Feb. 8, 1949. C. W. PETERSON 2,461,175

PANORAMING TRIPOD HEAD

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FIG. 1.

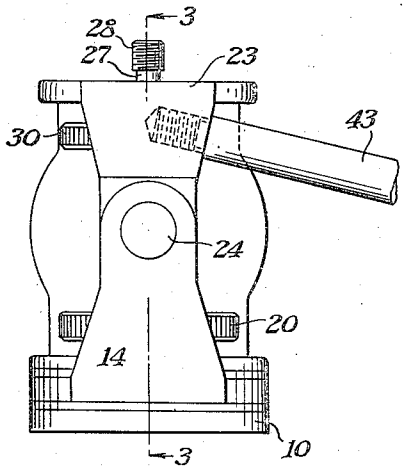


FIG. 3.

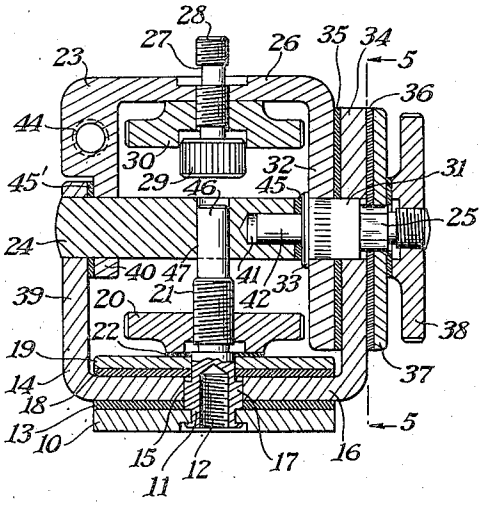


FIG. 2.

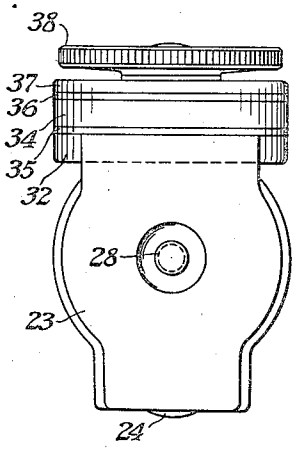


FIG. 4.

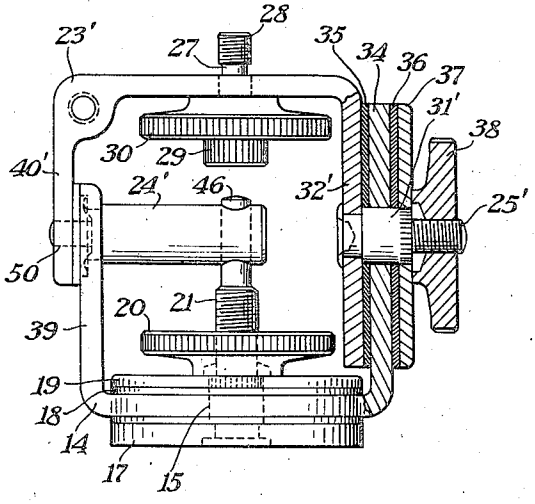
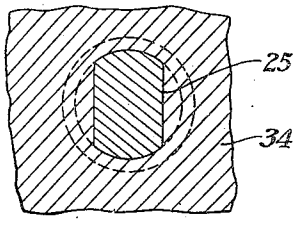


FIG. 5.



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PANORAMING TRIPOD HEAD

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3 Claims. (Cl. 248—183)

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This invention relates to tripod heads for cameras, and particularly to an accessory panoraming head for tripods which is capable of both horizontal and vertical swiveling movement.

One object of the present invention is the provision of a panoraming tripod head, the swiveling movements of which are effected manually and very smoothly.

Another object is to provide a tripod head of the type set forth which is simple in construction, simple to assemble, and very rigid as regards to twisting forces set up therein in effecting the swiveling motions, and as regard to camera vibration.

And still another object is to provide a tripod head, the swiveling motions of which are opposed by a frictional drag means made up of felt-like washers pressed against smooth metal surfaces, which combination of parts possess the property that the force required to start the swiveling motion is less than the force required to make the parts move faster relative to one another.

And yet another object is to support the moving parts on two spaced bearing supports so that the head is very rigid.

The novel features that I consider characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of specific embodiments when read in connection with the accompanying drawings in which,

Fig. 1 is a side elevation of a panoraming and tilting tripod head constructed in accordance with a preferred embodiment of the present invention,

Fig. 2 is a top plan view of the tripod head shown in Fig. 1,

Fig. 3 is a vertical sectional view taken substantially on line 3—3 of Fig. 1,

Fig. 4 is an end elevational view, partly in section, of another embodiment of the tripod head, and

Fig. 5 is a section taken on line 5—5 of Fig. 3.

Like reference characters refer to corresponding parts throughout the drawings.

Referring to Figs. 1–3, wherein a preferred embodiment of the present invention is shown, the present tripod head comprises a horizontal base plate 10, to which is fixed, or riveted, a vertical bearing shaft 11. The lower end of the shaft is drilled out and threaded to provide a socket 12

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for the reception of a conventional screw found in the top of all tripods, and for the purpose of fastening the head to a tripod, not shown. The top of the base plate 10 is smooth, or preferably polished, and has a felt, or felt-like, washer 13 engaging the same.

A lower U-shaped frame 14 has a reamed hole 15 in its cross-arm 16 which has a slip fit with the enlarged bearing portion 17 of the vertical shaft 11 to constitute the bearing for the horizontal swiveling movement of the entire head. The two faces of the cross-arm 16 are smooth, or polished, and the top side is engaged by a felt, or a felt-like, washer 18 which is forced thereagainst by a metal compression washer 19. The felt washer 18 and the compression washer 19 are held against rotation on shaft 11 by having straight-sided holes therein engaging flats on the shaft, see Fig. 5. A variable frictional drag, or a complete clamping action, in the horizontal swiveling motion of the head is effected by a vertical compression nut 20 threadedly engaging a threaded portion 21 of the shaft 11, said nut directly engaging the compression washer 19, or engaging an intermediate metal washer 22 to prevent marring the surface of the compression washer.

An upper U-shaped frame 23 is held in inverted nesting relation with the lower frame 14 by two aligned horizontal bearing shafts 24 and 25, extending through the overlapping upstanding arms of the two frames to afford a vertical swiveling motion of the camera attached to the head. The cross-arm 26 of the upper frame includes a conventional camera attaching screw arrangement which includes the screw 27 having a small threaded end 28 adapted to engage the tripod screw socket found in most cameras. The screw 27 is threaded in the cross-arm 26 for the purpose of adjusting the length of the screw above the top of the head, and a small knurled head 29 is provided on the end of the screw for manual manipulation thereof. A large lock nut 30 is also threaded onto the screw 27 for the purpose of pulling the attached camera down tight against the cross-arm 26 after the threaded end 28 of the screw has been threaded into the socket on the camera.

An enlarged portion 31 on the horizontal bearing shaft 25 is driven through a bore in the upstanding arm 32 of the upper frame 23 until a flange 33 thereon abuts the inner face of said arm. To insure a non-rotation relation between these two parts, the portion 31 is provided with serrations which cut into the walls of the bore

in the arm. The inner end of the portion 31 is smooth and finished to have a close slide fit with a bore in the upstanding arm 34 of the lower frame 14 so as to provide a bearing for the vertical swiveling motion of the head. Adjacent faces of the two upstanding arms 32, 34 are smooth, or polished, and disposed between the two is a felt, or felt-like, washer 35. Engaging the other face of the upstanding arm 34, which is polished, is a felt, or felt-like, washer 36 backed up by a metal compression washer 37. These two last-mentioned washers are held against rotation on the shaft 25 by any suitable means, such as having non-circular holes engaging non-circular portions on the shaft 25, as shown in Fig. 5. Variable frictional drags, or a complete clamping action, in the vertical swiveling motion may be effected by means of a horizontal compression nut 38 engaging a threaded end of shaft 25.

The other pair of overlapping upstanding arms 39 and 40 of the two frames 14 and 23, respectively, are journaled on the horizontal bearing shaft 24 which has a slide fit with a bore in each, and which is in alignment with shaft 25. The inner end of shaft 24 is provided with a reamed bore 41 which has a slip fit with a finished end 42 of a shaft 25 extending to the interior of the head. This connection is provided merely to furnish spaced bearing supports for the movable parts of the head and to render the head rigid against camera vibration—as when a motion picture camera is being used—and against torques induced by setting up the swiveling motion of the head by means of a handle 43 screwed into a socket 44 in one corner of the upper frame 23. It will be noticed that the bore 41 is made deeper than the length of the finished end 42 of shaft 25 so as to permit the longitudinal movement of the latter incident to a clamping action being set up by rotation of nut 38. For purposes of excluding dust and providing lubrication a felt washer 45 is placed on end 42 between the end of shaft 24 and the flange 33, and another washer 45' is placed on shaft 24 between the overlapping arms 39 and 40 of the two frames.

In order to add to the rigidity of the head as a whole, and to hold the shaft 24 in assembled position, the end 46 of the vertical bearing shaft 11 is finished and extends into a bore 47 in the horizontal bearing shaft 24 with a slide fit. This gives a bearing support for the vertical shaft 11 which is spaced from the bearing portion 17 thereof so that this shaft is supported at two spaced points and the rigidity of the head is thereby substantially increased.

I have found that felt pressed against polished metal has the property that the force required to start relative motion between the two is less than the force required to make it slide faster, e. g. the amount of friction increases with the speed of sliding. This is just the kind of frictional drag that is needed in manually operated panoraming tripod heads, and particularly for motion picture cameras, to make perfect non-jerky panorams, and the present tripod meets this important qualification ideally.

The job of assembling this tripod head is extremely simple as will be obvious from the following assembly technique. First of all, the vertical shaft 11 is inserted in plate 10 and staked, or riveted, thereto. Then, with the two frames 14 and 23 in nested relation and with the felt washer 35 in place, the shaft 25 is driven into the bore in the upstanding arm 32 of the upper frame

23 and through the bore in the upstanding arm 34 of the lower frame 14. Then the outer felt washer 36, metal compression washer 37 and compression nut 38 are put on the shaft 25. Next, after felt washer 45 has been put in place, shaft 24 is slipped through the overlapping arms 39 and 40 of frames 14 and 23, respectively, and is slipped onto the end 42 of shaft 25. Now, after the felt washer 13 has been placed on vertical bearing shaft 11, the shaft is inserted through the bore in the cross arm 16 of the lower frame 14, with the felt washer 18, the metal compression washer 19 and the compression nut 20 in position to receive the end of the shaft. Then the shaft is pushed up until the end 46 thereof passes into bore 47 in the horizontal bearing shaft 24. This vertical shaft will be held in assembled relation so long as nut 20 engages the threaded portion 21 thereof.

In Fig. 4 I have shown another modification of my tripod head. This head differs from that first described primarily in the arrangement of the spaced bearing supports, and since the component parts of the two are essentially the same, the parts of the second embodiment will be designated by the same reference characters used in describing the first insofar as they recur exactly the same, while those that differ slightly will be primed ('). This embodiment differs from the preferred one primarily in that the horizontal bearing shaft 24' does not extend clear across the head, but only to the center thereof where it is engaged by the end 46 of the vertical screw 11. The shaft 24' is staked to the upstanding arm 39 and has a reduced finished end 50 extending through a bore in the upstanding arm 40' of frame 23'. The horizontal bearing shaft 25' is staked, or riveted, to the upstanding arm 32' of the upper frame 23' and includes an enlarged bearing portion 31' forming a bearing for the upstanding arm 34 of the frame 14. Another distinction in this second embodiment over the first is that the two metal compression washers and the two associated felt washers instead of having non-circular holes engaging non-circular portions of shafts 25 and 11 to prevent rotation thereof, the shaft washers are provided with cooperating splines, as shown.

It should also be noticed that in this second embodiment the upstanding arm 40' of frame 23' lies outside of the upstanding arm 39 of frame 14, instead of inside thereof as in the first device, and that this arrangement produces a clamping action at the left side of the head as well as at the right when compression nut 38 is turned down. Accordingly, increased clamping action of the vertical swiveling motion with a given adjustment of the nut 38 is obtained with the second embodiment as compared with the first embodiment. The engagement between the two ends of the shafts 11 and 24' in the center of the head provides the double, spaced bearing supports for both the horizontal bearing shaft 24' and the vertical bearing shaft 11, as in the first embodiment, for the purpose of making the head completely rigid.

Although I have shown and described certain specific embodiments of my invention, I am fully aware that many modifications thereof are possible. My invention, therefore, is not to be limited to the precise details and construction shown and described, but is intended to cover all modifications coming within the scope of the appended claims.

Having thus described my invention, what I

claim is new and desire to secure by Letters Patent of the United States is:

1. A panoraming tripod head comprising a base which is adapted to be detachably connected to the top of a tripod; a vertical bearing shaft fixed to and extending a substantial distance from said base; a U-shaped lower frame having its cross arm rotatably engaging said shaft adjacent the base for horizontal rotation; a U-shaped upper frame disposed with its vertical arms in overlapping relation with those of the lower frame; a horizontal bearing shaft extending through one pair of overlapping arms and rotatable with respect to at least one of the arms; a second horizontal bearing shaft extending through the other pair of overlapping arms of the two frames in alignment with said first-mentioned horizontal bearing shaft, and fixed to one arm while rotatable with respect to the other; means on the cross arm of said upper frame for attaching a camera thereto; a handle fixed to the upper frame for controlling the movements of the head; means for frictionally restraining the combined horizontal rotation of the two frames about the vertical bearing shaft and a vertical rotation of the upper frame about the horizontal bearing shafts; the free end of said vertical bearing shaft being connected to a supporting member extending from one of the arms of the frames to render the head rigid against torque induced thereon by force applied to the handle to cause a desired rotation of the head.

2. A panoraming tripod head comprising a base which is adapted to be detachably connected to the top of a tripod; a vertical bearing shaft fixed to and extending a substantial distance from said base; a U-shaped lower frame having its cross arm rotatably engaging said shaft adjacent the base for horizontal rotation; a U-shaped upper frame disposed with its vertical arms in overlapping relation with those of the lower frame; a horizontal bearing shaft extending through one pair of overlapping arms and rotatable with respect to at least one of the arms; a second horizontal bearing shaft extending through the other pair of overlapping arms of the two frames in alignment with said first-mentioned horizontal bearing shaft, and fixed to one arm while rotatable with respect to the other; means on the cross arm of said upper frame for attaching a camera thereto; a handle fixed to the upper frame for controlling the movements of the head; means for frictionally restraining the combined horizontal rotation of the two frames about the vertical bearing shaft and a vertical rotation of the upper

frame about the horizontal bearing shafts; said first-mentioned horizontal bearing shaft fixed to one of said arms and extending toward the center of said head, said shaft provided with a hole in alignment with said vertical bearing shaft; and the free end of said vertical bearing shaft extending into said hole with a close fit to render the head rigid.

3. A panoraming tripod head comprising a base which is adapted to be detachably connected to the top of a tripod; a vertical bearing shaft fixed to and extending a substantial distance above said base; a U-shaped lower frame having its cross arm rotatably engaging said shaft adjacent the base for horizontal rotation; a U-shaped upper frame disposed with its vertical arms in overlapping relation with those of the lower frame; a horizontal bearing shaft extending through one pair of said overlapped arms and fixed to one arm while rotatable with respect to the other, the end of said shaft extending to the outside of said head being threaded for the reception of a clamping nut, and the other end of said shaft extending toward the center of said head and being finished to constitute a bearing support; a second horizontal bearing shaft extending through the other pair of overlapping arms of the two frames in alignment with said first-mentioned horizontal shaft, and extending across said head and having its end provided with a bore adapted to slip onto the finished end of said other horizontal bearing shaft; said last-mentioned horizontal shaft provided with a bore in axial alignment with said vertical bearing shaft, and the end of said vertical shaft extending into said bore with a slip fit; means on the cross arm of said upper frame for attaching a camera thereto; a handle fixed to the upper frame member for controlling movements of the head; and means for frictionally restraining the combined horizontal rotation of the two frames about the vertical bearing shaft; and means, including said clamping nut, for frictionally restraining the vertical rotation of the upper frame about the horizontal bearing shafts.

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