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Berger et al.

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[54] **ARTICLE SUPPORTING STRUCTURE**

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[51] **Int. Cl.** **B60n 1/02**

[58] **Field of Search** 248/429, 424, 184, 287, 248/298; 108/143, 137; 269/71, 73; 74/190, 206, 202, 27, 28; 355/86, 53

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[57] **ABSTRACT**

A horizontal platform is shiftable sideways on an underlying carrier frame which in turn is horizontally shiftable on a stationary base at right angles to the platform movement on the carrier frame. A feed screw shifts the carrier frame back and forth on the base, and a friction wheel drive shifts the platform back and forth on the carrier frame.

5 Claims, 2 Drawing Figures

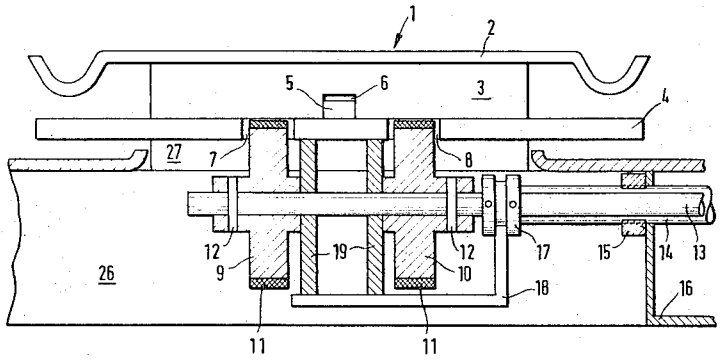

FIG. 1

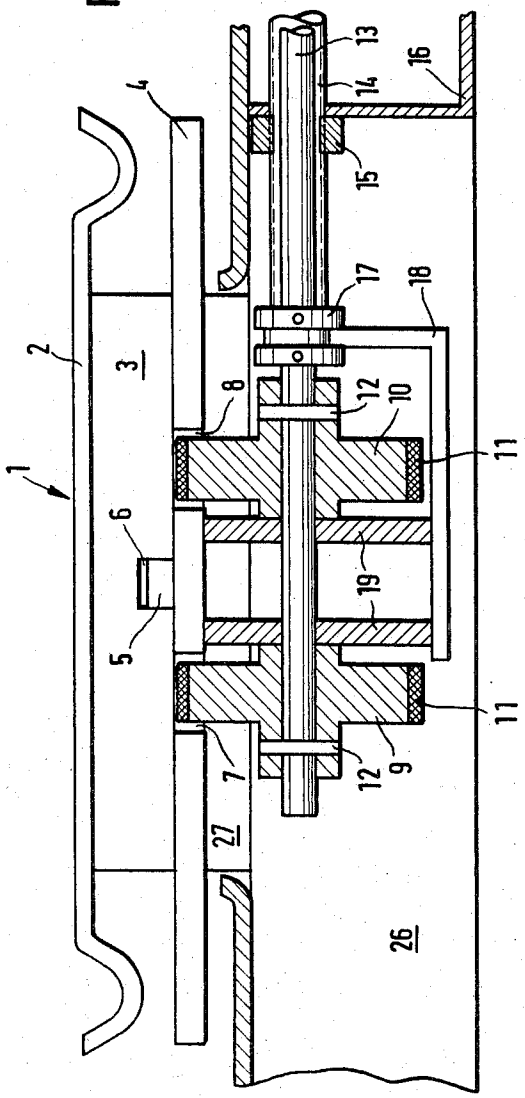
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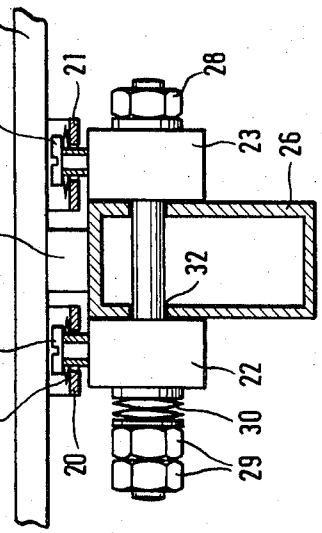
FIG. 2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ARTICLE SUPPORTING STRUCTURE

The invention relates generally to article supporting structures and it is concerned more particularly with the provision of a horizontal article supporting platform that can be moved selectively in the direction of one or the other of two horizontal axes extending at right angles to each other.

In many arts it is common to provide platforms which can be slid relative to a stationary Cartesian coordinate system in an exactly reproducible manner such that every point of the platform surface can be defined by a specific coordinate within this coordinate system. For instance, photo-composing apparatuses commonly incorporate so-called mechanical stages by means of which a photosensitive recording surface may be displaced relative to the optical axes of a stationary projection device such that a character or indicia projected by said projecting device can be placed on any arbitrary point of the recording surface.

The principal object of the present invention is to provide an improved article supporting structure incorporating a slidable platform of the cited type, which can be produced at a relatively low cost, and which can be moved easily and slid exactly in the direction of two axes extending horizontally at right angles to each other.

This object is accomplished, according to the invention by providing in an article supporting structure of the mentioned type a tongue and groove arrangement for guiding the platform in one direction; further by providing at least one friction wheel which acts on the underside of the platform so as to drive it in that one direction; by mounting the friction wheel or wheels and the respective part of the tongue and groove arrangement on a carrier frame; and by connecting the carrier frame to sliding members which encompass at least one stationary guide such that movement of the frame is only possible in a horizontal direction and impossible in the other respective axial direction and in vertical direction.

In an article supporting structure incorporating the invention rotation of the friction wheel or wheels causes shifting of the platform relative a carrier frame in the direction of one of the two axes of horizontal adjustment, the amount and the direction of such shift being exactly controllable as desired, and the tongue and groove arrangement insuring precise movement of the platform in only the desired direction. The friction wheels and the respective portion of the tongue and groove arrangement together with the carrier frame are moreover shiftable solely in the direction of the other of the two horizontal axes. In order to confine this movement of the carrier frame to a shift solely in the direction of the other axis the carrier frame is provided with slide blocks which cooperate with a stationary guide element in such a manner that the carrier frame is not only guided precisely in a horizontal direction, but is also securely prevented from moving in a vertical direction.

In accordance with a further development of the invention two friction wheels are non-rotatably secured to a first shaft and rotatably mounted by means of the latter on the carrier frame so that the platform may be shifted in the direction of one of the two horizontal axes to a desired extent one way or the other by a corresponding rotation of the first shaft.

In a practical embodiment of the invention, the first shaft is inserted into an externally threaded, hollow second shaft which in turn is passed through at least one stationary internally thread member, and one end of said second shaft is rotatably but non-shiftably connected to the carrier frame so that sliding movement of the carrier frame together with the platform in the direction of the other axis can be effected to a desired extent one way or the other by correspondingly rotating the second shaft.

In this manner, it is possible to move the platform to any desired point of a Cartesian coordinate system by rotating the first and second shafts in the proper directions and through the proper number of turns.

In accordance with a preferred embodiment of the invention, the slide blocks are manufactured from a low friction material and are pressed against the guide element from opposite sides with the aid of a bolt passing through the slide blocks and through a hole in the guide element which is elongated in the direction of the other axis.

Mounting clamps to which the slide blocks are fastened are secured on the underside of a plate member which is rigidly connected to the carrier frame and which guides the platform. The slide blocks are retained on the mounting clamps by screws and spring washers and spring washers are also provided on their supporting bolt so that it is possible to move the carrier frame on its associated guide element in a manner which is relatively flexible, but is practically free from play.

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

FIG. **1** is a schematic vertical section of an article supporting structure comprising drive and guide means constructed and designed in accordance with the invention; and

FIG. **2** is a schematic vertical section of a base and carrier frame assembly incorporated in the structure shown in FIG. **1**;

A platform **1** which is designed here as a mechanical stage for a photo-composing, apparatus comprises a pan **2** and a body plate **3** which is arranged under the pan and which is rigidly connected to said pan in a manner not shown more fully in the drawing. The body plate **3** lies on a carrier frame plate **4** in sliding relation, said frame plate being connected to a guide bar **5** which extends in the direction of one of the mentioned two horizontal axes. The bar **5** engages a groove **6** of the body plate **3** and acts as the tongue in a tongue and groove arrangement. The carrier frame plate **4** has recesses **7** and **8** which accommodate the friction wheels **9** and **10**. The peripheral contact surfaces of the wheels are coated with a suitable material with a high coefficient of friction and bear against the underside of the body plate **3** in order to slide the platform in the direction of the first axis relative to the carrier frame plate **4** by rotating said friction wheels.

The friction wheels **9** and **10** are pinned to a common first shaft **13** by means of pins **12**. This shaft projects from under the mechanical stage for actuation by hand or by a suitable drive means, not shown. The first shaft **13** is inserted into a hollow second shaft **14** which is provided with an external thread and is screwed through a nut **15** which is rigidly connected to a stationary base **16** of a mounting frame in a manner not shown

here in more detail. One end of the second shaft **14** projects outwardly from the mechanical stage as well as the shaft **13** so that the shaft **14** can also be driven manually or by a suitable drive means, not shown. The other end of the second shaft **14** is positioned in a sleeve **17** such that, although a rotational movement of the second shaft is possible relative to this sleeve, a relative sliding movement of the shaft in axial direction between the sleeve **17** and the second shaft **14** is reliably prevented. The sleeve **17** is secured to a carrier frame **19** by means of a connecting arm **18** and the carrier frame is in turn rigidly connected to the carrier frame plate **4.** The first shaft **13** is journaled in the carrier frame **19** so as to permit rotation in a manner which is not illustrated more fully.

As can be seen from FIG. **2,** the entire assembly which comprises the carrier frame **19,** frame plate **4,** shaft **13,** friction wheels **9** and **10** as well as the sleeve **17** and connecting arm **18** can be slid in the direction of the other of the mentioned two horizontal axes. The exact limitation of this movement is defined alone in the respective desired axial direction by means of corresponding guide members. The frame plate **4** is provided to this end with mounting clamps **20** and **21** on its underside. Slide blocks **22** and **23** are secured to said clamps by screws **24** and **25.** The slide blocks **22** and **23** are situated on both sides of the side surfaces of a guide beam **26** which is provided on its upper side with another guide bar **27** upon which the frame plate **4** may be slid. The guide beam **26** is provided in a manner not illustrated here with an elongated hole which extends in the other respective axial direction, through which a bolt **28** passes which also passes through the slide blocks **22** and **23.** The slide blocks are pressed onto the side surfaces of the guide beam **26** by means of nuts **28, 29** and spring washers **30.** The screws **24** and **25** are mounted on the mounting clamps **20** and **21** by means of spring washers **31** also. These spring washers ensure a certain amount of elasticity in guiding the carrier frame assembly with respect to the guide beam **26** without thereby causing objectionable play between the guide beam and slide blocks.

It can be readily seen from the drawing that the platform in accordance with the invention can be moved arbitrarily within the limits provided for a sliding movement by rotating the first shaft **13** and second shaft **14,** any arbitrary point of the support surface being able to assume any optional coordinate within the provided coordinate system within the set limits. In the case of a mechanical stage for a photo-composing apparatus, a photosensitive recording surface, for example, for setting characters or indicia which is arranged on the pan **2** can thus be advanced in both coordinate directions within one line or several lines disposed one below the other on a page and thus can be displaced relative to the stationary optical axis of a projection apparatus associated with the photo-composing apparatus. If the characters or indicia are not supposed to be set on a photosensitive surface line for line, it is also possible to move the two shafts **13** and **14** in a coordinated and arbitrary manner at the same time and in accordance with the size thereby causing a sequence of characters or indicia to be arbitrarily distributed over the photosensitive surface.

We claim:

1. An article supporting structure comprising a base, a platform carrier and a platform operatively interrelated so as to provide for horizontal shifting of said platform selectively in the direction of one or the other of two horizontal axes at right angles to each other, a feed screw mechanism mounted on said base in cooperative relation to said platform carrier for shifting the latter along one of said axes, and a friction wheel drive mounted on said carrier frame in underlying cooperative relation to said platform for shifting the latter along the other of said axes; said friction wheel drive comprising a pair of friction wheels, a first shaft mounting said friction wheels coaxially at a fixed spacing from each other and means mounting said first shaft rotatably on said carrier frame, and said feed screw mechanism comprising an externally threaded hollow second shaft surrounding said first shaft, an internally threaded member in cooperative engagement with said externally threaded second shaft; means mounting said externally threaded member on said base; and axial thrust transmitting means rotatably connecting said second shaft with said carrier frame.

2. An article supporting structure comprising a base, a platform carrier and a platform operatively interrelated so as to provide for horizontal shifting of said platform selectively in the direction of one or the other of two horizontal axes at right angles to each other, a feed screw mechanism mounted on said base in cooperative relation to said platform carrier for shifting the latter along one of said axes, a friction wheel drive mounted on said carrier frame in underlying cooperative relation to said platform for shifting the latter along the other of said axes, a stationary guide beam for said carrier frame extending in the direction of said one axis, and pressure means operatively interposed between said guide beam and said carrier frame for releasably retaining the latter in its shifted positions along said one axis, said pressure means comprising slide blocks of low friction material at opposite sides, respectively, of said guide beam; fastening means connecting said slide blocks to said carrier frame for movement therewith relative to said guide beam; and load transmitting means urging said slide blocks against opposite sides, respectively, of said guide beam.

3. An article supporting structure as set forth in claim **2** wherein said slide blocks are connected by fastening screws to mounting clips at the under side of a horizontal plate member of said carrier frame.

4. An article supporting structure as set forth in claim **2** wherein a mounting bolt for said slide blocks extends through an elongated aperture of said guide beam accommodating back and forth transverse movement of said mounting bolt in the direction of said other axis.

5. An article supporting structure as set forth in claim **2** wherein spring washers are operatively associated with said fastening means connecting said slide blocks with said carrier frame, and with said load transmitting means urging said slide blocks against said guide beam.

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