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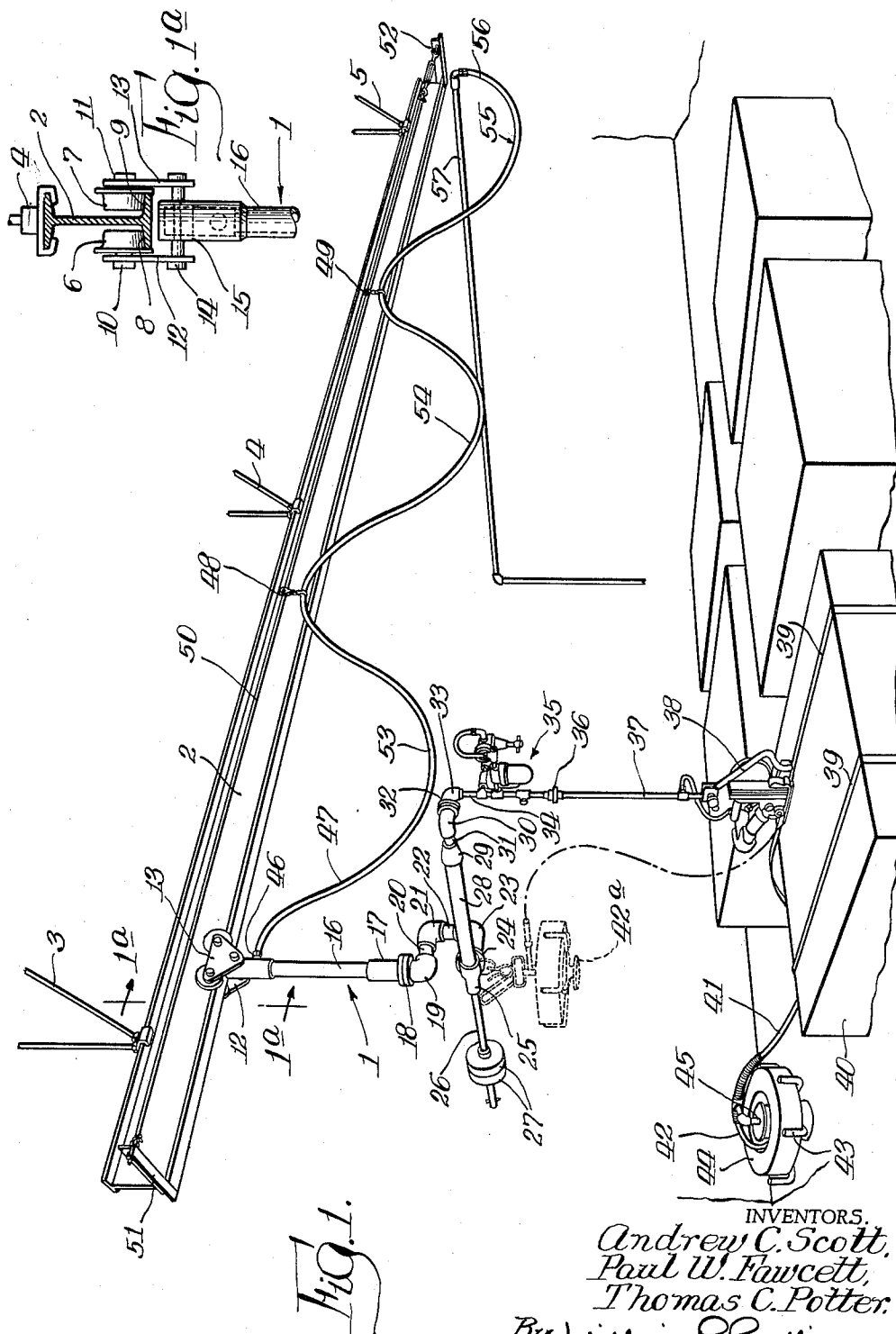
A. C. SCOTT ET AL

3,014,494

TOOL MOUNT

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3 Sheets-Sheet 1



INVENTORS.
Andrew C. Scott,
Paul W. Fawcett,
Thomas C. Potter.
By William P. Forcelli Atty.

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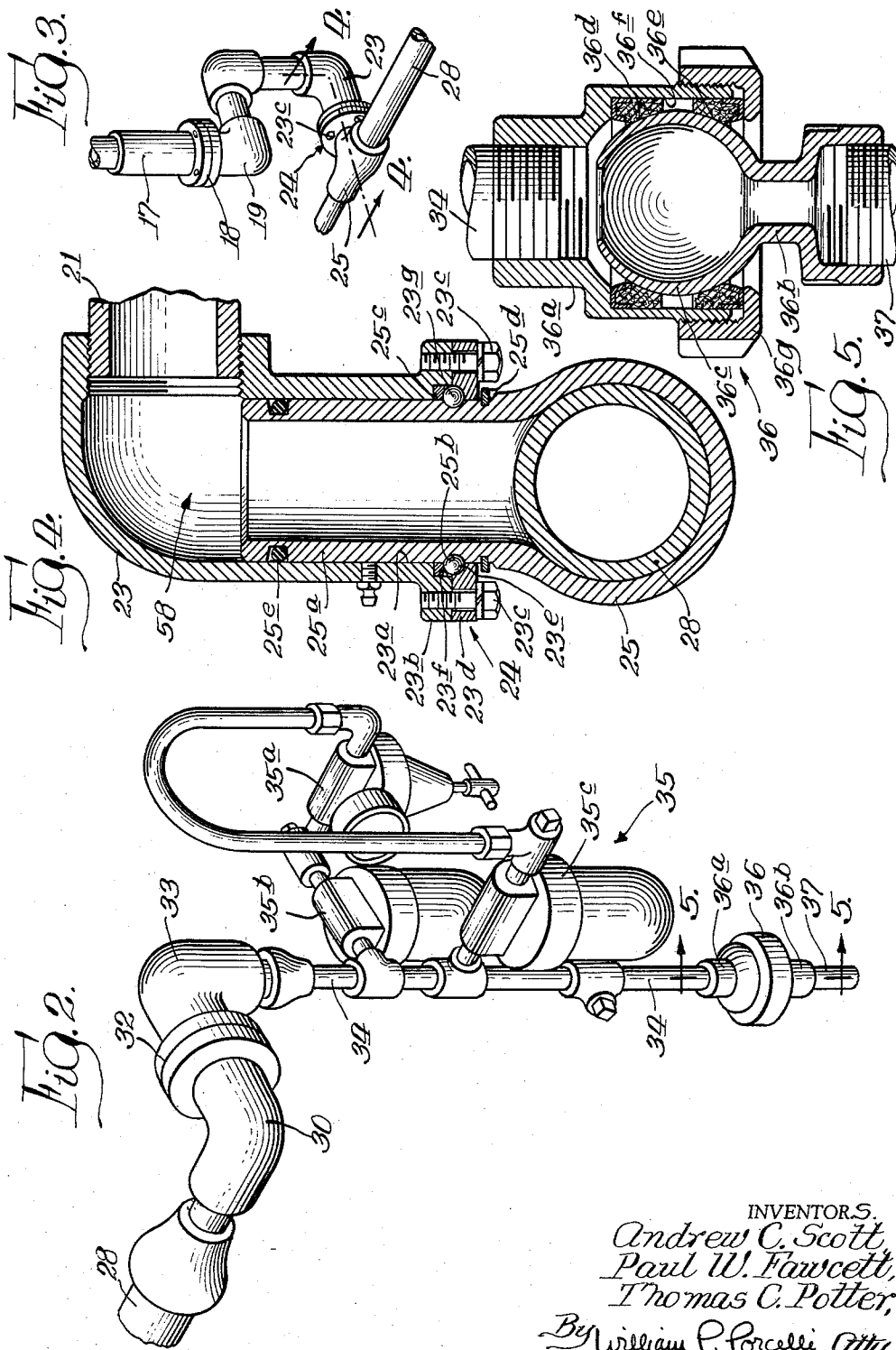
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INVENTORS,
Andrew C. Scott,
Paul W. Fawcett,
Thomas C. Potter,
By William P. Porcelli *Atty.*

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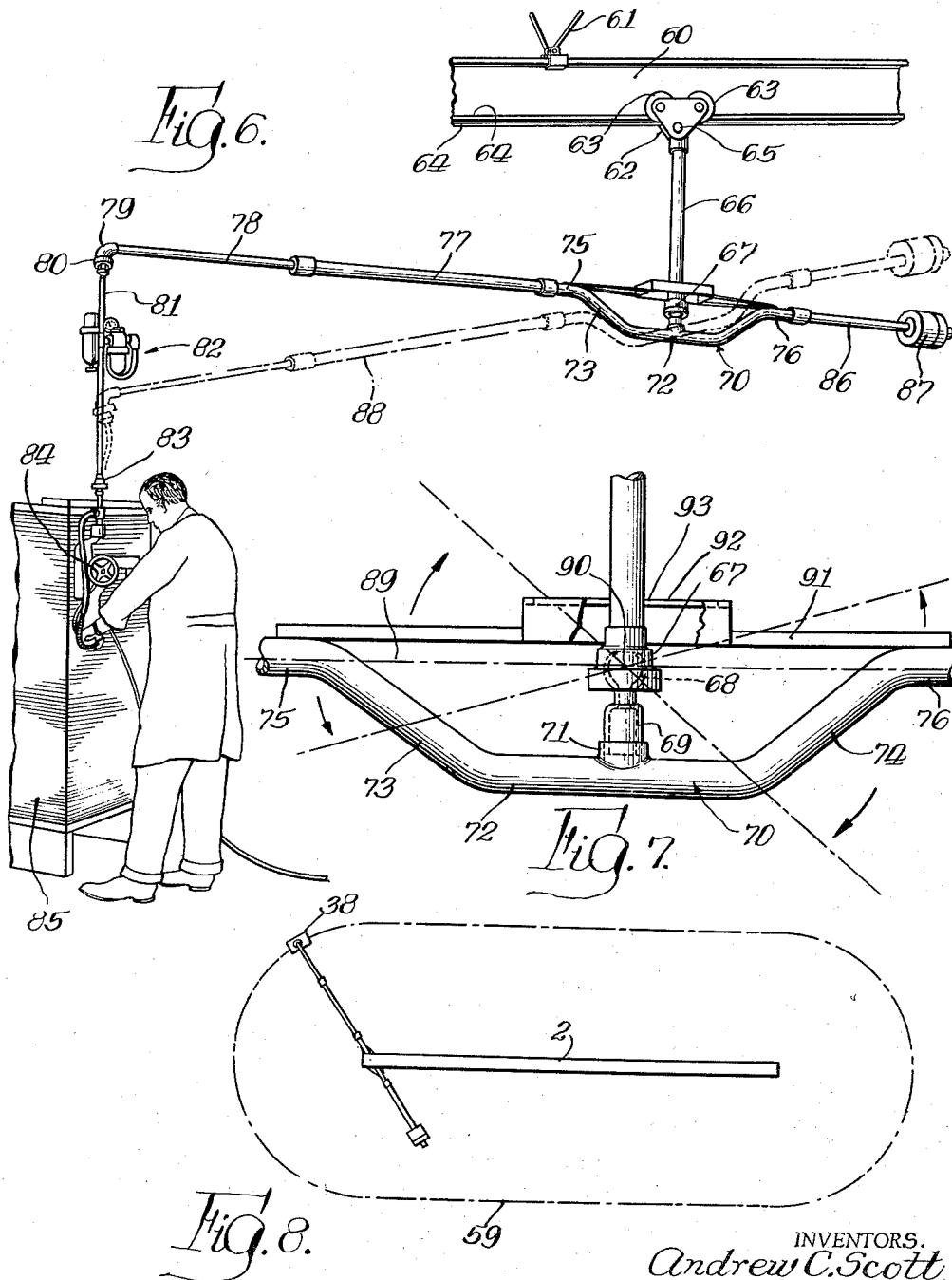
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INVENTORS.
Andrew C. Scott
Paul W. Fawcett,
Thomas C. Potter,
By William P. Forcelli, Atty.

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TOOL MOUNT

Andrew C. Scott, Hinsdale, Paul W. Fawcett, Western Springs, and Thomas C. Potter, Park Forest, Ill., assignors to Acme Steel Company, Chicago, Ill., a corporation of Illinois

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This invention relates to portable tool mounts and particularly to improvements in an overhead type of tool mount which supplies pressurized air for operating a tool supported by it.

Although, as the name suggests, portable tools are ordinarily understood to be those which can be moved about or carried by an operator to a desired work region rather than require that the work be brought to the tool as in the case of stationary tools or machines, many tools which are considered portable have so much weight that their manipulation is exceedingly fatiguing unless some means of movable tool support is provided which supports their weight.

Many tool mounts presently in use support the tool in the immediate work area without permitting any substantial relocation or movement, and these are relatively simple in construction. In cases where the tool mount is intended to permit the tool to be moved about a large area of operation, they are relatively complicated and expensive and usually entail what might be categorized as a major expense installation.

It is one of the important objects of this invention to provide an improved tool mount for portable tools which is relatively simple in construction and of relatively low cost and which provides sufficient freedom and range of movement that the tool supported by it can be moved to any work region within a very large area of operation. This is accomplished by means of a single overhead rail carrying for movement along it a trolley from which is suspended a vertical support provided with a boom supported at its lower end, the support for the boom permitting the boom to rotate through a complete circle in plan and also permitting the boom to be moved angularly up or down relative to the vertical support. The tool is supported from one end of the boom whose opposite end is counterbalanced to compensate for the weight of the tool. The combination of the movement along the rail and the rotational and angular movement of the boom permits the tool to be maneuvered quickly to any location within a very large operational region.

When the tools used are of a pneumatic type operated by air or fluid supplied under pressure, the problem is intensified because the tool mount must embody or carry conduit means for leading the air or fluid from a reservoir or other pressure source to the tool supported by the tool mount. Many tool mounts of this type have been created, but they all seem to have certain shortcomings which render them expensive, complicated, cumbersome to use, and/or impractical.

It is another object of this invention to provide an uncomplicated, practical and relatively inexpensive tool mount for a pneumatic or fluid operated tool which is easy to manipulate and which conveniently and efficiently provides conduit means for leading air or fluid from a reservoir or other pressure source to the tool. The manner of achieving this objective is by using rigid tubing for the tool support and the same tubing also as the conduit for the pressurized air or fluid. At the joints providing the rotational and angular movements of portions of the tool mount, special air-tight swivel connections are provided of a type ordinarily used in heavy duty conduits for the flow of liquids such as gasoline and oil.

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It is another object of this invention to provide a tool support for a pneumatic tool wherein the air line oiler and the air filter can be located in a rigid pipe close to the tool at all times to make it convenient for servicing and adjustment.

It is another object of the invention to make the supporting pipe for the tool mount of sufficiently large diameter and volume that it acts as an air accumulator and thereby reduces line pressure drop off due to sudden heavy air demands of the pneumatic tool being used. This precludes the need for a separate accumulator.

It is another object of the invention to locate the pivot point on the counterbalanced boom supporting the tool in such a location that, regardless of the angular position of the boom, there will be no upset of its balance and the tool will remain where positioned until it is again moved.

It is still another object of the invention to provide a tool mount which will conveniently accommodate auxiliary equipment such as a reel stand of strip material used with the tool so that the auxiliary equipment is automatically moved along with the tool as the tool is relocated, thus relieving the operator of the fatiguing problem of also relocating the auxiliary equipment independently of the movement required for tool relocation.

It is another object of the invention to provide an overhead tool mount embodying a safety feature which prevents falling of the tool mount in case of accidental loosening of the principal connection on its main support.

Other objects and advantages of the invention should become apparent by referring to the accompanying drawings in which:

FIG. 1 shows a perspective view of one embodiment of the tool mount of this invention in a typical position of use;

FIG. 1a shows a sectional view along the line 1a—1a of FIG. 1 and shows details of the overhead trolley support of the tool mount shown in FIG. 1;

FIG. 2 shows a perspective view of the portion of the tool mount embodying accessory items such as the air filter and air line oiler which are typical units used with any pneumatic tool installation;

FIG. 3 is a perspective view of a portion of the tool mount which shows the portions used to provide rotational movement of portions of the tool mount about two different axes;

FIG. 4 is a sectional view taken along the line 4—4 of FIG. 3 and particularly shows the interior construction of one of the swivel or rotational type joints;

FIG. 5 is a sectional view as viewed along the line 5—5 of FIG. 2 and particularly shows a ball and socket swivel type joint used on the tool mount;

FIG. 6 shows a perspective view of a second embodiment of the invention in a typical position as used;

FIG. 7 shows a portion of the tool mount of FIG. 6 enlarged and in partial section to indicate its construction more clearly; and

FIG. 8 shows a schematic top plan view of the tool mount of FIG. 1 and shows the plan area over which the tool mount can be moved in order to maneuver a tool supported by it to a convenient location within a very large area.

As shown in FIG. 1 the tool mount 1 is supported downwardly from an I-beam 2 suspended from suitable hanging supports 3, 4 and 5 which can be ordinarily connected to ceiling members in the building where the tool mount is to be used. The I-beam 2 is of a length dependent upon the floor area to be covered by the tool mount.

As viewed in FIG. 1a, the tool mount 1 is provided with four flanged wheels 6 and 7 which ride on surfaces 8.

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and 9 of the I-beam 2, the flanges on these wheels acting to maintain the tool mount centered on the I-beam 2. The wheels 6 and 7 are mounted on shafts 10 and 11 secured in triangularly shaped side plates 12 and 13 positioned on opposite sides of the I-beam. The lower ends of these side plates 12 and 13 are trunnioned on a shaft 14 which extends through an end cap 15. The end cap 15 fits over the upper end of a pipe 16 whose lower end is connected to the upper member 17 of a swivel connector 18 provided with a lower member 19 which is free to rotate about the vertical axis of the member 17. The lower member 19 is in the shape of an elbow and it is connected to a short length of pipe 20 which in turn is secured in an elbow 21 which in turn connects to a short pipe 22. The pipe 22 in turn is connected to an elbow 23 which is the inner member of another swivel connector 24. The outer member 25 of the connector 24 is provided with a reducer and secured to a rod 26 carrying cylindrical counterbalancing weights 27 which are adjustable along the rod 26. The other end of the member 25 is joined to the inner end of a pipe 28 whose outer end is connected to a reducer 29 which in turn is connected to another elbow 30 by means of a short pipe 31 therebetween. The member 30 is the inner end of a swivel connector 32 whose outer member 33 is free to swivel or rotate relative to the member 30 in a vertical plane. The member 33 is joined to a smaller diameter pipe 34 which is provided with connectors leading to a combined air line oiler, filter and pressure gauge all designated as 35. Pipe 34 finally connects to a ball and socket type swivel joint 36 which in turn supports another small diameter pipe 37. Suspended from the lower end of the small pipe 37 is an air operated tool 38 which can be of any conventional type. In this case the tool 38 shown is a combination type metal strap tensioning and sealing tool used for tensioning and securing metal strap loops 39 about cartons 40 or other objects. The strap loops 39 are provided from a continuous length of strap 41 which may be supplied from any conventional type unreeler 42 well known in the art. The unreeler 42 shown is provided with a coil support 43 on which is supported a coil 44 of strap 41. The coil support 43 is free to rotate on a hub 45 so that strap 41 can be drawn off from the coil 44 in as long a length as desired.

The pipe and the connectors used for the tool mount are of such a nature that they provide a continuous hollow or path for the passage of air from the end cap 15 to the tool 38. Leading into the end cap by a connector 46 is a flexible air hose 47 which is supported at spaced intervals by means of pulleys 48 and 49 which are free to move along a taut cable 50 suspended by the frame members 51 and 52 secured to opposite ends of the I-beam 2. The flexible air hose 47 is of sufficient length that it can extend from one end of the I-beam to the other. It is suspended in such a manner that it is formed into hanging loops 53, 54 and 55 between its points of suspension. Its inner end 56 is connected to a rigid pipe 57 which can be the ordinary rigid air supply line provided in most factories and work places.

The tool mount as described embodies four swivel connectors 18, 24, 32 and 36. The movement provided by the swivel connectors permits almost unlimited positioning of the tool 38 through a large range of positioning. The connector 18 provides circular positioning about a vertical axis while the connectors 24 and 32 permit adjustment about a horizontal axis. The swivel connector 36 which is a ball and socket connection permits further movement of the tool as a freely hanging pendulum.

By adjusting the positions of the counterbalance weights 27 on the rod 26, it is possible to arrive at a perfect balance of the tool mount so that the tool 38 can be raised or lowered as desired and it will remain in any position where it is placed. There is a slight amount of friction in all of the swivel connections which assists in

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maintaining a fixed position of the tool and tool mount members and this frictional resistance is increased by the effect of air pressure of the air supplied to the tool mount. This increased resistance is characteristic of the type connectors which are used.

Thus far, it has been shown that the tool mount itself is the air line which supplies the pressurized air to the tool 38. It has been found that the tool mount itself acts also as an air accumulator because of the large diameter pipe used. The result of this is that the large volume of air contained in the tool mount minimizes the pressure drop in the air line as the tool 38 is used. On certain tools where high volume of air is required, the tool mount is a distinct advantage since no special air accumulating means is required. In order to increase the accumulator effect, it is only necessary to increase the size of the pipes used in the construction of the tool mount.

As shown in FIGS. 3 and 4, details of the particular swivel connector 24 are shown. The inner end 25a of the outer member 25 is enclosed in the internal bore 23a of the inner member 23. The inner member 23 is provided with an outwardly extending flange 23b which is connected by means of bolts 23c to an annular ring 23d. The annular ring 23d is provided with an inner annular groove 23e which joins an inner annular groove 23f formed in the inner member 23. These grooves 23e and 23f combine to form a single side groove in which are positioned balls 23g. These balls 23g also engage an annular groove 25b formed on the outer surface of the inner end 25a of the member 25. These balls 23g provide an anti-friction bearing arrangement permitting free rotation of the member 25 relative to the member 23. They also prevent disassembly of the member 25 from the member 23. An O-ring 25c is also provided in the groove 23f and is used to prevent air leakage between the two members 23 and 25 to the atmosphere. A retaining ring 25d is provided in the member 25 to limit the inward movement of the end 25a into the member 23 to thereby prevent crushing of the O-ring 25c by pressure of the balls 23g on it. In addition another O-ring 25e is provided in another annular groove around the member 25 which further assists in preventing air leakage between members 23 and 25. With this arrangement it can be seen that a swivel connection 24 is provided which has an air tight chamber 58 through which air under pressure can be passed.

Although the connector 18 is not shown in cross section, it is of the same type as connector 24 and the anti-friction swivel connection between its two members 17 and 19 is identical to that for connector 24 as shown in FIG. 4.

The connector 36 is shown in cross section in FIG. 5 and it is provided with two members 36a and 36b which are joined together in an air tight manner and which are free to swivel with respect to each other. The member 36b is provided with a spherical end 36c which is held by the two packing rings 36d and 36e secured within the inside bore 36f of the member 36a. Assembly of the parts is held together by means of a threaded annular flange 36g which is threaded onto the member 36a.

The particular type swivel connectors 18, 24, 32 and 36 are a standard type which can be purchased from Barco Manufacturing Company of Barrington, Illinois, and are shown in their catalog No. 400-A (Rev.) 2 M-10-57.

The accessory items indicated at 35 are the ordinary air pressure regulator 35a, air line oiler 35b and air filter 35c. They are not shown because of their construction but because of their convenient location with respect to the location of the tool 38 which is possible because of the construction of the tool mount of this invention. Ordinarily these accessory items must be mounted relatively far removed from the location of the place where the tool 38 is used since they must be mounted rigidly.

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On prior art devices, the usual closest rigid mounting is beyond the end of the flexible air hose which is usually quite far from the tool. With the arrangement of this invention, these accessory items are readily available without requiring that the operator leave the tool location. As a change of air pressure or servicing of the other accessory items is required, the operator of the tool can reach them without leaving his work station. Thus, a very important advantage of convenience is achieved by this invention. Although the pipe 34 appears to be continuous between the connectors leading to the air line oiler 35b and from the air filter 35c, the short pipe section between the connectors is blocked so that air passes properly through the air line oiler 35b and the air filter 35c rather than bypass these units.

It should be noted that in FIGS. 1 and 3 the connectors 18 and 24 and the piping and elbows in between the two are connected in a C-shape. The purpose of this is to maintain the pivot point of this connector 24 in line with the center line of the tube 16 directly above it. This prevents eccentric loading of the connector 18 which would increase wear on it and retard its operation.

The fact that the entire tool mount is of rigid construction also permits the positioning of other accessory items, besides those indicated at 35, where desired on the tool mount. For convenience, as shown in FIG. 1, the coil unreeler 42 can be suspended as shown in dotted lines at 42a to a more convenient location on the tool mount. The unreeler is then used as an overhead type and it is automatically moved as the tool mount is used, thus reducing the work required of the tool operator in moving the coil unreeler from place to place as he moves from package to package. Also, by having the coil unreeler mounted overhead, no floor space is required for its use. These are desired advantages. To summarize, air under pressure is provided from a source of pressure in pipe 57 which provides air under pressure to the air line 47. The air in turn passes through the tool mount 1 which acts as an accumulator before it reaches the tool 38 which consumes it when it is operated. The tool mount is supported from a trolley riding on wheels 6 and 7 which are moved for the entire length of the I-beam 2. As the tool mount is moved along the I-beam 2, the air hose 47 is taken up in the form of its loops 53, 54 and 55. The angular movement provided by all of the swivel type connectors 18, 24, 32 and 36 provide a wide range of movement of the tool 38 so that it can be positioned at varying heights over a very large area. Also, since accessory items used with the tool 38 can be carried along on the tool mount, much time and effort of the tool operator are saved. The extent of the area of coverage is indicated by the dotted line 59 in FIG. 8. It is apparent that an extremely large area of coverage is provided with only a single trolley. Ordinarily, to obtain the same coverage with conventional units, it is necessary to provide a horizontally moving trolley or crane provided with a transversely moving trolley or crane so that the combined movements of both provide the coverage. Such an installation is much more expensive and, so, this invention provides a high degree of economy.

A second embodiment of the invention is shown particularly in FIGS. 6 and 7. This embodiment consists of an I-beam 60 supported by means of overhead supports 61 which are preferably secured to the ceiling members of a building or room where the tool mount is used. In a manner identical to that as shown in FIG. 1a, a trolley 62 is supported by the I-beam 60. The trolley is provided with four flanged wheels 63 which ride on the lower flanges 64 of the I-beam. Depending from a support beam 65 is a vertically extending pipe 66 whose lower end is provided with a socket 67 which is secured to a ball shaped end 68 to form a universal ball and socket connection identical to that as shown in FIG. 5 on the first embodiment already described. The ball shaped end 68 of the ball and socket connection is se-

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cured to a vertical pipe length 69 which is secured in an opening in another pipe 70 provided by a short projecting pipe portion 71. The pipe 70 is in a U-shape provided with a lower portion 72 connected between two upwardly slanting portions 73 and 74. These portions 73 and 74 are connected to two horizontal portions 75 and 76. The pipe portion 75 is coupled to another pipe portion 77 which in turn is coupled to a pipe 78 of reduced diameter. This pipe 78 is connected at an elbow 79 to another ball and socket type joint 80 similar in all respects to the ball and socket connection 36 shown in FIG. 5. The lower portion of the connection 80 is provided with a pipe 81 which carries the combined accessory unit 82 consisting of the ordinary air line pressure regulator, the air filter and the air line oiler. The lower end of the pipe 81 is connected to another ball and socket type joint 83 similar to joint 80. Depending from the lower portion of the ball and socket joint 83 is an air operated tool 84 which is used to tension and secure binding straps about an object 85. The pipe length 76 is coupled to another pipe length 86 on which is carried counterbalance weights 87 which are adjustable along the pipe length 86. The purpose of these weights 87 is to counterbalance the entire pipe 70 so that the tool 84 will remain in whatever position it is placed by the operator. The dotted lines 88 indicate a lowered position of the pipe 70.

It should be noted that the center line 89 of the pipe portions 75 and 76 intersect the center point 90 of the ball and socket connection formed by the members 67 and 68. This is deliberate in order to insure that the tool 84 will remain where it is positioned after it is positioned. If the center point 90 would be lower than where it is shown, as the pipe 70 would be moved from its horizontal position, the balance of the entire arm 70 would be upset and the tool would not remain where positioned.

Connected between the inner ends of the members 75 and 76 is a brace 91. The brace 91 is provided with a central member 92 provided with an opening 93 in it. It is through this opening that the depending pipe 66 passes. The opening 93 is smaller than the largest outside diameter of the socket 67. This is a safety feature which prevents the member 70 from falling in case the ball and socket connection formed by members 67 and 68 fails. If failure occurs, the portion of the member 92 with the hole 93 would merely drop onto the flange and prevent falling of the member 70 which could result in a serious accident. The hole 93 must necessarily be a slot of width less than the diameter of the socket 67 in order to obtain the full range of angular movement indicated for the member 70 and to also maintain the safety feature indicated.

As already described for the first embodiment, FIG. 8 shows the area of coverage of a tool 38 when mounted on the first embodiment. Similarly, the tool 84 can obtain the same work area coverage.

Although only two embodiments of the invention have been shown, it should be understood that the invention can be made in many other ways without departing from the true scope of the invention as defined by the appended claims.

We claim:

1. A tool mount comprising, a frame and a support for said frame, said frame being hollow and composed of a plurality of separate pipe lengths joined together successively by air tight swivel connections to provide angular movement between the different pipe lengths, the first of said pipe lengths being connected to a source of air and the last of said pipe lengths being connected to an air operated tool, the hollow of said frame providing a passage for air delivered from said source to said tool, said hollow being of larger volume than the air line to permit the frame to act as an accumulator for the storage of an extra volume of air for minimizing

air line pressure reduction when the tool consumes air during its operation, one of said swivel connections providing angular movement about a horizontal axis, and another providing it about a vertical axis, another of said swivel connections between the last of said pipe lengths and the next successive pipe length being a ball and socket type with the last of said pipe lengths extending substantially vertical when it is hanging freely to thereby provide a pendulum support for the tool allowing movement of the tool transverse to said support, said first pipe length being provided with a trolley which is carried by said support for supporting said frame, said support providing a guide for said trolley enabling the frame to be moved along the support in response to positioning and repositioning of the tool.

2. A tool mount comprising, a frame and a support from which said frame is hung, said frame being composed of a plurality of separate lengths joined together by swivel connections to provide angular movement between the different lengths, a tool connected to one of said lengths, a first of said swivel connections providing angular movement about a vertical axis and a second providing it about a horizontal axis, said swivel connections being arranged in vertical alignment with each other to maintain vertical axial loading on said first swivel connection.

3. A tool mount comprising, a frame and an overhead support for said frame, said frame being composed of a plurality of separate lengths joined together end to end, the first of said lengths being supported directly by said overhead support and hanging vertically downward from it, a second of said lengths being connected to the lower end of the first length by means of a first swivel connection which provides angular movement of the second of said lengths about a vertical axis, the third of said lengths being connected between its ends to the lower end of the second of said lengths by means of a second swivel connection which provides angular movement of the third of said lengths about a horizontal axis, a fourth swivel connection between a first end of the third of said lengths and a fourth of said lengths to which a tool is connected, said fourth length hanging freely from said fourth swivel connection to provide a pendulum support for said tool, said first and second swivel connections being arranged in vertical alignment with each other to maintain vertical axial loading on said first swivel connection.

4. A tool mount comprising, a frame and an overhead support for said frame, said frame being composed of a plurality of separate lengths joined together end to end, the first of said lengths being supported directly by said overhead support and hanging vertically downward from it, a second of said lengths being connected to the lower end of the first length by means of a first swivel connection which provides angular movement of the second of said lengths about a vertical axis, the third of said lengths being connected between its ends to the lower end of the second of said lengths by means of a second swivel connection which provides angular movement of the third of said lengths about a horizontal axis, a fourth swivel connection between a first end of the third of said lengths and a fourth of said lengths to which a tool is connected, said fourth length hanging freely from said fourth swivel connection to provide a pendulum support for said tool, said third length being provided with weights on its second end to counterbalance the weight of its first end from which the tool is mounted so that the tool will remain balanced at any level where positioned, said first and second swivel connections being arranged in vertical alignment with each other to maintain vertical axial loading on said first swivel connection.

5. A tool mount comprising, a frame and an overhead support for said frame, said frame being composed of a plurality of separate lengths joined together end to end, the first of said lengths being supported directly by said overhead support and hanging vertically downward from it, a second of said lengths being connected to the lower end of the first length by means of a first swivel connection which provides angular movement of the second of said lengths about a vertical axis, the third of said lengths being connected between its ends to the lower end of the second of said lengths by means of a second swivel connection which provides angular movement of the third of said lengths about a horizontal axis, a fourth swivel connection between a first end of the third of said lengths and a fourth of said lengths to which a tool is connected, said fourth length hanging freely from said fourth swivel connection to provide a pendulum support for said tool, said third length being provided with weights on its second end to counterbalance the weight of its first end from which the tool is mounted so that the tool will remain balanced at any level where positioned, said first and second swivel connections being arranged in vertical alignment with each other to maintain vertical axial loading on said first swivel connection, the first length being provided where supported by said overhead support with a trolley which rides on said overhead support which provides a guide for said trolley enabling the frame to be moved along the support in response to positioning and repositioning of the tool.

6. A tool mount comprising, a frame and a support for said frame, said frame being composed of a vertically hanging first length connected by a swivel connection to a second length extending transversely to said first length, said first swivel connection being a universal type providing angular movement of said second length about both vertical and horizontal axes, a tool supported as a pendulum from one end of the second length and means on its other end for counterbalancing the second length with the tool attached, the pivot point of said swivel connection being positioned in alignment with the principal axis of the second length, said positioning insuring proper counterbalancing of the second length at any of its angular positions.

7. A tool mount comprising, a frame and an overhead support for said frame, said frame being composed of a first length suspended directly from said support and connected at its lower end by means of a swivel connection to a second length from which a tool is suspended, said swivel connection projecting radially beyond the transverse periphery of said first length, said second length being provided with a member positioned above the height of the swivel connection with the first length extending through an opening in said member, said opening being small enough that the member interferes with the swivel connection when the member is lowered into contact with it, to thereby prevent the member from passing by the swivel connection and prevent the second length from dropping by force of gravity free of said first length in case the swivel connection is disconnected.

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