respectively to a fixed receptacle and to a carriage movable along a track.

15 Claims, 7 Drawing Figures



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4 Sheets-Sheet 1

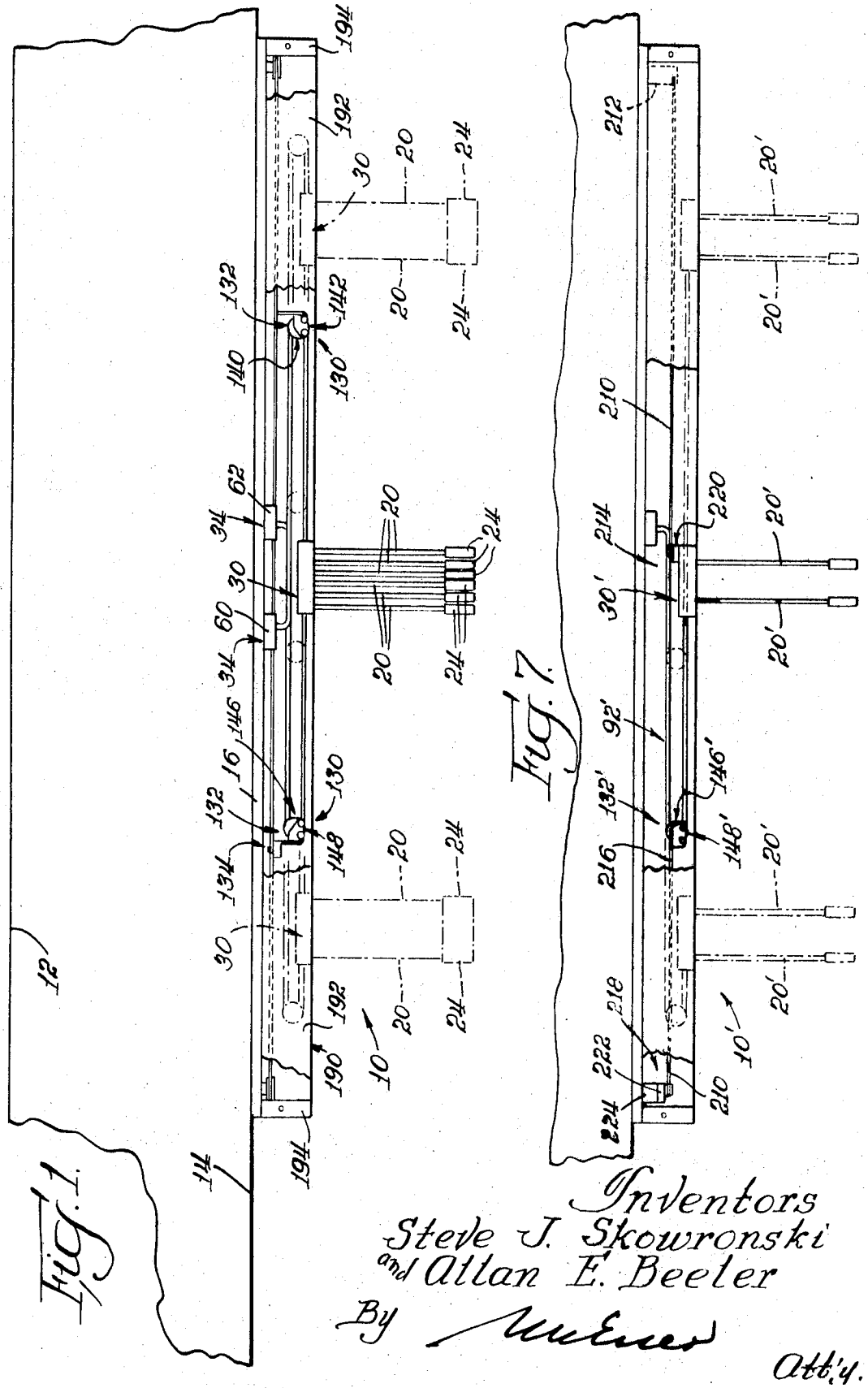


Fig. 1.

Fig. 7.

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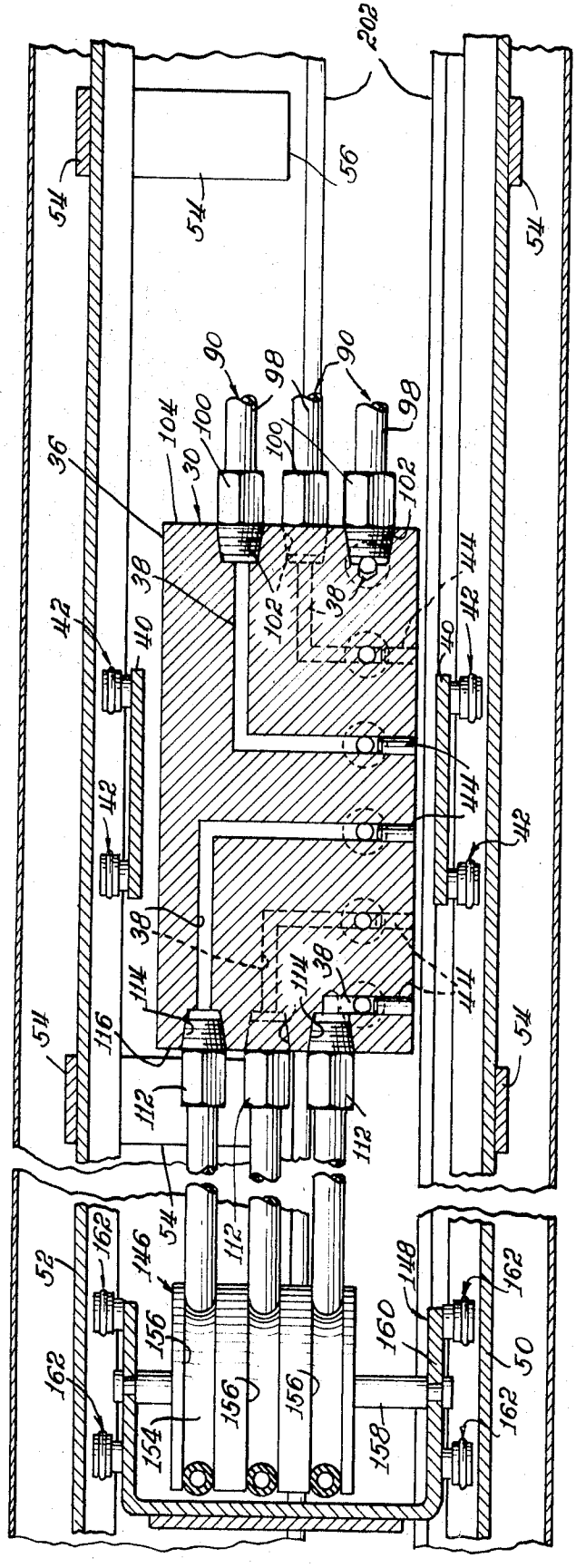


Fig. 5

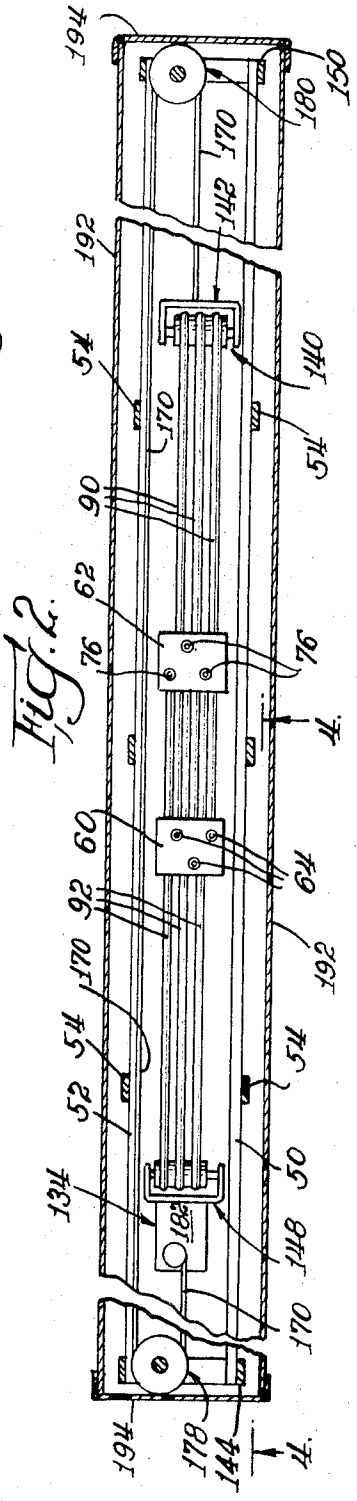
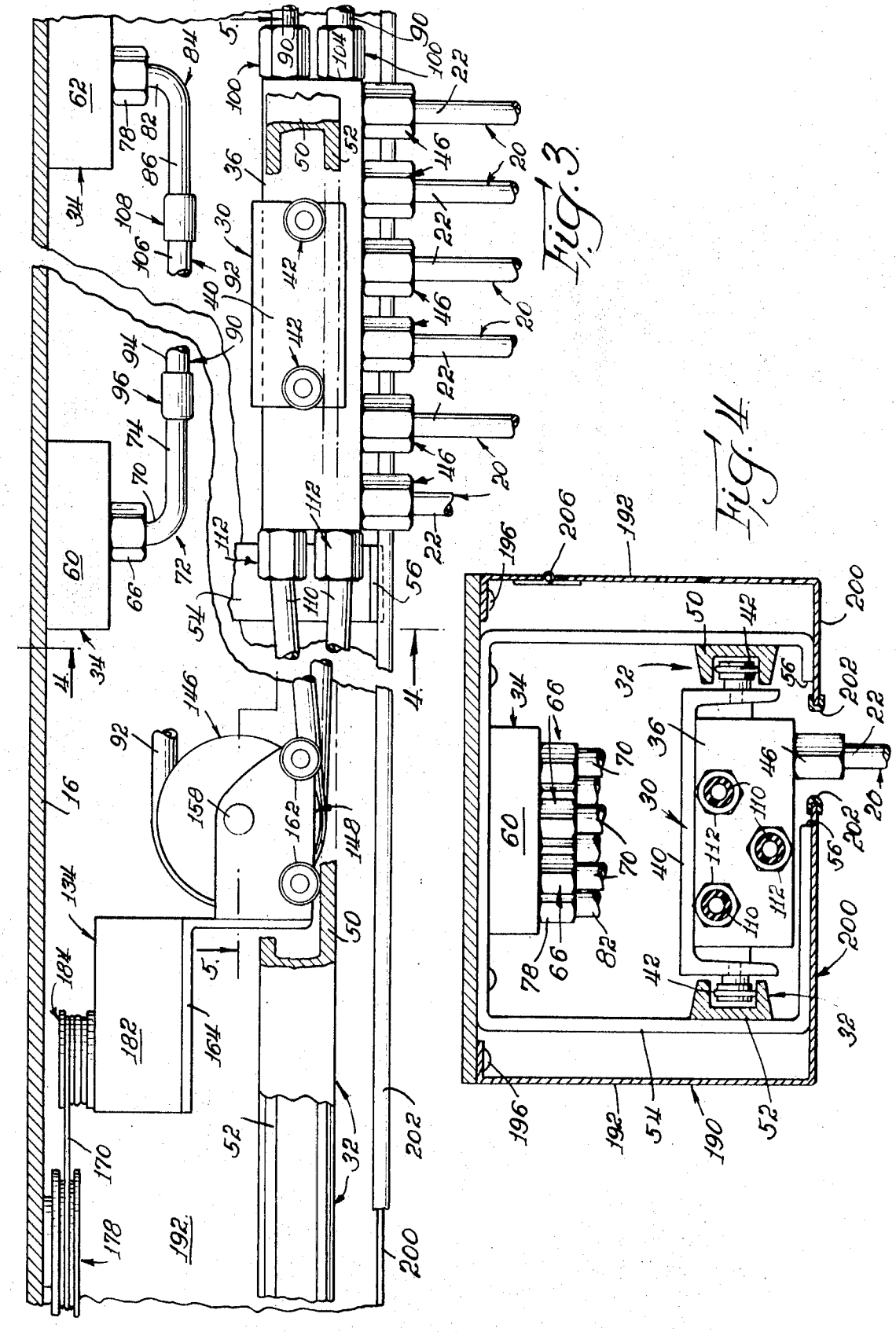


Fig. 2


FIG. 3
FIG. 4

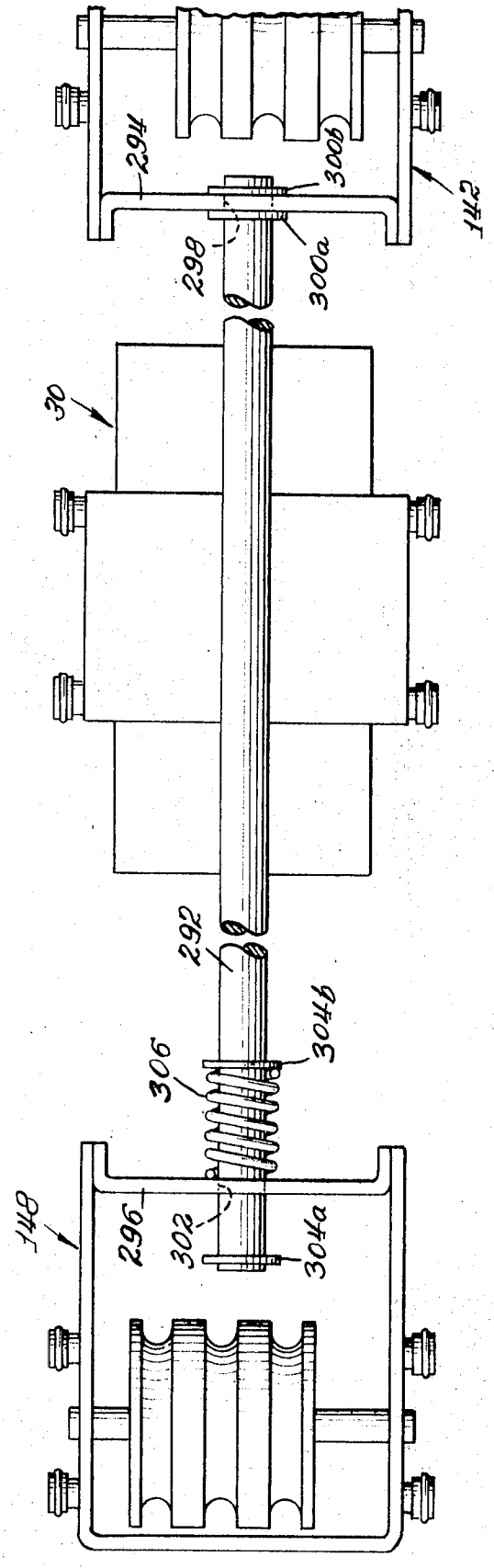


FIG. 6

UTILITY OUTLET FIXTURE WITH SLACK TAKE-UP

BACKGROUND OF THE INVENTION

This invention pertains generally to utility outlet fixtures of the type used in supplying vacuum, oxygen, air, nitrogen, nitrous oxide, and other piped utilities, and electrical utilities where applicable, to operating rooms and other medical and surgical facilities, and more particularly to improved overhead utility outlet fixtures providing access to utilities at remote points of use within an enlarged room space yet substantially eliminating any need to have utility hoses trailing about the floor.

Presently, many operating rooms and other medical and surgical facilities have utility outlet fixtures in the form of wall-mounted outlet stations to which elongated flexible conduits in the form of hoses for piped utilities may be connected as by means of quick-disconnect devices. The hoses are needed to bring the utilities to remote points of use within the room. Thus, in such an operating room, for example, it is not uncommon to find a clutter of utility hoses trailing about the floor.

However, in some more recently built or more recently remodeled medical and surgical facilities, wall-mounted outlet stations have been displaced in favor of overhead utility outlet fixtures from which suitably connected hoses are suspended. In some overhead utility outlet fixtures, the hoses are wound on reel mechanisms permitting extension of the hoses to remote points of use within the room and retraction of the hoses for storage at a raised level. Such reel mechanisms are complicated and accommodate only one hose apiece. In other overhead utility outlet fixtures, the suspended hoses are fixed, and extension hoses are needed to bring the utilities to remote points of use within the room. With overhead utility outlet fixtures of the latter type, in order to provide access to utilities at remote points of use within the room, it is necessary either to have several fixtures or to use extension hoses of sufficient length to reach various portions of the room.

This invention is addressed to the problem of providing an overhead utility outlet fixture providing access to utilities within an enlarged room space while eliminating problems such as utility hoses trailing about the floor.

SUMMARY OF THE INVENTION

It is a general object of this invention to provide an improved utility outlet fixture useful in supplying vacuum, oxygen, air, anesthetic gases, and other piped utilities, and electrical utilities where applicable, to operating rooms and other medical and surgical facilities.

It is a more particular object of this invention to provide a utility outlet fixture improved over known utility outlet fixtures in that it provides utility access at points of use anywhere within an enlarged room space and eliminates a utility hose trailing about the floor.

The preceding objects may be attained in an overhead utility outlet fixture comprising, in combination, a carriage, from which a plurality of elongated flexible conduits may be suspended, an elongated overhead track, along which the carriage is movable, a plurality of elongated flexible utility conduits which are connected at opposite ends to fixed inlets and to the carriage, and means for removing slack in the conduits at any position of the carriage along the track. The slack removing means holds the carriage at any position along the track. The track may be extended to any practicable length, for example, ten or more feet, to span an enlarged work area. Thus, utility access is provided within an enlarged room space.

These and other objects, features, and advantages of this invention are evident from the following description, with the aid of the attached drawings illustrating a preferred embodiment of this invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is an elevational view, partly broken away and in section, showing a typical installation of a utility outlet fixture embodying the principles of this invention;

FIG. 2 is a top plan view of the fixture of FIG. 1 with the top plate removed;

FIG. 3 is a longitudinal sectional view, partly broken away, taken substantially along line 3—3 of FIG. 2;

FIG. 4 is a cross-sectional view, taken substantially along line 4—4 of FIG. 3, omitting background portions for clarity;

FIG. 5 is a detail section view taken substantially along line 5—5 of FIG. 3;

FIG. 6 is a horizontal sectional view showing a modified form of slack removing means for the fixture of FIG. 1; and

FIG. 7 is a view, similar to FIG. 1, showing a simplified utility outlet fixture also embodying the principles of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1, an overhead utility outlet fixture **10**, which constitutes a preferred embodiment of this invention, is shown in a typical installation in a room having a ceiling **12** and a dropped ceiling **14**. The room represents an operating room or other medical or surgical facility. Piping for utilities, such as vacuum, oxygen, air, nitrogen, and nitrous oxide, is concealed between the true ceiling **12** and the dropped ceiling **14**. As shown an upper mounting plate **16** of the fixture **10** is held firmly against the underside of the dropped ceiling **14** as by means of tie rods (not shown) anchored in the true ceiling **12**. Alternatively, the fixture **10** may be recessed between the dropped ceiling **14** and the true ceiling **12**. The fixture **10** has a plurality of elongated flexible utility conduits **20**, six in number as shown, which are suspended to reach to a level approximately from 6 to 7 feet above the floor of the room. Thus, the conduits **20** remain out of the way yet may be reached easily by persons working beneath the fixture **10**. Within the fixture **10**, suitable connections are made between the concealed piping and the conduits **20**, each conduit **20** being supplied with a particular utility from the concealed piping. Of course, the same utility may be supplied to more than one of the conduits **20**. In accordance with the principles of this invention, the conduits **20** may be moved, as a group, to any position along an elongated path, preferably 10 or more feet along, in order to provide utility access within a greatly enlarged room area. The range of movement of the group of conduits **20** is suggested in phantom lines in FIG. **1**.

The upper end **22** of each conduit **20** is supported in a manner to be described hereinafter. Each conduit **20** carries a conventional valved fitting **24**, which is adapted for connection to a conventional connector fitting (not shown) on an infeed conduit of apparatus (not shown) utilizing the utility to be supplied. Preferably each fitting is indexed for a particular utility. Such fittings are conventional in utility piping systems and are outside the scope of this invention.

The upper ends **22** of the conduits **20** are supported from a wheeled carriage **30**. The carriage **30** is supported by an elongated track **32** (FIG. 3) for movement along the track **32**. A pair of utility inlet receptacles **34** are mounted fixedly to the plate **16** intermediate the ends of the track **32** and in spaced relation to the track **32**.

The carriage **30** comprises a generally oblong manifold block **36**, through which a plurality of internal passages **38** are drilled, a bracket **40**, which is bolted or otherwise mounted rigidly to the manifold block **36**, and opposite pairs of carriage wheels **42**, which are journalled to the bracket **40**. Lead-in portions of the drilled passages **38** are closed by means of suitable plugs **44**. Preferably, the wheels **42** have O-ring tires and anti-static bearings made of conductive nylon or other suitable material. Each passage **38** is used to supply a utility to one of the conduits **20**. Conventional DISS (Diameter-Index-Safety-System) couplings **46** are used to connect the conduits **20** to the passages **38**. A male portion of each DISS coupling **46** has a threaded stem and is mounted in a suitably threaded

socket in the manifold block **36**. A female portion of each DISS coupling **46** is suitably carried on the upper end **22** of one of the conduits **20**. The respective DISS couplings **46** are aligned longitudinally and extend beneath the manifold block **36**. Such DISS couplings and similar DISS couplings used elsewhere in the fixture **10** are of types conventionally used in utility piping systems for operating rooms and other medical and surgical facilities and are outside the scope of this invention.

The track **32** comprises a pair of elongated parallel track rails, **50** and **52** respectively, mounted fixedly to the plate **16** by means of a plurality of longitudinally spaced brackets **54**. The track rails **50** and **52** are generally channelled in cross-section to support the opposed pairs of wheels **42** of the carriage **30** for movement of the carriage **30** along the track **32**. Each bracket **54** is fabricated from a strip to a box-like configuration with a lower slot **56** providing clearance for the conduits **20**.

The inlet receptacles **34** specifically comprise first and second longitudinally spaced receptacle boxes, **60** and **62** respectively, mounted fixedly to the plate **16**. Suitable openings (not shown) are provided above the respective receptacles **60** and **62**, both in the dropped ceiling **14** and in the plate **16**, for access to the concealed piping. Tubing **64** (FIG. 2) extending into the first receptacle **60** is used to connect the concealed piping to conventional DISS couplings **66**. Male portions of the DISS couplings **66** extend downwardly from the first receptacle box **60**. Female portions of the DISS couplings **66** are carried on the shorter legs **70** of generally L-shaped tubular stems **72**. The longer legs **74** of the stems **72** are parallel and are pointed generally toward the second receptacle box **62**. Tubing **76** (FIG. 2) extending into the second receptacle box **62** is used to connect the concealed piping to similar DISS couplings **78**. Male portions of the DISS couplings **78** extend downwardly from the second receptacle box **62**. Female portions of the DISS couplings **78** are carried on the shorter legs **82** of similar generally L-shaped stems **84**. The longer legs **86** of the stems **84** are parallel and are pointed generally toward the first receptacle box **60**.

A first group of elongated flexible conduits **90**, three in number as shown, are connected at opposite ends respectively to the first receptacle **60** and to the carriage **30**. A second group of elongated flexible conduits **92**, similar to the conduits **90** and also three in number as shown, are connected at opposite ends respectively to the second receptacle **62** and to the carriage **30**. The upper end **94** of each conduit **90** is suitably connected to the longer leg **74** of one of the stems **72**, as by means of barbs (not shown) on the leg **74**, and accidental disassociation thereof is prevented by means of a conventional ferrule-type coupling **96**. The lower end **98** of each conduit **90** is connected to one of the passages **38** in the manifold block **36** by means of a conventional DISS coupling **100**. A male portion of each DISS coupling **100** has a threaded stem and is mounted in a suitably threaded socket **102** at a first end **104** of the manifold block **36**. A female portion of each DISS coupling **100** is carried on the lower end **98** of each conduit **90**. The upper end **106** of each conduit **92** is suitably connected to the longer leg **86** of one of the stems **84**, as by means of barbs (not shown) on the leg **74**, and accidental disassociation thereof is prevented by means of a similar ferrule-type coupling **108**. The lower end **110** of each conduit **92** is connected to one of the passages **38** in the manifold block **36** by means of a similar DISS coupling **112**. A male portion of each DISS coupling **112** has a threaded stem and is mounted in a suitably threaded socket **114** at a second end **116** of the manifold block **36**. A female portion of each DISS coupling **112** is carried on the lower end **110** of each conduit **92**. The conduits **90** and **92** are crossed intermediate the ends of the track **32**, as shown, and are sufficiently long to permit movement of the carriage **30** over substantially the entire length of the track **32**. Thus, at any position of the carriage **30** along the track **32**, slack ordinarily would occur in the conduits **90** and **92**. However, such slack is taken up in a manner next to be described.

Means are provided for removing slack in the conduits **90** and **92** at any position of the carriage **30** along the track **32**. This means, which is indicated generally at **130**, generally comprises means **132** for engaging slack in the conduits **90** and **92** and means **134** for biasing the slack engaging means **132** and the carriage **30** apart along the track **32**.

The slack engaging means **132** comprises a first gang of pulleys **140**, each of which engages slack in one of the conduits **90**, in combination with a first wheeled pulley truck **142**, which guides the first gang of pulleys **140** for movement along the track **32** between the carriage **30** and a first end **144** of the track **32**. The slack engaging means **132** further comprises a second gang of pulleys **146** each of which engages slack in one of the conduits **92**, in combination with a second wheeled pulley truck **148**, which guides the second gang of pulleys **146** for movement along the track **32** between the carriage **30** and a second end **150** of the track **32**. Each gang of pulleys **140** or **146** may be fabricated as a single part **154** having plural grooves **156** and is journalled to a shaft **158**. Each pulley truck **142** or **148** comprises a generally U-shaped bracket **160**, which supports the shaft **158** in transverse relation to the track **32**, as shown, and opposed pairs of wheels **162**, which are journalled to the bracket **160**. Preferably, O-ring tires for the wheels **162** and bearings for the pulleys **140** and **146** are made of conductive nylon or other suitable material. A bracket, which is suitably attached to the bracket **160** of the second pulley truck **148**, provides a horizontal platform **164** extended toward the second end **150** of the track **32**.

The biasing means **134** comprises an elongated flexible wire **170**, which is attached at a first end to the first gang of pulleys **140** and at a second end to the second gang of pulleys **146**, and means for tensioning the wire **170** to bias the first gang of pulleys **140** toward the first end **144** of the track **32** and the second gang of pulleys **146** toward the second end **150** of the track **32**. The wire **170** passes over a first pulley or guide **178** adjacent the first end **144** of the track **32** and over a second pulley or guide **180** adjacent the second end **150** of the track **32** and is generally taut therebetween. As shown, the wire tensioning means is in the form of a conventional negator-spring cartridge **182** having an external take-up reel **184** for the wire **170** and applying a predetermined amount of tension to the wire **170**. A simple helical spring may be substituted for the negator-spring cartridge **182** if desired. The negator-spring cartridge **182** is suitably mounted on the platform **164** of the first gang of pulleys **140**. The first end of the wire **170** is attached to the take-up reel **184**. The second end of the wire **170** is attached to the bracket **160** of the second wheeled truck **148**. Thus, the biasing means **134** biases the first gang of pulleys **140** toward the first end **144** of the track **32** and biases the second gang of pulleys **146** toward the second end **150** of the track **32**. Likewise, the biasing means **134** retains the carriage **30** in any position along the track **32**. Such negator-spring cartridge is of a well known type and is outside the scope of this invention.

A housing **190** substantially encloses the parts of the fixture **10** other than the suspended conduits **20**. The housing **190** comprises a pair of side panels **192** and a pair of end covers **194**. The side panels **192** are suitably attached at upper flanged portions **196** to the plate **16** and extend at lower flanged portions **200** beneath and generally against the brackets **54**. The lower flanged portions **200** are spaced to define a slot **202** generally coinciding with the slots **56** in the brackets **54** and providing clearance for the conduits **20**. Preferably, the edges of the slot **202** are finished to remove sharp edges that would tend to cut the conduits **20**. The end covers **194** are flanged to permit attachment to the side panels **192** as by means of self-threading screws. At least one of the side panels **192** may be hinged longitudinally, as at **206**, for access to the enclosed parts upon removal of the end covers **194**.

In FIG. **6**, a modified form of biasing means is shown for use in the fixture **10** in place of the biasing means **134** of FIGS. **1** through **5**. The biasing means comprises an elongated rod **292**, which clears the carriage **30** to permit movement of the carriage **30** relative thereto, and means for resiliently connecting

the rod **292** between inwardly facing end brackets **294** and **296** on the respective pulley trucks **142** and **148**. A first end portion of the rod **292** passes through a suitable opening **298** in the end bracket **294** and is retained by snap rings **300***a* and **300***b* seated in suitable grooves (not shown) in the first end portion of the rod **292**. The snap rings **300***a* and **300***b* are positioned to rigidly hold the rod **292**. A second end portion of the rod **292** passes through a suitable opening **302** in the end bracket **296** and is retained by snap rings **304***a* and **304***b* spaced apart to permit limited movement of the rod **292** relative to the end bracket **296**. A coiled spring **306**, which is piloted over the rod **292** between the inner snap ring **304***b* and the end bracket **296**, biases the pulley trucks **142** and **148** apart along the track **32** (FIG. **3** etc.).

In FIG. **7**, in which primed reference numerals are used to indicate parts similar to like-numbered parts in FIGS. **1** through **5**, a simplified overhead utility outlet fixture **10'** is shown in a typical installation on a dropped ceiling **14'**. Except as noted, the fixture **10'** is similar in construction and operation to the fixture **10**.

Since only two suspended conduits **20'** are provided, only two conduits **92'** are provided between the fixed receptacle **60'** and the movable carriage **30'**. The slack engaging means **132'** comprises a single gang of pulleys **146'**, each of which engages slack in one of the conduits **92'**, and a single wheeled pulley truck **148'** which guides the gang of pulleys **146'** for movement along the track (not shown).

As shown, a biasing force is applied to the second end of carriage **30'** by means of a first wire **210**, which is attached at a first end to a fixed bracket **212** adjacent the first end of the track and at a second end to means **214** for tensioning the wire **210** to bias the carriage **30'** toward the first end of the track, and a biasing force is applied to the gang of pulleys **146'** by means of a second wire **216**, which is attached at a first end to the pulley truck **148'** supporting the first gang of pulleys **146'** and at a second end to means **218** for tensioning the wire **216** to bias the gang of pulleys **146'** toward the second end of the track **32**. As shown, the wire tensioning means **214** is in the form of a conventional negator-spring mechanism **220**, which is suitably mounted on the carriage **30'**, and the wire tensioning means **218** is in the form of a similar negator-spring mechanism **222**, which is suitably mounted on a fixed bracket **224** adjacent the second end of the track. Such negator-spring mechanisms are of a well known type and are outside the scope of this invention.

In order to compensate for the force-dividing effect of the gang of pulleys **146'**, the biasing force on the gang of pulleys **146'** should be approximately twice that on the carriage **30'**, and the wire tensioning means **214** and **218** should be selected accordingly. For example, the negator-spring cartridge **220** may be selected to apply a 3-pound tensioning force on the carriage **30'** whereupon the negator-spring mechanism **222** should be selected to apply a 6-pound tensioning force on the gang of pulleys **146'**. Alternatively, two or more wires, each tensioned by means of a separate negator-spring cartridge, may be connected in parallel to the gang of pulleys **146'**, such negator-spring cartridges being selected to apply the gang of pulleys **146'** through the parallel wires cumulative tension equal to the tension which the negator-spring cartridge **220** applies to the carriage **30'** through the wire **210**. In either instance, negator-spring cartridges are preferred over simple springs by reason of the fact that the tension applied by a negator-spring cartridge remains essentially constant no matter how much wire has been taken up by the take-up reel of the negator-spring cartridge.

Thus, it may be seen that the objects of this invention may be attained in overhead utility outlet fixtures that are simple in construction and efficient in operation.

Hereinbefore and in the claims which follow, the term "wire" is intended to encompass tapes and other elongated flexible elements capable of passing over a pulley or the like.

We claim:

1. A utility outlet fixture comprising an elongated track adapted to be fixedly supported, a utility inlet adapted to be supported in spaced relation to said track and adapted to be connected to at least one utility source, a carriage supported by said track for movement in opposite directions, conduit means connected at opposite ends respectively to said utility inlet and to said carriage, and means for removing slack in said conduit means at any position of said carriage relative to said track, said means for removing slack comprising means movable along said track for engaging slack in said conduit means and biasing means connected to said means for engaging slack biasing said means for engaging slack and said carriage apart along said track.

2. The fixture of claim **1** wherein said means for engaging slack comprises a pulley engaging slack in said conduit means and means supported by said track for guiding said pulley for movement along said track.

3. The fixture of claim **1** wherein said conduit means comprises plural elongated flexible conduits connected at opposite ends respectively to said inlet and to said carriage.

4. The fixture of claim **3** wherein said means for engaging slack comprises a gang of pulleys, each pulley engaging slack in one of said conduits, and means supported by said track for guiding said gang of pulleys for movement along said track between said carriage and an end of said track.

5. The fixture of claim **4** wherein said biasing means biases said gang of pulleys and said carriage toward opposite ends of said track.

6. A utility outlet fixture comprising: an elongated track adapted to be fixedly supported; a utility inlet adapted to be supported in spaced relation to said track and adapted to be connected to at least one utility source; a carriage supported by said track for movement in opposite directions; conduit means comprising plural elongated flexible conduits connected at opposite ends respectively to said utility inlet and to said carriage; and means for removing slack in said conduit means at any position of said carriage relative to said track; said means for removing slack comprising a first pulley engaging slack in a first of said conduits, means supported by said track for guiding said first pulley for movement along said track between said carriage and one end of said track, a second pulley engaging slack in a second of said conduits, means supported by said track for guiding said second pulley for movement along said track between said carriage and another end of said track, and biasing means connecting said pulleys for biasing said pulleys apart along said track.

7. The fixture of claim **6** wherein said biasing means biases said first pulley toward the first end of said track and said second pulley toward the second end of said track.

8. The fixture of claim **7** wherein said biasing means comprises a wire connected at a first end to said first pulley and at a second end to said second pulley, means supported adjacent the opposite ends of said track for guiding said wire intermediate its ends, and means connected between one end of said wire and one of said first and second pulleys for tensioning said wire.

9. The fixture of claim **7** wherein said biasing means comprises an elongated rod, means for connecting one end of said rod to one of said first and second pulleys, and means for resiliently connecting the other end of said rod to the other of said first and second pulleys.

10. A utility outlet fixture comprising: an elongated track adapted to be fixedly supported; a utility inlet adapted to be supported in spaced relation to said track and adapted to be connected to at least one utility source; a carriage supported by said track for movement in opposite directions; conduit means comprising plural elongated flexible conduits connected at opposite ends respectively to said utility inlet and to said carriage; and means for removing slack in said conduit means at any position of said carriage relative to said track; said means for removing slack comprising a first gang of pulleys, each pulley engaging slack in one of said conduits, means supported by said track for guiding said first gang of pulleys

for movement along said track between said carriage and one end of said track, a second gang of pulleys, each pulley engaging slack in one of said conduits, means supported by said track for guiding said second gang of pulleys for movement along said track between said carriage and another end of said track, and biasing means connecting said gangs of pulleys for biasing said gangs of pulleys apart along said track.

11. The fixture of claim **10** wherein said biasing means biases said first gang of pulleys toward the first end of the track and said second gang of pulleys toward the second end of said track.

12. The fixture of claim **10** wherein said biasing means comprises a wire connected at a first end to said first gang of pulleys and at a second end to said second gang of pulleys, means supported adjacent the opposite ends of said track for guiding said wire intermediate its ends, and means connected between one end of said wire and one of said first and second gangs of pulleys for tensioning said wire.

13. The fixture of claim **10** wherein said biasing means comprises an elongated rod, means for connecting one end of said rod to one of said first and second gangs of pulleys, and means for resiliently connecting the other end of said rod to the other of said first and second gangs of pulleys.

14. A utility outlet fixture comprising: an elongated track adapted to be fixedly supported; a utility inlet located in spaced relation to said track and adapted to be connected to at least one utility source; a carriage supported by said track for movement in opposite directions, conduit means connected at opposite ends respectively to said utility inlet and to said carriage; and means for removing slack in said conduit means at any position of said carriage relative to said track, said means for removing slack comprising means movable along said track for engaging slack in said conduit means and biasing means connected to said means for engaging slack biasing said means for engaging slack and said carriage apart along said track; said biasing means comprising a first wire connected at a first end to said carriage and at a second end to structure adjacent a first end of said track, means connected between one end of said first wire and that to which said end of said wire is connected for tensioning said first wire, a second wire connected at a first end to said gang of pulleys and at a second end to structure adjacent a second end of said track, and means connected between one end of said second wire and that to which said end of said second wire is connected for tensioning said second wire.

15. The fixture of claim **14** wherein the tensioning force on said gang of pulleys is approximately twice the tensioning force on said carriage.

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