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ADJUSTABLE SUPPORT MEANS FOR A CASSETTE AND LIKE DEVICES

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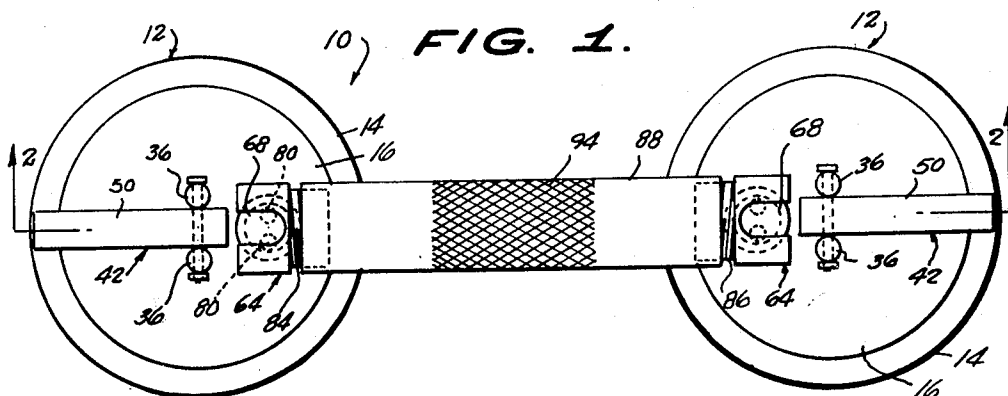


FIG. 2.

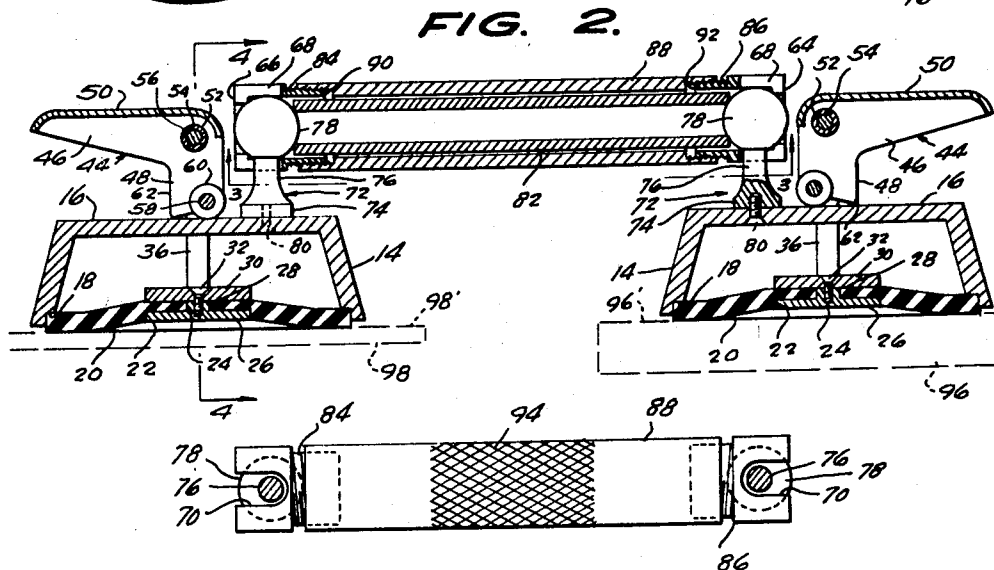


FIG. 3.

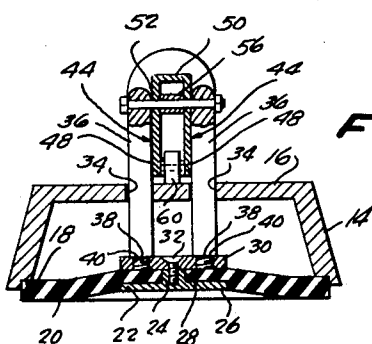


FIG. 4.

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ADJUSTABLE SUPPORT MEANS FOR A CASSETTE AND LIKE DEVICES

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8 Claims. (Cl. 248—206)

This invention relates to the general field of support devices and, more specifically, the instant invention pertains to support devices or means especially adapted for adjustment or manipulation whereby the supported article may be moved into a desired location or area.

One of the primary objects of this invention is to provide an adjustable support means or device which is especially designed to support a cassette in proper position relative to the object forming the subject matter of an X-ray examination whereby the physician, technician, nurses and other attendants need not become exposed to X-ray or gamma radiation or the like, for it is well-known that exposure to such rays frequently results in physical injury to those who may be attending a patient.

A further object of this invention is to provide adjustable support means for holding a cassette or similar article at a desired location relative to a patient's anatomy, the supporting means holding the cassette fixedly and without motion whereby blurred and indistinct pictures are obviated since the means or device eliminates the holding of the cassette at the desired location through manual manipulation.

Another object of this invention is to provide a cassette holding device having a high degree of adjustability and which readily lends itself to field work, as well as in emergencies wherein it is impossible to bring into the field or the emergency area the elaborate X-ray equipment found in most modern hospitals.

This invention contemplates, as a still further object thereof, the provision of means of the type generally described supra, the means being relatively non-complex in construction and assembly, inexpensive to manufacture, and which is durable in use.

Other and further objects and advantages of this invention will become more evident from a consideration of the following specification when read in conjunction with the annexed drawing, in which:

FIGURE 1 is a top plan view of a cassette or X-ray film-holding device constructed in accordance with this invention;

FIGURE 2 is a longitudinal, medial detail, cross-sectional view, FIGURE 2 being taken substantially on the horizontal plane of line 2—2 of FIGURE 1, looking in the direction of the arrows;

FIGURE 3 is a bottom plan view of the adjusting assembly, partly in cross-section, FIGURE 3 being taken substantially on the horizontal plane of line 3—3 of FIGURE 2, looking in the direction of the arrows; and

FIGURE 4 is a detail, cross-sectional view, FIGURE 4 being taken on the vertical plane of line 4—4 of FIGURE 2, looking in the direction of the arrows.

Referring now more specifically to the drawing, reference numeral 10 designates, in general, a cassette or X-ray film-holding device constructed in accordance with the teachings of this invention. The device 10 is seen to comprise a pair of identically constructed, spaced, suction cup assemblies 12 having a frusto-conical configuration. The suction cup assemblies 12 are preferably made

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of cast aluminum and, as is seen in FIGURES 1 and 2, each suction cup assembly 12 includes a sidewall 14 which tapers upwardly to terminate in a base wall 16 disposed substantially in the plane of the frustum. The lower end of each sidewall 14 is undercut to form a continuous circumferential groove indicated at 18 in which is seated a flexible diaphragm 20 formed of rubber or of some other suitable air-impervious material.

Each diaphragm 20 has a centrally-located, downwardly-facing cylindrical recess 22 (see FIGURES 2 and 4) which is in open communication with a centered passage 24 that extends transversely therethrough.

Each of the recesses 22 receives a discoidal plate 26 therein, and each plate includes a centrally-positioned internally-threaded cylindrical boss 28 that is received within each of the passages 24, respectively. Superimposed centrally over each of the diaphragms 20, respectively, is a substantially flat cylindrical clamp member 30 through the center of which extends a screw 32 that is threadedly received in the boss 28. Thus, as the screws 32 are tightened each diaphragm 20 is clamped between its respective associated discoidal plate 26 and the clamp member 30, in an air-tight manner.

Each of the base walls 16 is formed with a pair of transversely-extending, substantially centrally-located, diametrically-opposed openings 34 (see FIGURE 4) positioned above the clamp member 30, the pairs of openings each receiving for reciprocation therethrough, respectively, a pair of axially-elongated cylindrical standards 36. Each pair of standards 36 has a respective lower end reduced in diameter and threaded as at 38 for threaded connection within diametrically-opposed threaded openings 40 formed in the clamp member 30 (see FIGURE 4).

Reference numeral 42 indicates, in general, a bell-crank manually-operable lever for each suction cup 12. Each of the bell-crank levers includes a pair of oppositely-disposed, laterally-spaced, substantially parallel and identically constructed L-shaped sidewalls 44. The sidewalls 44 each comprises an elongated leg portion 46 and a relatively shorter foot portion 48. A bight wall 50 extends between and connects with the upper marginal edges of each pair of leg portions 46, respectively.

A bell-crank lever 44 is interposed between each pair of standards 36, respectively, and the heel portions 52 of each pair of sidewalls 44 receive transversely therethrough an elongated pivot pin 54 having opposed ends supported on the upper ends of each pair, respectively, of standards 36. Each pin 54 is telescoped through a spacer collar 56 which extends between adjacent pairs of heel portions 52 (see FIGURES 2 and 4).

A shaft 58 extends between and is supported on adjacent pairs of foot portions 48 adjacent the free ends thereof and proximate a pair of edges thereof. Mounted on the shaft 58 is a lock roller 60 which is adapted to engage the adjacent base wall 16 when the bell-crank levers 42 are pivoted to their down position shown in FIGURE 2, and wherein the lock rollers 60 are shown as having passed their respective dead-center position. Over-running of the rollers 60 as they are moved to their locked position is prevented by engagement of the tips 62 of each pair of adjacent foot portions 48 with the base walls 16, respectively.

Reference numeral 64 connotes a pair of axially-elongated, substantially hollow cylindrical sockets, and each

socket 64 is provided with an annular end wall 66. Each socket 64 is also formed with a pair of diametrically-opposed inwardly-extending slots 68, 70 which extend through the respective end walls 66.

Indicated at 72 are a pair of pedestals, each comprising a cylindrical base 74 and an upstanding throat 76 of reduced diameter, the latter terminating at its upper end in a sphere or ball 78. The pedestals 72 are each inserted through the open end of one of the sockets 64, respectively, the bases 74 passing through the annular end walls 66 after which the pedestals 72 are turned at substantially 90° to the direction of their entry to cause the spheres 78 to engage and seat against the adjacent end wall 66. The bases 74 are fixedly connected to base walls 16 as by screws 80.

The pair of spheres or balls 78 are held in spaced relation relative to one another by means of an elongated substantially hollow tubular, cylindrical spacer member 82 having opposed ends abutting against adjacent portions of the two spheres or balls 78. As is seen in the drawing, the opposed ends of the spacer member 82 extend partially within the open ends of the sockets 64, and the latter are provided with left and right-hand external threads 84, 86, respectively. An elongated hollow, tubular element 88 surrounds the member 82 and is provided at its opposed ends with internal left and right-hand threads 90, 92 adapted to be threadedly received by the threads 84, 86, respectively. To facilitate actuation of this adjustable holding device or means, the external central portion of the element 88 is preferably knurled as at 94.

From the above description it should be immediately apparent that the rotation of the tubular element 88 in one direction will cause the sockets 68 to be drawn toward the opposed ends of the tubular element 88 to cause the spheres or balls 78 to be rigidly clamped between the annular end walls 66 and their respective adjacent ends of the cylindrical member 82. Rotation of the tubular element 88 in the opposite direction releases this clamping action to permit free swivelling action of the spheres or balls 78 together with their attendant pedestals 72.

Referring now to FIGURE 2 of the drawing, reference numeral 96 designates, in dotted lines, a support member. The support member 96 may be a table, platform, or wall, or any other device having a substantially planar surface 96'. Reference numeral 98 indicates, in dotted lines, a cassette or any other similar object also having a substantially planar surface 98'. In this figure, the adjustable support means or device is shown in its operative position. That is, one of the suction cups 12 is illustrated as being connected to the base or support 96 and the other of the suction cups 12 is shown as being connected to a cassette 98.

The operation of the device is deemed to be self-evident from the foregoing description, but a brief explanation thereof is set forth below.

Again referring to FIGURE 2 and with the component elements of this invention as shown therein, to release the suction cups 12 from the cassette and base, it is only necessary that the bell-crank levers 42 be turned in such directions as to cause the rollers 60 connected thereon to pass to the other side of their respective dead-center positions relative to the pivot pins 54 whereby the force exerted by the formerly distorted diaphragms 20 will cause the latter to move substantially flush with respect to the planar surfaces 96', 98', thereby breaking the vacuum. Of course, this also causes the standards 36 to move downwardly. The suction cups 12 may then be detached from their associated planar surfaces 96', 98'.

Turning the tubular element 88 in one direction releases the clamping action between the cylindrical member 82 and the sockets 64 whereby the suction cups 12 may be rotated about the vertical axes of the pedestals 72, or, if necessary, the pedestals 72 can be pivoted in one of the slots 68, 70. Again, the ball-and-socket type of connec-

tion permits the suction cup assemblies to be swung about the longitudinal axis of the cylindrical member 82.

After the desired adjustment has been made, the tubular element 88 is then turned in the reverse direction to fixedly secure the adjusted positions and the bell-crank levers are turned in the opposite direction to cause the roller 66 to move to the off-center position shown in FIGURE 2, and in so moving, the standards 36 are elevated and draw their connected diaphragms 20 upwardly to cause a vacuum or a suction effect between the diaphragms and the elements to which the suction cups are to be connected.

While the above description of the operation and assembly of this adjustable support has been offered in connection with a support for a cassette, it will be readily understood that the description is given in order to provide an environment for the invention, for the device or means may be used in other fields of endeavor.

Having described and illustrated in detail one embodiment of this invention, it will be understood that the same is offered merely by way of example, and that this invention is to be limited only by the scope of the appended claims.

What is claimed is:

1. An article of manufacture comprising an article supporting device, said device including an elongated substantially hollow tubular element having a pair of opposed ends, a socket movably mounted on each of said ends, means for moving said sockets axially of said element, each of said sockets having a slot extending transversely therethrough, a ball mounted in each of said sockets, each of said balls having a pedestal projecting through said slot in its associated socket, a continuous rigid elongated tubular member disposed in said element and having its opposed ends juxtaposed with respect to adjacent sides of said balls, said means being operable responsive to rotation of the tubular element in one direction to move said sockets toward one another to clamp said balls against adjacent ends of said member, said means also being operable responsive to rotation of said tubular element in the opposite direction to move said sockets away from one another to release said balls, and a suction cup fixedly secured to each of said pedestals.

2. An article of manufacture as defined in claim 1, wherein each of said sockets includes an annular end wall in which its associated ball seats and each of said slots extends, respectively, transversely through one of said annular end walls.

3. An article of manufacture as defined in claim 2, wherein said means for moving said sockets relative to one another comprises threaded connections between said element and said sockets.

4. An article of manufacture as defined in claim 3, wherein said suction cups each include a frusto-conical sidewall having a base wall extending transversely thereacross and disposed substantially in the plane of the frustum and said pedestals are connected, respectively, to each of said base walls, and wherein a flexible diaphragm is secured to the base end of each of said sidewalls.

5. An article of manufacture as defined in claim 4, wherein a pair of spaced standards are mounted for reciprocation through each of said base walls and project on opposite sides thereof, means connecting the ends of each pair of standards, respectively, with one of said diaphragms, and means connected with the other end of each pair of standards operable to reciprocate said standards and thereby flex their diaphragms.

6. An article of manufacture as defined in claim 5, wherein said last-named means include lock means for holding said standards in such position as to flex said diaphragms.

7. An article of manufacture as defined in claim 5, wherein said last-named means include a bell-crank lever pivotally supported on said other ends of said standards, and roller means engageable with said base wall.

8. An article of manufacture as defined in claim 7,

and means on said bell-crank lever to prevent the over-throw of said roller.

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