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3,366,426

ALIGNMENT GUIDE

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2 Sheets-Sheet 2

FIG. 2.

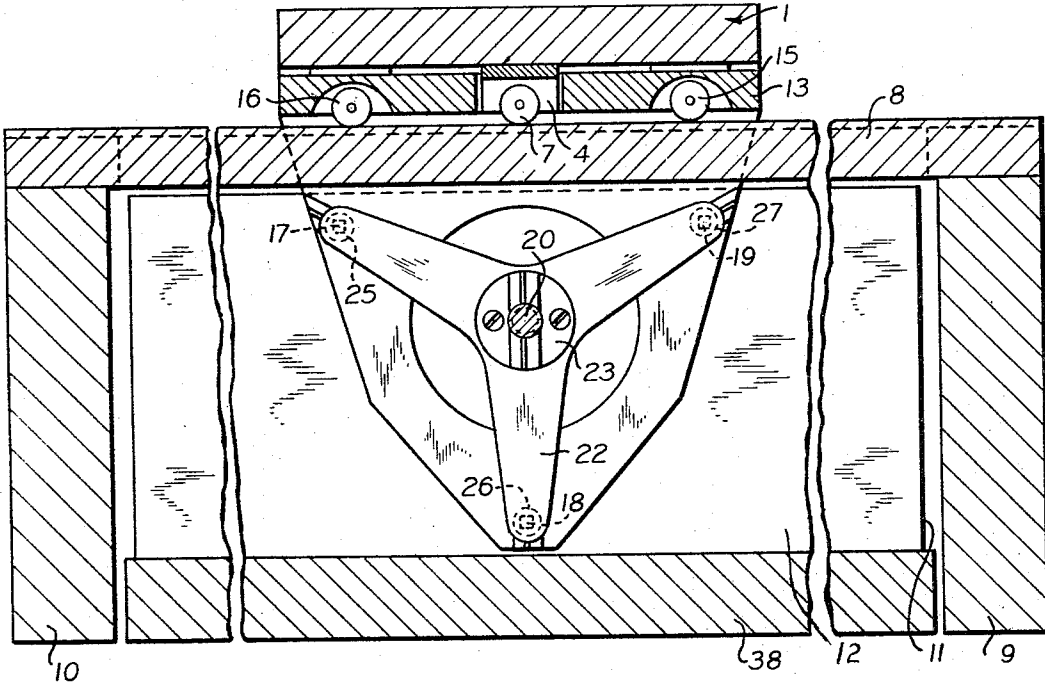
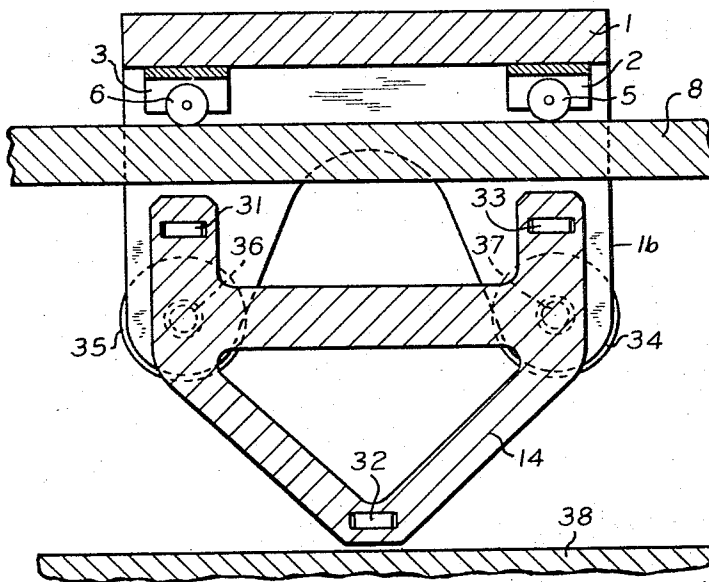


FIG. 3.



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**ALIGNMENT GUIDE**

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9 Claims. (Cl. 308—6)

The present invention relates to an alignment guide, in general, and to an apparatus for guiding a member, for instance a tool or the like, along a guide path of a guide body, in which the weight of the member is assumed by a carrying path and the member carrier engages the guiding path, in particular.

In a known apparatus of this kind, which serves the forming of grating lines, the tool holder is supposed to be moved linearly as much as possible in the direction of the line to be formed, whereby particularly the deviations to the right or the left from the prescribed moving path are to be avoided.

The apparatus is designed such that the carrier of the tool, which is connected with a round guide by means of levers and a guide system, has the possibility to swing about the median axis of the round guide, and in particular up to the abutment of a slide shoe, secured laterally on the lever, on the reference face of an optical face body.

The slide shoe does not engage the reference face of the face body by means of a point, rather its engaging face has a rectangular cross-section.

This arrangement ment brings about the drawback, that lateral deviations from the prescribed moving path of the guide system are transmitted to the tool to be displaced linearly in such manner, that the slide shoe operates a pivot point of a double-armed lever having non-equal arms. The lever transmits, corresponding to the length of the lever, the mentioned deviations at a reduced scale onto the tool.

Since the slide shoe is in engagement with the reference face of the optical face body, a further drawback resides in the known structure such that based on the one-sided engagement force of the slide shoe, the optical face body is deformed due to the bending stress crosswise to the prescribed moving path, whereby the manufacturing inaccuracy is additionally worsened.

Furthermore, an apparatus of a similar structure is known, which avoids though the first drawback of the above described apparatus such that the tool holder, secured to the slide shoe, operates independently from the coarse guide system.

The coarse guide comprises a slide guide in a groove on two sides, which slide has a rectangular opening extending from its upper side to its lower side, through which opening extends a slide shoe with play.

The slide shoe is equipped with three projections which engage their own guide path and which prevent any edging or tipping of the slide shoe relative to this guide path.

The slide shoe is urged towards the guide path by means of springs which are supported on the mentioned slide. The slide of the coarse guide system constitutes simultaneously the drive element, so that the longitudinal movements accorded to the slide are transmitted to the slide shoe.

If the inaccuracies, which are present or develop in the coarse guide system, cause deviations in the movement of the slide from its prescribed working position, the slide can be moved relative to the slide shoe, whereby it does

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not transmit any of its deviation movements to the slide shoe.

The movement plane of the slide shoe connected with the tool is thus produced exclusively by the projections of the slide shoe engaging the guide path.

The drawback resides, however, the same as in the first described apparatus, that due to the one-sided pressure force of the slide shoe onto the guide path, which is brought about by spring elements, the guide path is deformed crosswise to the prescribed movement path due to occurring bending moments.

It is, therefore, one object of the present invention to provide an alignment guide which avoids the drawbacks of the known structures.

It is another object of the present invention to provide an alignment guide which eliminates deformations of the guide path by the complete freedom from any moments of the guide path.

It is still another object of the present invention to provide an alignment guide wherein the guide body as well as the member carrier sliding on its guide path are merely elements of a closed force rectangle complying with the equilibrium condition and exerting only pressure forces.

With these and other objects in view, which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawings, in which:

FIGURE 1 is a section of the alignment guide designed in accordance with the present invention;

FIG. 2 is a section along the lines 2—2 of FIG. 1; and

FIG. 3 is a section along the lines 3—3 of FIG. 1.

Referring now to the drawings, the alignment guide comprises a displaceable member 1, which is movable by means (not shown), for instance, by a threaded spindle or the like, perpendicularly to the sheet of the drawings of FIG. 1. The weight of the member 1 is taken up, as is shown in FIGS. 2 and 3, by means of rollers 5, 6 and 7 on a supporting path 8, which rollers 5, 6 and 7 are secured to the member 1 by means of bearings 2, 3 and 4.

The supporting path 8 rests at its ends, as shown in FIG. 2, on supporting bodies 9 and 10 by means of a three-point support (not shown), whereby the weight load of the member 1, which is assumed by the supporting path 8, is fed by means of the supporting bodies 9 and 10 to a foundation (not shown).

The supporting path 8 is deformed due to the occurring bending moments by the weight of the member 1, since the supporting path 8 is freely carrying between the supporting bodies 9 and 10 and in particular the carrying path 8 is deformed such, that the member 1 is subjected to a deviation movement, which is perpendicular to the movement of direction. It is, however, not the aim of the present invention to compensate for the mentioned deviation movement. It is the aim of the present invention, as has been stated above, to assign to a member secured to a carrier 13 in its moving direction a movement parallel to a guide path 12 of a guide body 11. The guide body 11 includes a second path or face 30 on the side of the guide body 11 opposite the guide path 12. In order to obtain the mentioned linear movement of the member carrier 13, the fork-shaped member 1 surrounds the guide body 11, and includes a first side 1a and a second side 1b, respectively, extending adjacent and in spaced relationship relative to the guide path 12 and the second path 30, respectively of the guide body 11.

The member carrier 13 is supported on the supporting path 8 by means of rollers 15 and 16. The supporting path 8 is, as can be ascertained from FIG. 1, equipped with a groove 8', so that the member carrier 13 projects through the supporting path 8 without contacting the latter. The member carrier 13 has itself, as shown in

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FIGS. 1 and 2, likewise a rectangular opening 13', so that the bearing 4 secured to the member 1 can project through the member carrier 1 without engaging the same. The member carrier 13 is brought into engagement with the guide path 12 of the guide body 11, as shown in FIGS. 1 and 2, by means of slide shoes 17, 18 and 19 by means of a pretensioned catch 22, which can be secured by a nut 21. The catch 22 is formed in the present embodiment as a resilient three-armed spring blade.

The catch 22 is secured to one side of a part 23, and the other side of the part 23 is equipped with a groove of V-shaped cross-section. The part 23 is connected with a part 1 by means of a ball 24 guided in the V-shaped groove and centered in the threaded bolt 20. Since upon turning the screw bolt 20, the catch 22 is subjected to a change of its length due to its displacement, it is connected with the member carrier 13 by means of projections 25, 26 and 27 guided in V-shaped grooves and secured to the catch 22.

The projections 25, 26 and 27 of the catch 22 which engage the V-shaped grooves constitute simultaneously the coupling between the member 1 and the member carrier 13, that means the longitudinal movements applied to the member 1 are transmitted to the member carrier 13 by means of the catch 22. The screw bolt 20, nut 21, part 23, catch 22, projections 25, 26 and 27, ball 24 and the mountings therebetween, constitute a first pressure means.

A counter-pressure element 14 is disposed between the second side 1b of the member 1 and the second path on face 30 of the guide body 12 and aligned relative to the member carrier 13 such that the engaging points of rollers 31, 32 and 33 on the second path 30 of the guide body 11, as well as the engaging points of the slideshoes 17, 18 and 19 on the guide path 12 of the guide body 11, as well as substantially the engaging points of the projections 25, 26 and 27 of the catch 22 in the V-shaped grooves in the carrier member 13, are disposed always on a linear line parallel to the direction of pressure.

The counter-pressure element 14 is maintained as shown in FIGS. 1 and 3 in position by means of the screws 34 and 35 secured to the second side 1b of the member 1. The connection between the screws 34 and 35 and the counter-pressure element 14 is flexible by means of balls 36 and 37 centered in the screws 34 and 35. The guide body 11 is connected with the base plate 38, which has no connection with the carriers 9 and 10. The screws 34 and 35, balls 36 and 37 and the mountings therebetween constitute a second pressure means.

The constructive arrangement of the present device described in connection with FIGS. 1, 2 and 3 shows that no moments effect the guide body 11 and a deformation of the guide body 11 is thus not possible. Accordingly, the member secured to the carrier 13 is subjected to a movement corresponding to the linearity of the guide path 12.

While I have disclosed one embodiment of the present invention, it is to be understood that this embodiment is given by example only and not in a limiting sense, the scope of the present invention being determined by the objects and the claims.

I claim:

1. An apparatus for guiding a member along a stationary guide path of a guide body comprising,
  - a longitudinal guide body having opposite longitudinal surfaces defining a first guide surface and a second guide surface, respectively,
  - a longitudinal support having a supporting surface and longitudinally disposed relative to said guide body,
  - a generally U-shaped member movably supported on said supporting surface and having first and second sides, respectively, extending adjacent and in spaced relationship relative to said first guide surface and second guide surface respectively,

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said supporting guide surface being disposed independent from said guide surface of said guide body, a U-shaped member carrier movably supported on said supporting guide surface and extending therefrom adjacent said first guide surface of said guide body between said first side of said generally U-shaped member and said first guide surface,

first selectively adjustable pressure means connected to said first side of said generally U-shaped member for pressing said member carrier against said first guide surface,

said member carrier constituting a first pressure element,

a counter-pressure element disposed between said second side of said generally U-shaped member and said second guide surface of said guide body,

second pressure means connected to said second side of said generally U-shaped member for pressing said counter-pressure element against said second guide surface of said guide body,

said member carrier and said counter-pressure element and said first and second pressure means aligned to apply pressure from opposite sides to said guide body through said member carrier and said counter-pressure element, respectively, parallel to the direction of said pressing of said pressure means, and

said first pressure means and said member carrier adapted for longitudinal movement of said member carrier against said first guide surface when said first pressure means is longitudinally moved, and

said selectively adjustable first pressure means further constitutes a coupler between said first pressure means and said member carrier for moving said member carrier longitudinally along said first guide surface when said first pressure means is longitudinally moved.

2. The apparatus, as set forth in claim 1, wherein said counter-pressure element and said member carrier are pressing against said first guide surface and second guide surface, respectively, and said first pressure means are pressing against said member carrier, at engaging points,

said engaging points between said first pressure means and said member carrier as well as between said member carrier and said first guide surface, and between said counter-pressure element and said second guide surface are disposed on a line parallel to the direction of the pressure of said pressing.

3. The apparatus, as set forth in claim 1, wherein said first pressure means includes a resilient member pressing against said member carrier.

4. The apparatus, as set forth in claim 3, wherein said resilient member comprises a spring blade catch, and

ball joints operatively connecting said member carrier with said first side of said member and operatively connecting said counter-pressure element with said second side of said member, respectively.

5. The apparatus, as set forth in claim 3, wherein said first pressure means includes a threaded bolt and nut combination secured to said first side of said member,

said resilient member comprises a spring blade catch means including radial arm portions for pressing against said member carrier,

said spring blade catch means includes projections on said arm portions facing said member carrier,

said member carrier having groove means in which said projections are slidably mounted for expansion of said spring blade catch means, and

a ball disposed in a V-shaped ball joint groove between the end of said threaded bolt and the middle of said spring blade catch means.

6. The apparatus, as set forth in claim 1, wherein said engaging points between said member carrier and

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said guide body comprising slide shoes for sliding against said first guide surface.

7. The apparatus, as set forth in claim 1, further comprising
- at least two longitudinally spaced first roller means, said member carrier is supported on said support surface by said at least two longitudinally spaced first roller means,
- said member carrier having an opening adjacent said support path between said at least two longitudinally spaced first roller means,
- second roller means for supporting said member on said supporting surface and passing through said opening, and
- said member is fork-shaped and transversely surrounds said guide body.
8. The apparatus, as set forth in claim 1, wherein said second pressure means and said counter-pressure element adapted for longitudinal movement of said counter-pressure element against said second guide surface when said second pressure means is longitudinally moved.
9. The apparatus, as set forth in claim 8, further comprising
- rollers disposed between said counter-pressure element and said second guide surface of said guide body and mounted on said counter-pressure element.

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