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RADIOACTIVE-SOURCE FLOOR STAND UNIT

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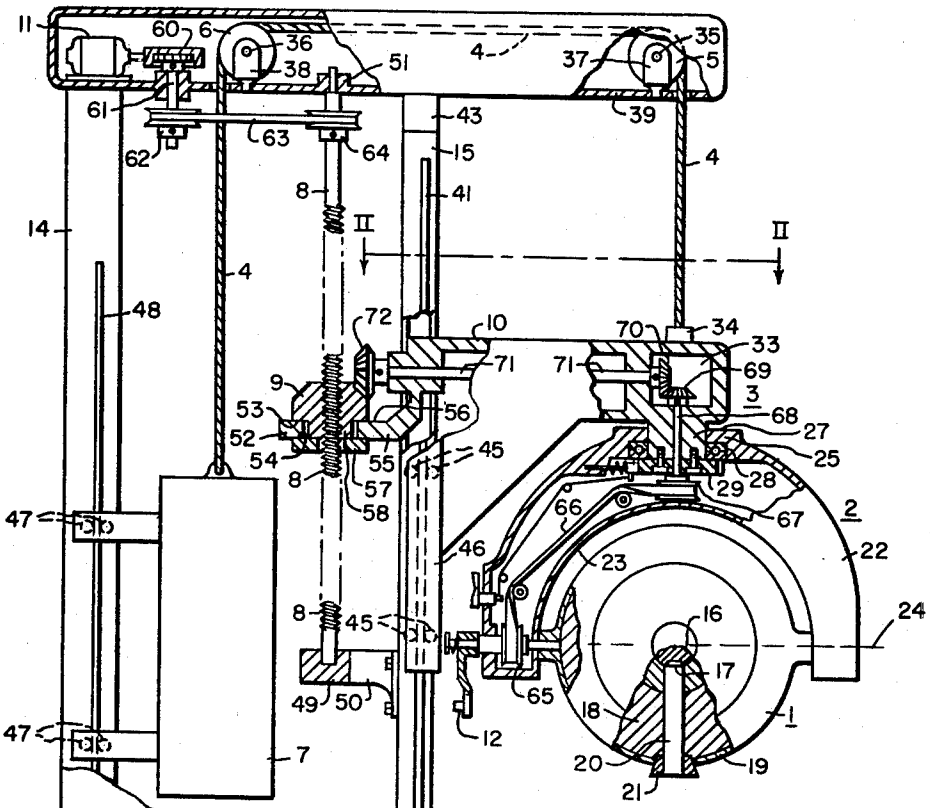


Fig. 1.

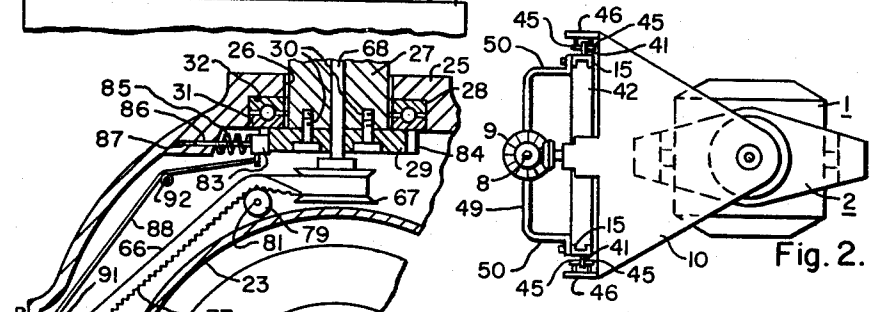


Fig. 2.

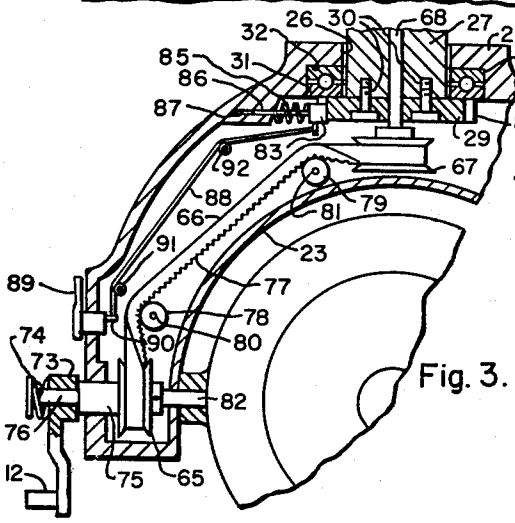


Fig. 3.

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RADIOACTIVE-SOURCE FLOOR STAND UNIT

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This invention relates to a radioactive-source floor stand unit, and, more particularly to such a unit as adapted for either therapeutic or industrial use.

Radioactive-source units for medical therapy as well as for industrial use employ radioactive isotopes such as cobalt 60, iridium 192, or other gamma-emitting isotopes, contained in a holder having an aperture for permitting a beam of radiation to emerge from the holder and including a considerable thickness of shielding material, usually lead, to absorb undesired radiation from the radioactive isotope for protection of operating personnel. A prime object of the present invention is to provide a radioactive-source floor stand unit including means for raising and lowering the relatively heavy source holder to different vertical positions as well as providing for rotary movement thereof about vertical and horizontal axes to orient the radiation-directing aperture in any desired direction from any given vertical position of such holder.

Another object of the invention is to provide in a unit of the character mentioned, manual means whereby the source holder may be raised and lowered with relative ease.

Another object of the invention is to provide in a unit of the type identified, powered means whereby the source holder may be raised and lowered.

Still another object of the invention is to provide in a unit of the type identified, vertical drive means operable manually and/or by power to afford flexible control of the raising and lowering of the source holder.

The foregoing objects and other objects, advantages and inherent functions of the invention will become apparent from the following description of a radioactive-source floor stand unit embodying the invention, taken in connection with the accompanying drawing, in which:

FIGURE 1 is a side elevation view, partly in outline and partly in section, of a radioactive-source floor stand unit embodying the invention;

FIG. 2 is a plan view taken along the line II—II in FIG. 1; and

FIG. 3 is an enlarged sectional view of a portion of the radioactive-source floor stand unit shown in FIG. 1.

Referring primarily to FIG. 1 in the drawing, the radioactive-source unit embodying the invention comprises in general a radioactive-source-material holder 1 pivotally mounted in a yoke member 2 carried by a swivel member 3 suspended from one end of a cable 4 which passes over overhead pulleys 5 and 6 and is attached at its opposite end to a depending counterweight 7, together with a vertically-disposed threaded spindle 8, a rotatable drive element 9 associated therewith, a connector member 10 operably connected to the rotatable drive element 9 and operatively connected to the swivel means 3, together with a reversible electric motor 11 and operator's handle 12 each operatively connected to the rotatable drive element 9 by a means to be identified hereinafter, a floor base 13, and spaced-apart vertically-extending support columns 14 and 15 attached thereto for support of the pulleys 5 and 6.

Referring to FIGS. 1 and 2, for sake of illustration, the radioactive-source-material holder may be of substantially cylindrical shape having essentially, as shown in FIG. 1, at its center a removable mounting element 16 including a radioactive material 17 such as cobalt 60 surrounded by a shield 18 of material such as lead and encased in

a shell of such as steel material. Essentially, the source holder 1 further includes an aperture 20 which by means (not shown) is adapted to be brought into and out of registry with the radioactive material 17 for directing radiation of gamma rays therefrom to the exterior of said holder, together with a cone 21 encircling an outermost end of said aperture for directing the radiation beam emerging therefrom.

According to one feature of the invention, the radioactive-source-material holder 1 is pivotally connected to the lowermost ends of spaced-apart depending arms 22 and 23 of the yoke member 2 along a horizontal axis 24 passing through the center of gravity of such holder, and at right angles to the direction of extension of the aperture 20. By virtue of such support, it will be appreciated that the radioactive-source-material holder 1 may be rocked manually about the axis 24 for orientation of the aperture 20 relative to such axis in a manner as desired by an operator of the equipment and, further, it will be appreciated that said holder 1 will tend to remain balanced and disposed in any given angular position relative to the axis 24 which it may be caused to assume.

Referring to FIGS. 1 and 3, the yoke member 2, for reasons which hereinafter will become apparent, is hollow and is provided at its apex with a boss 25 having a central opening 26 extending vertically therethrough to accommodate extension of a cylindrical connector portion 27 of the swivel means 3 into the interior of said yoke member. The yoke member 2 is rotatably supported by such connector portion 27 of the swivel member 3 through the medium of an annular thrust bearing 28 and circular thrust member 29 disposed in the interior of said yoke member and removably secured as by machine screws 30 (FIG. 3) to the lowermost end of said connector portion. An annular recess 31 formed in said yoke member 2 in encirclement of opening 26 serves to locate the thrust bearing 28 and define an annular thrust shoulder 32 for support of said yoke member through the medium of said thrust bearing 28 and the member 29. From the foregoing it will be appreciated that the yoke member 2, in being supported through the medium of the thrust bearing 28, is free to be turned about the vertically-extending axis of the connector portion 27 of the swivel member 3 to any desired angular position with respect to such axis. This movement of the yoke member 2 about a vertical axis may be accomplished by the exertion of manual effort on one or the other of the two arms 22 and 23 of said yoke member, thereby providing for rotary movement of the radioactive-source-material holder 1 for orientation of the aperture 20 therein relative to such vertical axis. It will be seen that by rocking movement of the radioactive-source-material holder 1 about the horizontal axis 24 relative to the yoke member 2 and by turning movement of said yoke member about the vertical axis of swivel member 3, the aperture 20 in such holder may be oriented in any desired direction, relative to any given vertical position thereof.

For reasons which hereinafter will become apparent, the swivel member 3 is provided with a central cavity 33 and is adapted at 34 for connection to the lowermost end of a respective depending portion of the cable 4 for support thereby.

The pulleys 5 and 6 are rotatably mounted on respective pins 35 and 36 carried by respective brackets 37 and 38 fixed to a horizontal supporting member 39 carried by the vertical support columns 14 and 15. Pulley 5 is located adjacent to the projecting end of a cantilever portion of such supporting member 39 and is thereby horizontally spaced beyond the vertical support columns 14 and 15 for free suspension of the respective portion of the cable 4 along a line parallel to such columns in a

manner which affords clearance of the swivel-yoke-holder assemblage 3, 2, 1 with respect thereto.

The pulley 6 is located on member 39 for support of the respective counterweight-suspending end of the cable 4 to accommodate disposition of the counterweight 7 within a housing 40 which substantially encloses such columns.

Referring to FIGS. 1 and 2, vertical movement of the swivel member 3 and hence of the swivel-yoke-holder assemblage 3, 2, 1 is directed by a pair of spaced-apart vertical guide rails 41 integrally attached respectively to the spaced-apart vertical columns 15 for disposition at opposite sides of a vertical opening 42 through the housing 40 defined at its sides by these columns and at top and bottom by fixed horizontal members 43 and 44. To follow the direction defined by these guide rails, the connector member 10 is joined at its one end to the swivel member 3 and is provided with two pairs of rollers 45 at each of its sides for cooperation with opposite side faces of the respective guide rails 41. On a particular side of the member 10, the two pairs of rollers 45 are carried by a respective side member 46 attached to member 10 and are spaced-apart vertically to prevent tilting of such member 46. The rollers of each pair are disposed at opposite sides, respectively, of a particular guide rail 41 for rolling contact with the opposite parallel guide faces thereof. Referring particularly to FIG. 2, it will be apparent that, in addition to directing vertical movement, the horizontally spaced-apart relationship of the oppositely-arranged dual pairs of rollers 45 in cooperation with the spaced-apart guide rails 41 will prevent any swinging movement of the suspended swivel-yoke-holder assemblage 3, 2, 1. Furthermore, this arrangement accurately aligns and maintains alignment of the axis of symmetry of the swivel-yoke-holder assemblage with respect to the pulley 5 to assure that substantially the entire weight of such assemblage will be carried by the cable 4 without exertion of any appreciable side thrust between the rollers 45 and the guide rails 41.

The counterweight 7 is also directly suspended from the cable 4; vertically spaced-apart pairs of rollers 47 cooperable with a vertical guide rail 48 being provided to assure that a given vertical path of movement of such counterweight will be maintained.

The threaded spindle 8 is vertically disposed within the housing 40 and in exposure to the vertical opening 42 between the columns 15. The lower end of the spindle 8 is rotatably supported in a horizontal support member 49 which spans opening 42 (FIG. 2) and is provided at its opposite ends with brackets 50 adapted for removable attachment to the vertical columns 15. The upper end of the spindle 8 is rotatably guided by a journal member 51 suitably attached to or formed in the horizontal supporting member 39.

The rotatable drive element 9 encircles the threaded spindle 8 and has internal threads in meshing engagement with the threads of said spindle for advancement in a vertical direction axialwise therealong. The drive element 9 is operatively connected to a respective end of the connector element 10, which projects through the vertical opening 42 between the columns 15, through the medium of a follower element 52 formed integrally with said connector member. The drive element 9 has a thrust transmitting connection with the follower element 52 through the medium of annular shoulders 53 and 54 in rotatably slidable contact with upper and lower surfaces 55 and 56 of follower element 52. Annular shoulder 53 is formed on a surface of the drive element 9, while the annular shoulder 54 constitutes one face of an annular thrust member 57 which is secured by suitable means (not shown) to the lowermost end of a reduced portion 58 of the drive element 9; such reduced portion 58 extending through a vertical opening in the follower element 52.

According to a feature of the invention, the reversible motor 11 for raising and lowering the swivel-yoke-holder assemblage 3, 2, 1 is operatively connected to the threaded spindle 8 through the medium of a worm and gear drive 60, a shaft 61, a pulley 62, a V-belt 63, and a pulley 64. The shaft 61 is suitably journaled for rotation in a portion of the horizontal supporting member 39; the pulley 62 is suitably secured for rotation with the shaft 61; and the pulley 64 is secured for rotation with the threaded spindle 8.

According to other structural features of the invention, the drive element 9 is in the form of a bevel gear having external threads which adapt same for operable connection with the operator's handle 12 carried by the yoke member 2, through the medium of a pulley 65, flexible belt 66 and pulley 67 disposed within the yoke member arm 23, a vertical shaft 68 extending centrally through and journaled in the connector portion of the swivel member 3, a pair of bevel gears 69, 70 disposed within the cavity 33 of said swivel member, a shaft 71 extending horizontally through and journaled in the connector member 10, and a bevel gear 72 in meshing engagement with the external teeth of said drive element 9.

As a safety feature which assures that the maximum amount of effort which may be exerted in behalf of vertical movement of the swivel-yoke-holder assemblage by manipulation of the handle 12 will be limited, the handle 12 is yieldably connected to the pulley 65 for turning movement of same through the medium of detent means. Such detent means, for example, may take the form in which it is shown in the drawing wherein a notched annular end face of a hub portion 73 of handle 12 is urged by a compression spring 74 into engagement with a correspondingly notched end of an integral hub portion 75 of the pulley 65, journaled in the yoke arm 23 and extending outwardly through the pulley hub portion. The hub portion 73 of handle 12 is journaled and slidable axially on a shaft 76 attached to the pulley hub 75 as an extension thereof, and the compression spring 74 is disposed in encirclement of the shaft 76 and retained by a suitable retaining element attached thereto.

The flexible belt 66 may be of reenforced rubber-like material preferably having a notched inner face 77 for meshing with correspondingly notched surfaces (not shown) on the pulleys 65 and 67 to assure a non-slip driving connection therebetween. A pair of belt-guide rollers 78 and 79 supported on fixed pins 80 and 81 perpendicular to the axes of pulleys 65 and 67 are disposed within the yoke member arm 23 in proximity to such pulleys, respectively, for guiding cooperation with the notched surface 77 of belt 66 to transpose its movement between the pulley 65 having a horizontal axis and the pulley 67 having a vertical axis.

As shown in the drawing, a shaft 82 journaled in an inner portion of yoke member 2 and rockably supporting one side of the radioactive-material holder 1 along the axis 24 may extend from the pulley 65 to complete rotatable support of same.

Pulley 67 and bevel gear 69 are suitably secured for rotation with the vertical shaft 68 at its opposite ends, while the bevel gears 70 and 72 are secured for rotation in unison with the horizontal shaft 71.

A further feature of the invention includes locking means for holding the yoke member 2 against rotary movement about the vertical axis of the swivel member 3 to assure that once such yoke member has been caused to assume a given adjusted position with respect to such axis, it may not accidentally be moved from its selected position. Such locking means includes a locking pin 83 disposed within the yoke member arm 23 and guided for movement toward and away from a toothed outer surface 84 of the thrust member 29. Advancement of the locking pin 83 into locking engagement with the toothed surface 84 is urged by a compression spring 85 which en-

circles a guide stem 86 attached to pin 83 and is slidably guided within an opening 87 formed in the arm. For retraction of pin 83 out of locking engagement with toothed surface 84, a flexible wire is provided within arm 23 which is operable by a rotary unlocking handle 89 disposed adjacent to the operator's handle 12. Wire 88 is connected at its one end to the locking pin 83 and at its opposite end is eccentrically connected via a pin 90 to the rotary handle 89. Wire 88 is slidably guided by fixed pins 91 and 92, such that turning movement of handle 89 will be transformed by action of wire 88 into a pulling effort on the pin 83 to act in opposition to the bias effort of the spring 85.

Operation of the unit with respect to raising and lowering the radioactive-source material holder

Referring to FIGS. 1 and 3, when it is desired to raise or lower the radioactive-source-material holder 1 exclusively by operation of the motor means 11 without resort to manipulation of the handle 12, the reversible motor 11 will be energized accordingly by operation of a selector switch means (not shown) to turn the spindle 8 in the appropriate direction through the medium of the worm-gear drive 60, shaft 61, belt 63 and pulley 64. Respective to direction of rotation of the threaded spindle 8, such rotation will occur relative to the drive element 9, which will be restrained from rotation at this time by its engagement with the bevel gear 72 and the friction inherent in the previously-identified linkages operably connecting such bevel gear 72 to the operator's handle 12. During such rotation of the threaded spindle 8 in a respective direction relative to the drive element 9, such drive element in threaded engagement with same will be caused to move axially therealong in a vertical direction respective to the direction of rotation of said spindle. Through the medium of a respective shoulder 53 or 54 in rotating sliding engagement with the respective surface 56 or 55 of follower element 52, such follower element will be actuated vertically correspondingly with movement of the drive element 9 to raise or lower the swivel-yoke-holder assemblage 3, 2, 1 connected to said follower element 52 through the medium of connector member 10, while the counterweight 7 moves correspondingly, as permitted by travel of the cable 4 on the pulleys 5 and 6. When the holder 1 is thereby caused to assume the desired vertical position, the switch means (not shown) will be operated to deenergize the motor 11 and thereby terminate further vertical movement of such assemblage at this time. To effect vertical movement of the swivel-yoke-holder assemblage 3, 2, 1 in the reverse direction, by operation of the motor means 11, the switch means (not shown) may be reversed for effecting reverse operation of such motor and corresponding rotation of the threaded spindle 8 for vertical movement of such assemblage in a reverse direction in the manner as previously described.

Should it happen that during actuation of the swivel-yoke-holder assemblage 3, 2, 1 vertically by operation of the motor means 11, a respective portion of the connector member 10 or its associated side member 46 should be brought into contact with one or the other of horizontal members 43 and 44 at the top and bottom of the opening 42, vertical movement of such connector member 10 in that particular direction will thus be terminated. Continued operation of the motor 11 resulting in turning of the threaded spindle 8, however, will cause the drive element to turn about said spindle while rotating the operator's handle 12 through the medium of the bevel gear 72, shaft 71, bevel gears 70 and 69, the shaft 68, pulley 67, the belt 66, and the pulley 65. Thus, it will be apparent that even though connector member 10 should reach the end of its vertical travel along guide rails 41 while the motor 11 is allowed to remain in operation, little strain and no damage to the equipment will result.

Should it be desired to adjust the vertical position of the holder 1 without resort to operation of the motor 11 or, subsequent to operation of such motor to effect slight readjustment in such vertical position, the operator's handle 12 may be turned in the desired direction for corresponding turning movement of the pulley 65 through detent means 73, 74. With the motor 11 inoperative, the threaded spindle 8 will be locked against rotation by the worm and gear drive 60 connected thereto through the medium of the shaft 61, pulleys 62 and 64, and the belt 63, so that rotation of the pulley 65 by turning of the handle 12 will cause the drive element 9 to be advanced along the non-rotating spindle 8 in a respective vertical direction for raising or lowering the swivel-yoke-holder assemblage by rotation of the bevel gear 72 through the medium of the belt 66, pulley 67, shaft 68, bevel gears 69 and 70 and the shaft 71. During such actuation of the swivel-yoke-holder assemblage by manipulation of the operator's handle 12, should the connector member 10 as including side member 46 reach the end of its travel in a particular vertical direction and be caused to come in contact with either of the horizontal members 43 and 44, the degree of force which may be exerted by such connector member against a respective one of said horizontal members is limited by the torque which may be transmitted from the handle 12 to the pulley 65 through the medium of the detent means 73, 74, the teeth of which are free to ride over those on the projecting end of the hub portion 75 of the pulley 65 when greater than a certain degree of turning effort is applied to the handle 12. Thus it will be apparent that no excessive strain or damage to the equipment will result from such operation by the handle 12.

According to an important operational feature of the invention, the operator's handle 12 may be employed to control the rate of ascent or descent of the swivel-yoke-holder assemblage 3, 2, 1 during operation of the motor 11. During such operation, the motor 11 will be employed to effect rotation of the threaded spindle in the manner as previously described, while handle 12 will be operated to effect turning of the drive element 9 about the axis of said spindle through the medium of the bevel gear 72, also as previously described in detail. It will be apparent that by choice of direction of rotation of the operator's handle 12 and the rate at which it is turned, relative to the direction of rotation of the motor-operated spindle 8, the rate of ascent or descent of the drive element 9, hence of the carriage 10 and swivel-yoke-holder assemblage, may be varied and controlled manually. By proper turning of the handle 12, the drive element 9 may be made to rotate in either the same or the opposite direction as that of the spindle 8. Referring to FIG. 1 of the drawing, it will be seen that rotation of the drive element 9 in the same direction as that of the spindle 8 will tend to discourage advancement of said drive element with respect to the vertical axis of said spindle, hence discourage vertical movement of the swivel-yoke-holder assemblage, while rotation of the drive element 9 counterwise with respect to rotation of the spindle 8 will tend to accelerate its rate of advancement along the axis of the spindle 8, hence to increase the rate of the vertical movement of the swivel-yoke-holder assemblage. By manipulation of the operator's handle 12 while the motor 11 is in operation, the rate of vertical movement of the holder 1 may be increased, decerased or held stationary, as desired.

Having now described the invention what we claim as new and desire to secure by Letters Patent is:

1. In a radioactive-source unit including a mounting base and a radioactive-source holder, the combination of a yoke member having two spaced-apart downwardly-extending arms depending from its apex and spanning said radioactive-source maerial holder in pivotal support there-

of along the horizontal axis, swivel means pivotally supporting said yoke member for rotary movement about a vertical axis, pulley means mounted in fixed positions relative to said base, counterweight means, flexible cable means passing over said pulley means and connecting said counterweight to said swivel means for balancing-support of the swivel-yoke-holder assemblage while permitting vertical movement of same, an elongated gear-engageable member mounted in a fixed position relative to said base and extending in a vertical direction, a rotatable drive element in engagement with said elongated gear-engageable member for vertical movement therealong, a rigid connector member having at one end a vertical thrust-transmitting connection with said rotatable drive element and operatively connected at its opposite end to said swivel means, vertical guide means secured to said base, roller means cooperable between said guide means and said rigid connector member to direct movement of same along a given vertical path parallel to said elongated gear-engageable member, and operating means for effecting rotation of said rotatable drive element.

2. In a radioactive-source unit including a mounting base and a radioactive-source holder, the combination of a hollow yoke member having two spaced-apart downwardly-extending arms depending from its apex and spanning said radioactive-source material holder in pivotal support thereof along the horizontal axis, swivel means having a vertical connector portion extending into said hollow yoke member and pivotally supporting same for rotary movement about a vertical axis, pulley means mounted in fixed positions relative to said base, counterweight means, flexible cable means passing over said pulley means and connecting said counterweight to said swivel means for balancing-support of the swivel-yoke-holder assemblage while permitting vertical movement of same, an elongated gear-engageable member mounted in a fixed position relative to said base and extending in a vertical direction, a rotatable drive element in engagement with said elongated gear-engageable member for vertical movement therealong, a rigid connector member having at one end a vertical thrust-transmitting connection with said rotatable drive element and operatively connected at its opposite end to said swivel means, vertical guide means secured to said base, roller means cooperable between said guide means and said rigid connector member to direct movement of same along a given vertical path parallel to said elonagted gear-engageable member, operating means for effecting rotation of said rotatable drive element, with said operating means including a rotatable handle disposed on the lower end of one arm of said hollow yoke member, and rotatation-transmitting means extending from said handle through said one arm, through said swivel means and through said rigid connector member to said rotatable drive element.

3. In a radioactive-source unit including a mounting base and a radioactive-source holder, the combination of a hollow yoke member having two spaced-apart downwardly-extending arms depending from its apex and spanning said radioactive-source material holder in pivotal support thereof along the horizontal axis, swivel means having a vertical connector portion extending into said hollow yoke member and pivotally supporting same for rotary movement about a vertical axis, pulley means mounted in fixed positions relative to said base, counterweight means, flexible cable means passing over said pulley means and connecting said counterweight to said swivel means for balancing-support of the swivel-yoke-holder assemblage while permitting vertical movement of same, a threaded spindle mounted in a fixed position relative to said base and extending in a vertical direction, a rotatable drive element having an axial opening in screw-threaded engagement with said threaded spindle for vertical movement therealong, a rigid connector member having at one end a pivotal thrust-transmitting connection with said rotatable drive element for vertical movement thereof and operatively connected at its opposite end to said swivel means, vertical guide means secured to said base, roller means cooperable between said guide means and said rigid connector member to direct movement of same along a given vertical path parallel to said threaded spindle, operating means for effecting rotation of said rotatable drive element, with said operating means including a rotatable handle disposed on the lower end of one arm of said hollow yoke member, rotation-transmitting means extending from said handle through said one arm, said swivel means and said rigid connector member to said rotatable drive element, wherein said rotatable drive element is in the form of a gear-nut having bevel gear teeth on its exterior, and said rotation-transmitting means includes a flexible drive assemblage operable by said handle and disposed within said one arm of said hollow yoke member, a vertical shaft extending centrally through the aforesaid vertical connector portion of said swivel means, a pair of bevel gears driven by said vertical shaft to translate the vertical turning movement into a horizontal turning movement, a horizontal shaft driven by said bevel gears and journaled in said rigid connector member, and a third bevel gear operably connected to said shaft and in meshing engagement with the aforesaid bevel gear teeth of said gear-nut.

4. In a radioactive-source unit including a mounting base and a radioactive-source material holder, the combination of a hollow yoke member having two spaced-apart downwardly-extending arms depending from its apex and spanning said radioactive-source material holder in pivotal support thereof along a horizontal axis, swivel means having a vertical connector portion extending into said hollow yoke member and pivotally supporting same for rotary movement about a vertical axis, pulley means mounted in fixed positions relative to said base, counterweight means, flexible cable means passing over said pulley means and connecting said counterweight to said swivel means for balancing-support of the swivel-yoke-holder assemblage while permitting vertical movement of same, a rotatable threaded spindle mounted in a fixed position relative to said base and extending in a vertical direction, a rotatable drive element having an axial opening in screw-threaded engagement with said threaded spindle for vertical movement therealong, a rigid connector member having at one end a pivotal thrust-transmitting connection with said rotatable drive element for vertical movement therewith and operatively connected at its opposite end to said swivel means, vertical guide means secured to said base, roller means cooperable between said guide means and said rigid connector member to direct movement of same along a given vertical path parallel to said threaded spindle, and operating means for effecting rotation of said threaded spindle.

5. In a radioactive-source unit including a mounting base and a radioactive-source material holder, the combination of a hollow yoke member having two spaced-apart downwardly-extending arms depending from its apex and spanning said radioactive-source material holder in pivotal support thereof along a horizontal axis, swivel means having a vertical connector portion extending into said hollow yoke member and pivotally supporting same for rotary movement about a vertical axis, pulley means mounted in fixed positions relative to said base, counterweight means, flexible cable means passing over said pulley means and connecting said counterweight to said swivel means for balancing-support of the swivel-yoke-holder assemblage while permitting vertical movement of same, a rotatable threaded spindle mounted in a fixed position relative to said base and extending in a vertical direction, a rotatable drive element having an axial opening in screw-threaded engagement with said threaded spindle for vertical movement therealong, a rigid connector member having at one end a pivotal thrust-transmitting connection with said rotatable drive element for

vertical movement therewith and operatively connected at its opposite end to said swivel means, vertical guide means secured to said base, roller means cooperable between said guide means and said rigid connector member to direct movement of same along a given vertical path parallel to said threaded spindle, operating means for effecting rotation of said threaded spindle, wherein said operating means includes an electric motor having a worm-and-gear drive connection with said threaded spindle which is thereby restrained against turning when said motor is inoperative, and said unit includes means normally restraining said rotatable drive element against rotation and operable manually to effect such rotation of

said rotatable drive element either for effecting vertical movement thereof independently of rotation of said threaded spindle, or to alter the effect of threaded-spindle-rotation on vertical movement of said rotatable drive element.

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