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[54] **INSTRUMENT HEAD MOUNTING**

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[51] **Int. Cl.** **F16m 13/00**

[58] **Field of Search** 248/123, 124, 125, 287, 248/295, 297

[56] **References Cited**

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[57] **ABSTRACT**

A hollow supporting column for an up and down adjustable instrument head mounts the rack bar of a rack and pinion drive for the instrument head. Prongs of the instrument head project through slots in the column and mount guide rollers and friction pads in cooperative engagement with inside surfaces of the column.

10 Claims, 2 Drawing Figures

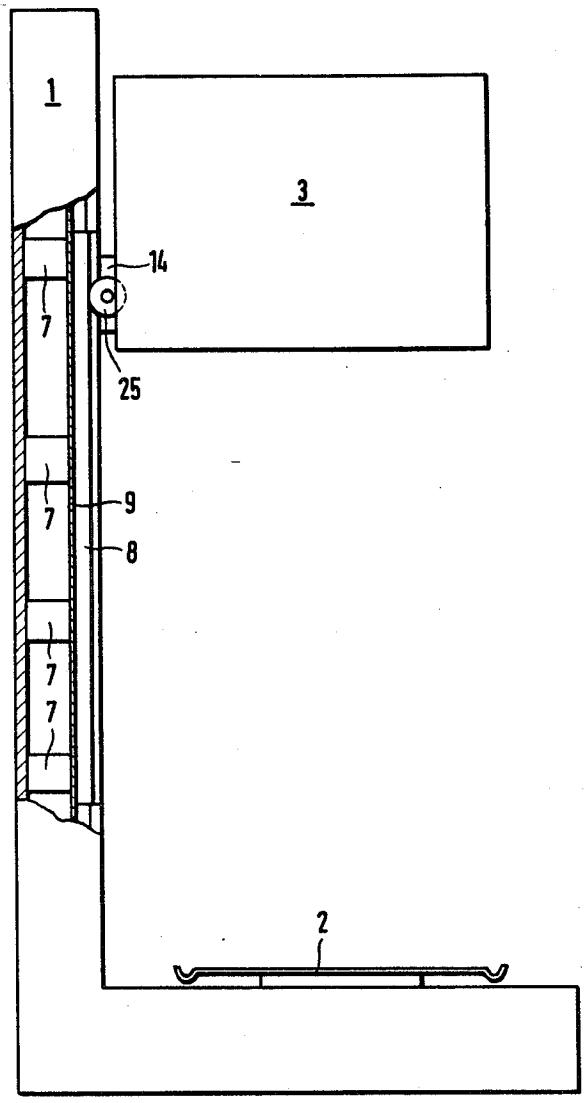


FIG. 1

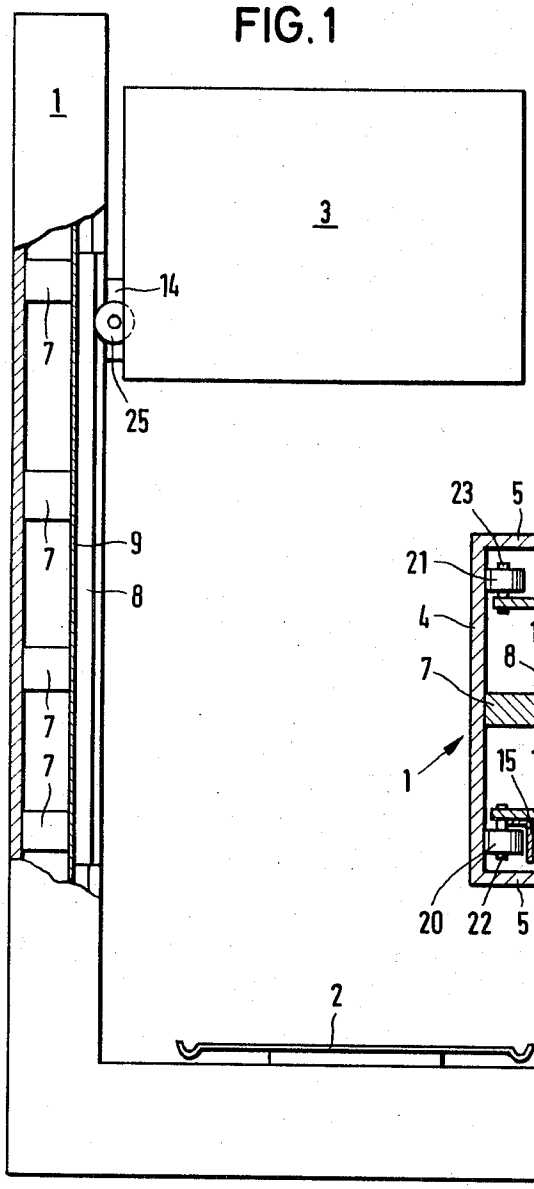
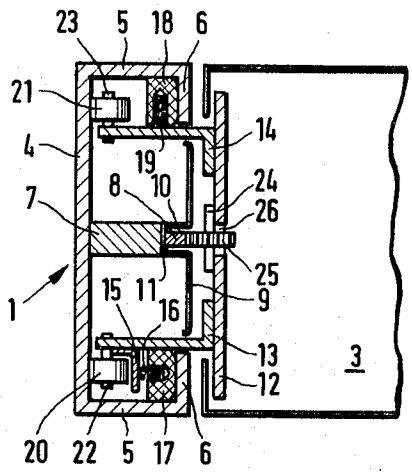

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FIG. 2


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INSTRUMENT HEAD MOUNTING

This invention relates to a structure for guiding an instrument head along an elongated support frame, and it is concerned more particularly with the guiding of a projection apparatus on the column of a photo-composing machine.

In photo-composing machines or other optical recording or reproducing apparatuses, it is necessary for the projection apparatus, together with a suitable lens system, to be adjustable in height relative to a projection surface upon which the photosensitive material usually lies. For instance, the distance between the projection surface and the projection apparatus must be able to be varied in the direction of the optical axis of the projection device in order to take care of the desired enlargement. To this end, support columns have heretofore been used on which the projection apparatus, after fastening elements have been loosened can be shifted so as to adjust its height on the column and thereby its distance from a projection surface usually connected to the support column.

The principal object of the present invention is to provide an improved structure for guiding an instrument head in longitudinal direction on a support frame, permitting easy and delicate sliding adjustment of the instrument head without having to loosen and retighten complicated or awkward fastening means, and also affording a relatively elastic mounting of the instrument head so that the suspension of said head insures immunity to shocks and vibrations.

In the case of a guide structure of the type cited hereinbefore, this object is accomplished in accordance with the invention in that the suport frame has a U-profile opening towards the instrument head; in that the side flanges of the profile web are connected along their longitudinal outer edges to end flanges which extend inwardly and perpendicular to the side flanges; in that the instrument head has prongs which extend substantially parallel to the profile side flanges and into the U-profile between its end flanges; in that the prongs have respectively secured thereto a spring biased pressure pad which bears against an inner side surface of the U-profile; in that on each prong there is also rotatably journalled a guide roller whose contact surface bears against the inner web side of the U-profile; and in that a toothed rack which extends in the direction of movement of the instrument head and which is engaged by a pinion which in turn is rotatably journalled on the instrument head, is connected to the inner web side of the U-profile approximately in the middle between its side flanges.

This design of the guide structure in accordance with the invention permits the instrument head to be slid in longitudinal direction in a delicate and easy acting manner with the aid of the guide rollers as well as the toothed rack and pinion, the instrument head being automatically retained in its adjusted position by means of the pressure pads should the drive on the gear cease or be discontinued. Since, on the other hand, the pressure pads are pressed against inside surfaces of the U-profile by means of compression springs, an elastic mounting of the instrument head on the support frame is assured since these compression springs when properly arranged, allow a limited amount of pivotal movement of the instrument head both about a horizontal and about a vertical axis relative to the support frame.

In accordance with a further development of the invention, the U-profile of the support frame is shielded by a cover plate which is secured in place together with the toothed rack and which is dimensioned such that there remains between the longitudinal side edges of said cover plate and the adjacent longitudinal edges of the end flanges of the U-profile a sufficient amount of space to allow the prongs of the instrument head to pass therethrough.

A very pleasing appearance of the support frame is attained by such a cover plate which closes the opening of the U-profile over its entire length, since the frame then looks like a rectangular column which is closed on all sides and which merely has two parallel slots extending longitudinally on the side adjacent the instrument head into which the prongs of said instrument head are inserted. Furthermore, by closing the opening of the U-profile with the aid of the cover plate, the inner surfaces of the U-profile, which form the surfaces of contact for the guide rollers and pressure pads, are also protected from dirt and dust so that the guide is quite free of servicing needs.

In accordance with another development of the invention, the toothed rack is secured to a back-up member mounted on the web of the U-profile so that its surface of contact with the pinion is located approximately in one plane with the end flanges of the U-profile. This arrangement also provides a pleasing external appearance of the support frame and, at the same time, facilitates the structural design of the driving connection with the instrument head. According to a preferred embodiment of this development, the cover plate has an indentation receiving the toothed rack, the bottom of the indentation being secured between the toothed rack and the back-up member. In this way it is possible to secure the cover plate to the support frame in a very simple and reliable manner by merely setting the cover plate with the bottom of its indentation upon the back-up member of the support frame and then by screwing, for example, the toothed rack thereupon from the outside so as to interpose the bottom of the indentation between the rack and the back-up member.

In accordance with a first embodiment of the invention, the pressure pads are secured to angle clips by means of compression springs arranged substantially parallel to the side flanges of the U-profile. The angle clips extend respectively from the prongs of the instrument head toward the adjacent side flanges of the U-profile. In this embodiment of the invention, it is possible for the instrument head to execute a pivoting movement about the horizontal axis which is limited by the compression springs and is designed to absorb any possible shocks or vibrations.

In accordance with another embodiment, the pressure pads are secured to the prongs themselves by means of compression springs which are disposed substantially parallel to the end flanges of the U-profile. In this embodiment, a limited pivoting movement of the instrument head relative to the support frame is possible about a vertical axis.

In accordance with a third and preferred embodiment of the invention, one pressure pad is secured to an angle clip which extends from one of the prongs of the instrument head toward the adjacent side flange of the U-profile by means of a compression spring extending substantialy parallel to the side flanges of the U-profile, and the other pressure pad is secured to the

other prong itself by means of a compression spring which extends substantially parallel to the end flanges of the U-profile. In this third embodiment which is a combination of the first two embodiments of the invention, a limited pivotal movement of the instrument head relative to the support frame is possible about a horizontal as well as about a vertical axis. This type of mounting of the instrument head on the support frame is designed to absorb shocks exerted on the instrument head in practically all directions.

The invention will now be more fully described with reference to an embodiment illustrated in the drawing, in which:

FIG. 1 is an elevational view, partly in section of a support frame and an associated instrument head designed as a projection apparatus; and

FIG. 2 is a sectional plan view of the support frame together with part of the instrument head.

A support frame 1 which is suitably sustained on an underlying mounting face not shown, is provided at its base with a table presenting a horizontal projection surface 2; and a projection apparatus 3 forming an instrument head has an optical axis directed upon the projection surface 2. The projection apparatus 3 is mounted on the support frame 1 by means of members shown in detail in FIG. 2 so that it can be moved up and down.

As can be seen from FIG. 2, an upright column of the support frame 1 has a U-profile which is open towards the projection apparatus 3, and comprises a web 4, two side flanges 5 forming the legs of the U, and two end flanges 6 which extend inwardly at right angles relative to the side flanges 5 and define the opening of the U-profile. Approximately in the middle between the two side flanges 5 there are mounted on the inner surface of the web 4 a series of spacing members 7 forming a backup member for a toothed rack 8 which in turn extends in the direction of movement of the projection apparatus 3. A cover plate 9 is secured between the toothed rack 8 and the spacing members 7. The cover plate 9 has an indentation 10 whose bottom 11 abuts on said spacing members 7 and which can be secured to the spacing members 7 together with the toothed rack 8 by means of, for example, screws which are not shown here.

The projection apparatus 3 whose inner equipment is not shown in more detail has on its side facing the support frame 1 a plate 12 which is rigidly connected with the housing of the projection apparatus 3 in a manner not shown more fully in the drawing. Two prongs 13 and 14, which are designed as bent plate elements, are secured to the plate 12 such that the longer flanges thereof which extend perpendicularly from the plate 12 in the direction of the support frame 1 are disposed approximately parallel relative to the side flanges 5 of the U-profile. The prong 13 is provided on the end which is inserted into the U-profile with an angle clip 15 whose shank facing away from the prong 13 is disposed approximately parallel to the adjacent end flange 6. A pressure pad 17 which is pressed against the inner surface of the adjacent end flange 6 and partially against the inner surface of the adjacent side flange 5 is arranged on the angle clip 15 by means of a compression spring 16 in a manner not shown in more detail in the drawing.

The end of the prong 14 which is inserted into the U-profile has a similar pressure pad 18 which, however, is connected with the prong 14 by means of a compression spring 19. While the compression spring 16 of pressure pad 17 is disposed approximately parallel to the adjacent side flange 5, the compression spring 19 of pressure pad 18 is arranged approximately parallel to the adjacent end flange 6. Both ends of the prongs 13 and 14 which are inserted into the U-profile are provided with guide rollers 20 and 21 which are rotatably journalled by shafts 22 and 23 on the prongs 13 and 14 in a manner not shown in more detail. The guide rollers 20 and 21 make contact at their peripheries with the inner surface of the web 4.

On the side of the plate 12 of the projection apparatus 3 which faces toward the support frame 1 there is provided in a manner not shown in full detail a mounting 24 for a pinion 25 which is arranged approximately in the middle between the prongs 13 and 14 such that it engages the toothed rack 8 of the support frame 1. A cut-out section 26 is provided in the plate 12 into which the pinion 25 is inserted in order that the pinion 25 can be disposed relatively close to the plate 12.

In the case of a system for driving the pinion 25 either by means of a suitable motor or a manually operated crank in a manner not shown in further detail, the projection apparatus 3 is moved upwardly or downwardly on the support frame 1 in the respective desired direction, the pinion 25 meshing with the toothed rack 8 in so doing. During this movement, the guide rollers 20 and 21 roll in the inner surface of the web 4 of the U-profile. The pressure pads 17 and 18, which are preferably manufactured from a wear-resistant hard fiber or plastic, slide along the inner surfaces of the side flanges 5 and end flanges 6. The pressure pads 17 and 18 are pressed against the inner surfaces of the flanges 5 and 6 by the compression springs 16 and 19 associated with said pressure pads with such firmness that the projection apparatus 3 is reliably maintained in the desired adjusted position when the pinion 3 is relieved of driving torque.

Since the compression spring 16 is arranged substantially parallel to the adjacent side flange 5 and the compression spring 19 extends substantially parallel to the adjacent end flange 6, a certain limited amount of pivotal movement of the projection apparatus 3 relative to the support frame 1 is possible both about a horizontal as well as about a vertical axis by virtue of the elasticity of the compression springs. Due to this elastic suspension, almost all shock or vibrational forces acting in arbitrary directions can be prevented from reaching the projection apparatus 3.

The cover plate 9 closes the opening of the U-profile such that the outer surface of the cover plate lies approximately in the same plane as the outer sides of the end flanges 6. The cover plate 9 is dimensioned such that between its side edges adjacent to the end flanges 6 and the end flanges themselves merely a narrow space remains which permits the prongs 13 and 14 of the projection apparatus 3 to pass therethrough. In addition to preventing dirt and dust from penetrating into the interior of the U-profile, this cover plate 9 also affords an esthetic outer appearance of the entire support frame 1 which then looks like a rectangular column which is closed on all sides. The only visible gaps on this column are merely two strip-like slots on the side adjacent the projection apparatus 3 which are occupied by the prongs 13 and 14 of the said projection apparatus 3.

Although two compression springs **16** and **19** are shown in the illustrated embodiment of the invention which are disposed in different directions, the pressure pads **17** and **18**, together with their associated compression springs **16** and **19**, may of course be identically disposed on the prongs **13** and **14**, i.e. the two compression springs may either be disposed both parallel to the side flanges **5** or they may both be disposed parallel to the end flanges **6**.

We claim:

1. The combination of a stationary support structure, an instrument head, and connecting means operatively interposed between said support structure and instrument head so as to provide for back and forth adjustment of the latter relative to said support structure, said connecting means comprising a hollow, longitudinally slotted column member on said support structure; a rack and pinion drive operatively interposed between said column member and said instrument head; support prongs on said instrument head projecting into said column member, and roller means and slide blocks mounted on said supporting prongs, said column member having a cross sectional U-profile presenting a web, a pair of side flanges, and a pair of end flanges connected, respectively, to the outer, longitudinal ends of said side flanges and extending inwardly therefrom in generally parallel relation to said web, said roller means being mounted on said prongs so as to bear against the inside surface of said web, and said slide blocks being mounted on said prongs so as to bear against the inside surfaces of said side and end flanges.

2. The combination set forth in claim **1** and further comprising spring means operatively associated, respectively, with said prongs and acting upon said slide blocks so as to urge the latter against the inside surfaces of said side flanges.

3. The combination set forth in claim **1** and further comprising spring means operatively associated, respectively, with said prongs and acting upon said slide blocks so as to urge the latter against the inside surfaces of said end flanges.

4. The combination set forth in claim **1** and further comprising spring means operatively associated with one of said prongs and acting upon one of said slide blocks so as to urge it against the inside surface of one of said side flanges; and spring means operatively associated with the other of said prongs and acting upon another of said slide blocks so as to urge said other slide block against the inside surface of one of said end flanges.

5. The combination set forth in claim **1** wherein said rack and pinion drive comprises a rack bar on said column member positioned between said end flanges thereof in transversely spaced relation thereto, and a pinion in mesh with said rack bar rotatably mounted on said instrument head.

6. The combination set forth in claim **5** wherein a face plate of said instrument head has an aperture accommodating said pinion of said rack and pinion drive.

7. The combination set forth in claim **5** wherein said supporting prongs of said instrument head extend into said column member at opposite sides, respectively, of said rack bar.

8. The combination set forth in claim **5** and further comprising a back up member for said rack bar secured to the inside of said web of said U-profile.

9. The combination set forth in claim **8** and further comprising a cover plate for said column member extending between said supporting prongs of said instrument head.

10. The combination set forth in claim **9** wherein said cover plate has an indentation seated on said back up member between the latter and said rack bar.

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