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TUBE STAND LOCKING DEVICE

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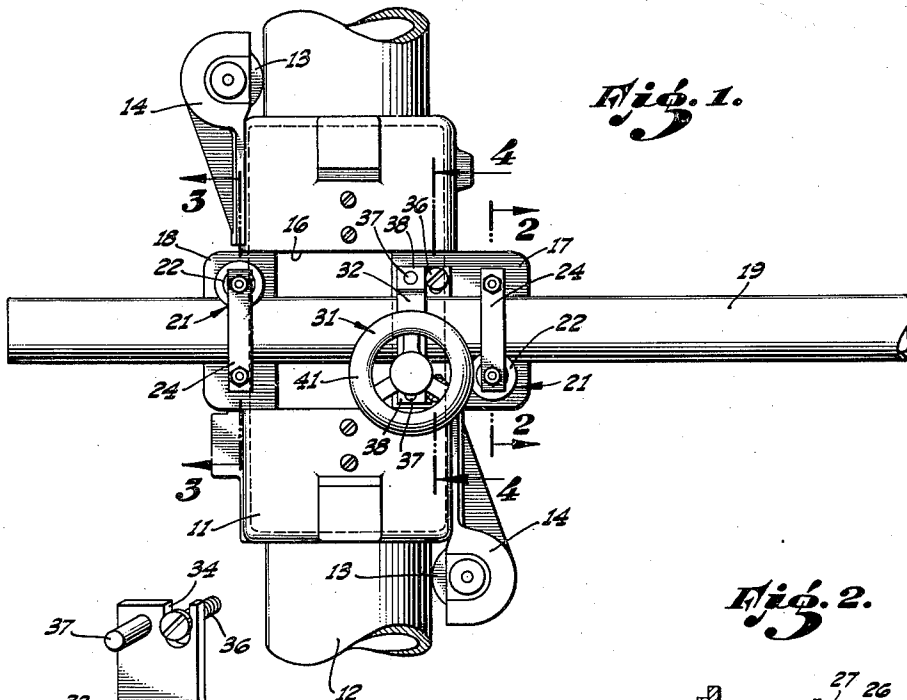


Fig. 1.

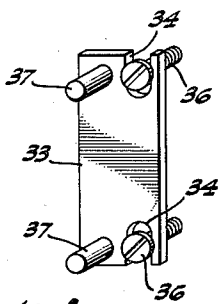


Fig. 5.

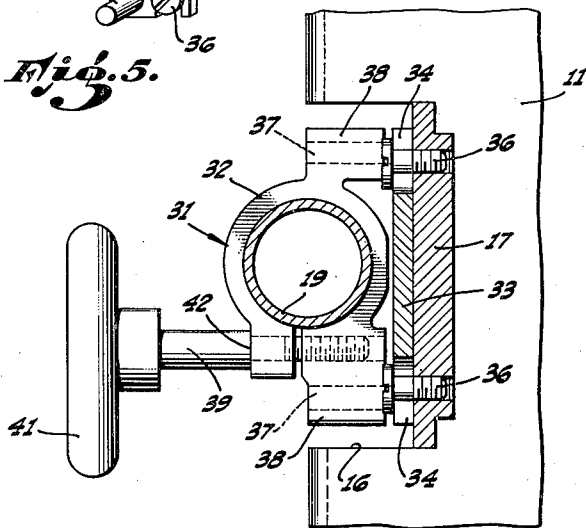


Fig. 4.

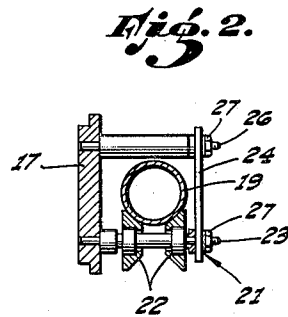


Fig. 2.

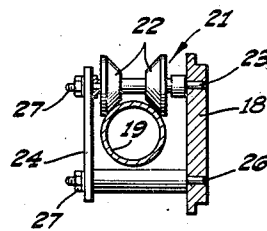


Fig. 3.

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TUBE STAND LOCKING DEVICE

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3 Claims. (Cl. 248—221)

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The present invention relates to adjustable supports and particularly to a tube stand locking device used in X-ray machines. More specifically the invention comprises adjustable mounting means for the tube head in an X-ray machine which permits of angular and transverse adjustments under the control of a single locking means.

Portable X-ray machines are provided with adjustable tube heads to make it possible to photograph objects of differing sizes and shapes. To obtain satisfactory images the tube head from which the rays emanate must be so supported that it can be adjusted into optimum position relative to these various articles and bodies. The mounting means should be of a type which permits of ready adjustment and also should have the additional characteristic that when placed in position the head will remain there until intentionally displaced. In the devices of the prior art, the tube head has usually been supported by means requiring a plurality of manual adjustments and locking means. According to the present invention the tube head is adjustably supported and is adapted to be locked in any set position by simplified means which are so constructed as to function with maximum effectiveness throughout the life of the device and regardless of wear which may take place in the parts.

It is therefore an object of the present invention to provide a new and improved adjustable support of a type particularly adapted for X-ray tube heads. It is another object of the invention to provide an adjustable locking device for an X-ray tube support which is unaffected by wear in the relatively movable parts and in which a single locking means controls both angular and lateral adjustments.

Referring now to the drawings in which a preferred embodiment of the invention is illustrated:

Figure 1 is a side elevation of an adjustable support constructed in accordance with the present invention;

Figure 2 is a section upon the line 2—2 of Figure 1;

Figure 3 is a section upon the line 3—3 of Figure 1;

Figure 4 is a section through the clamping means upon the line 4—4 of Figure 1; and

Figure 5 is a view in perspective of the adjustable clamp supporting plate.

In the drawings a preferred embodiment of the invention is illustrated and is seen to com-

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prise a cylindrical body or sleeve 11 mounted for vertical displacement upon a post 12 from which it is concentrically spaced by means of a plurality of unshown rollers and on which it is adapted to be raised and lowered by means of pulleys 13 positioned in fixed bracket housings 14. Body 11 is provided with a centrally located cut out section 16, at the sides of which extend platforms 17 and 18 lying flat in a plane which cuts across the cylinder.

A horizontal transverse tubular arm 19 is slidably and rotatably carried by body 11 by means of supports indicated generally by the reference character 21 which are positioned upon the platforms 17 and 18. Reference to Figures 2 and 3 discloses that each of these supports comprises a pair of frusto-conical ball bearing rollers 22 rotatable upon a shaft 23 fixed in the adjacent platform. To form an enclosure around the tubular arm to eliminate all possibility of accidental displacement a second fixed pin 26 is provided opposite each pair of rollers 22 and upon the opposite side of the arm. These pins 26 do not contact the arm but instead cooperate with the roller axial pins 23 to support a closure plate 24 secured by nuts 27. The rollers 22 upon the supporting platform 17 underlie the arm 19 while the rollers upon platform 18 are positioned thereabove. With a heavy object such as an X-ray tube head carried upon the right hand end of arm or shaft 19, it is clear that the arm would be held in equilibrium by the rollers 22 without the necessity of additional supports.

It is desirable at times, as indicated, to lock the arm 19 in an adjusted position. The tube head, let us assume, has been moved into proper position relative to the object to be photographed and has been set at the proper angle by twisting the arm 19. To secure the head locking means indicated generally by the reference character 31 are provided and are seen to comprise an integral clamp 32 carried by a vertically adjustable supporting plate 33 secured to platform 17. Plate 33 is formed with spaced vertical slots 34 slidably enclosing headed screws 36 secured in the platform, the relationship being such that plate 33 is permitted a limited range of vertical movement. A pair of studs 37 project horizontally from plate 33 and extend slidably within bosses 38 formed integrally on the upper and lower sides of clamp 32 to support that important element for limited horizontal movement. Clamp 32 surrounds tube 19 and is divided at its lower side, the portions or arms being connected and drawn together by the threaded inner end of shaft 39

carrying a lock wheel 41 at its outer end. Shaft 39 is provided above its threaded portion with a shoulder 42 adapted to abut the outer portion of the clamp to draw the two sides together against natural internal resilience.

Clamp 32, it is to be especially noted, is adjustable both vertically and horizontally. The possible movement of plate 33 relative to its supporting screws 36 makes possible the vertical movement of the clamp while the sliding movement of the bosses 38 upon their supporting pins 37 makes possible the lateral or horizontal adjustment. This relationship is of importance for continued use results inevitably in changes in the supporting rollers 22 and their positions through wear and other causes. These changes effect a corresponding shifting of the tube 19. Were the clamp 32 to be mounted fixedly upon the platform 17 its operating characteristics, such as ability to release completely and its ability to tighten readily, would inevitably change with such wear. The clamp 32, however, is adapted to accommodate this change in tube position and inherently provides a construction in which the locking means functions with the same ease and accuracy within a relatively wide range of tube positions.

It is also to be noted that a single locking means 31 firmly clamps the supporting tube 19 against both rotary or twisting movement, and against longitudinal sliding movement, making it possible for the operator to use one hand to adjust the tube head at the end of arm 19 while the other hand remains free to lock the tube in place when the proper position has been found.

The operation of the adjustable mounting means constructed in accordance with the present invention is as follows: An X-ray tube head or object of appreciable weight is assumed at the right hand end of the tube 19 and additionally it is assumed that the vertical post 12 is fixedly supported. The operator raises or lowers the cylindrical body 11 upon tube 12 until the arm 19 has reached the proper vertical height. Thereafter the arm or tube 19 is advanced to the right or to the left, the arm traveling upon the supporting rollers 22 upon its under and upper sides. When the arm has reached the proper horizontal position, the tube head at the end thereof is angularly adjusted by rotating the arm 19 and, at the proper relationship, the lock wheel 41 is rotated, bringing together the two sides of the clamp 32 and locking arm 19 against further movement.

While the particular device herein shown and described in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiment of my invention, and that I do not mean to limit myself to the details of construction or design herein shown, other than as defined in the appended claims.

I claim:

1. An adjustable support comprising a vertically adjustable carriage, an elongated tubular arm, spaced rollers rotatably mounted on said carriage positioned above and below said arm to support same for longitudinal movement and for rotation, a clamp to secure said arm against longitudinal movement and against rotation, a vertically slotted plate, pins guiding said plate for vertical displacement relative to said rollers, and means mounting said clamp for horizontal displacement on said plate lateral of the axis of said arm, said mounting means comprising horizontal pins on said plate and horizontal seats therefor in said clamp.

2. An adjustable support for X-ray tube heads and the like comprising a vertically adjustable sleeve, vertically and horizontally spaced pairs of rollers mounted externally on said sleeve, a transversely extending tubular arm extended between said pairs of rollers and contacted on its upper and lower sides thereby, said arm being adapted to carry a tube head on its end adjacent the underlying pair of rollers, a support plate mounted on said sleeve for vertical transverse movement relative to said arm, a clamp enclosing said arm and mounted on said plate for horizontal movement transverse to said arm, and means to tighten said clamp on said arm to prevent its rotation and longitudinal movement.

3. An adjustable support for X-ray tube heads and the like comprising a vertically adjustable sleeve, spaced pairs of frusto-conical rollers mounted externally on said sleeve, a transverse tubular arm adapted to carry a tube head extended between said pairs of rollers and contacting the opposed surfaces of the rollers of each pair, a support plate formed with vertical slots, means in said slots positioning said plate to said sleeve for limited vertical adjustment relative to said rollers, a split clamp enclosing said tubular arm, spaced horizontal pins carried by said support plate slidably positioned in said clamp to mount same for horizontal displacement, and means to tighten said clamp on said tubular arm to prevent rotation and longitudinal sliding movement.

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