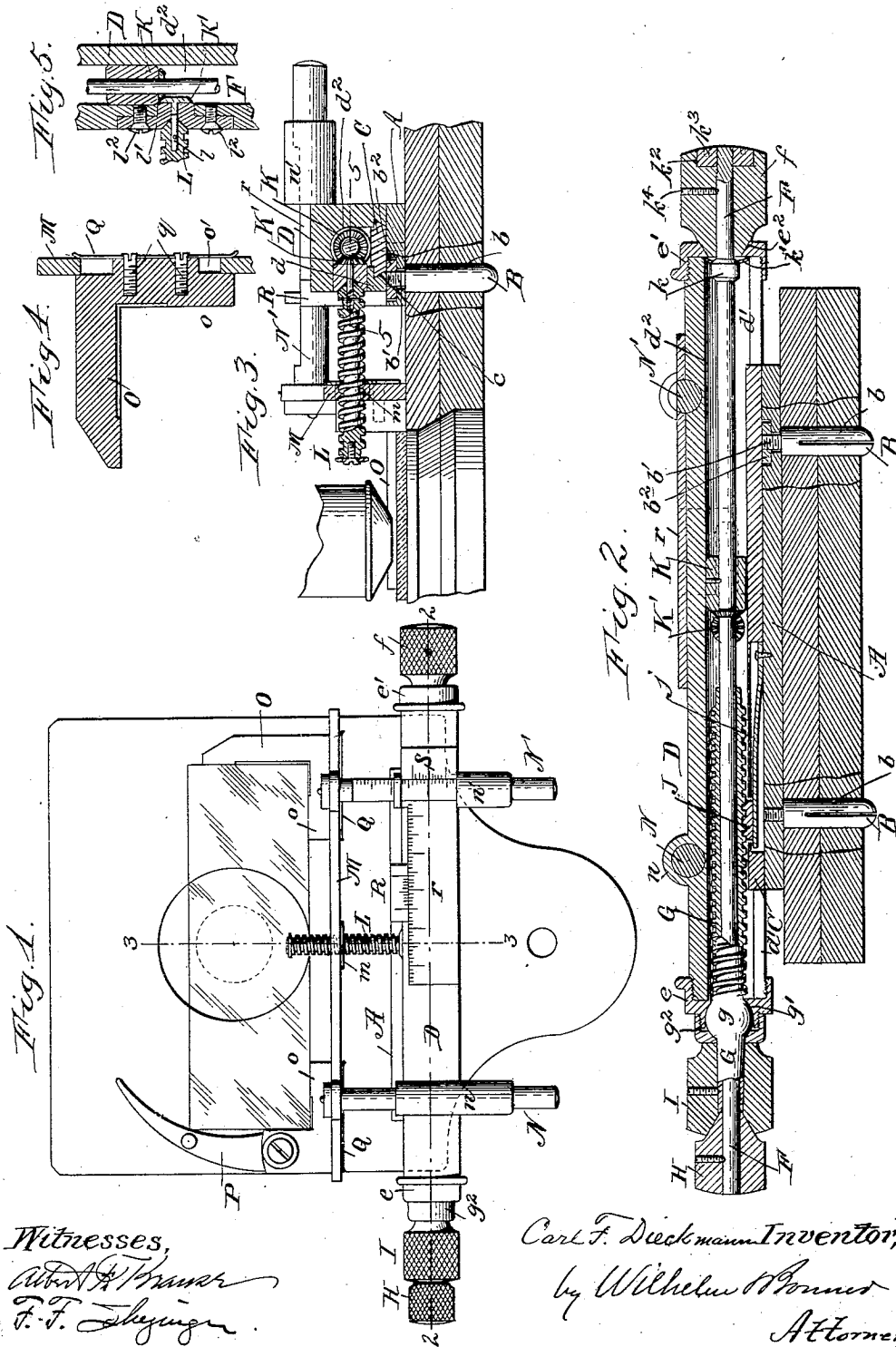


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MECHANICAL STAGE FOR MICROSCOPES.

(Application filed Nov. 7, 1901.)

(No Model.)



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MECHANICAL STAGE FOR MICROSCOPES.

SPECIFICATION forming part of Letters Patent No. 703,047, dated June 24, 1902.

Application filed November 7, 1901. Serial No. 81,444. (No model.)

To all whom it may concern:

Be it known that I, CARL FREDERICK DIECKMANN, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Mechanical Stages for Microscopes, of which the following is a specification.

This invention relates to a mechanical stage for microscopes of that character provided with holding fingers or devices for the specimen-slide and means for moving said holding-fingers in any desired direction on the microscope-stage to bring the desired portion of the specimen-slide into correct position beneath the objective.

One object of the invention is to provide a simple and desirable mechanical stage by which the specimen-slide can be quickly moved in any direction to the desired position on the stage, the construction being such that there is no play or lost motion in the operating parts and a very fine adjustment can be had.

Another object of the invention is to provide a mechanical stage with an exceedingly simple means for detachably securing the same to the ordinary microscope-stage without in any wise altering the same.

In the accompanying drawings, Figure 1 is a plan view of a microscope-stage, showing a mechanical stage embodying my invention applied thereto. Fig. 2 is an enlarged vertical longitudinal section through the main slide on the line 2 2, Fig. 1. Fig. 3 is an enlarged transverse vertical section on the line 3 3, Fig. 1. Fig. 4 is an enlarged horizontal section through the rigid slide-holding finger and associated parts. Fig. 5 is a section through the bevel-pinion bearing on the line 5 5, Fig. 3.

Like letters of reference refer to like parts in the several figures.

A represents the base of the mechanical stage. This base is in the form of an elongated flat plate or bar and is provided adjacent to its ends with depending split posts or pins B. These posts or pins are adapted to enter the holes *b*, provided in the ordinary microscope-stage for the posts carrying the

usual spring holding-fingers for the glass specimen-slide. One of the posts is preferably adjustably secured to the base-plate, as by a screw-threaded shank *b'*, passing through a hole of larger diameter than the screw, and a clamping-nut *b²* on the shank. By this means the relative position of the posts can be nicely adjusted to the holes in the microscope-stage.

The base-plate A has secured to its upper face a longitudinal strip C, which is provided with opposite undercut or beveled longitudinal edges *c*.

D represents a main slide, the bottom of which is slotted longitudinally to provide separated longitudinal sides *d*, which slide on the base-plate A at each side of the strip C. The undercut side edges of the strip engage in corresponding grooves *d'* in the inner faces of the sides *d*, the strip thus constituting a dovetailed guide for the main slide. The slide is provided with a longitudinal bore *d²* and at opposite ends with bearing-caps *e e'*, which are preferably screwed on the screw-threaded ends of the slide, and each of which is provided with a central bearing-opening.

F represents a longitudinal shaft arranged in the bore *d²* of the slide and having one end thereof projecting through an opening in the bearing-cap *e'*, to which projecting end is secured a milled head *f*, the inner end of which is reduced and bears in the central bearing-opening *e²* of the bearing-cap *e'*, thus constituting the bearing for one end of the shaft F. The opposite end of the shaft F projects longitudinally through a hollow shaft G, which is provided with an enlarged spherical bearing portion *g*, working in a corresponding bearing-opening *g'* in the other bearing-cap *e* and held therein by means of a screw-collar *g²*, screwed onto the outer screw-threaded end of the cap *e*. The shaft F extends through the hollow shaft G and has secured to the projecting end portion a milled head H. The hollow shaft G has secured thereto between the head H and the screw-collar *g²* a milled head I. The inner portion of the hollow shaft G, which extends into the bore of the slide, is provided with an external screw-thread, which engages

with a segmental nut J, which is carried by one end of a flat spring *j*, located in a recess in the strip C, and the opposite end of which is secured to the base-plate of the mechanical stage. The nut projects up into the bore d^2 through an opening in the strip C. By turning the hollow shaft G by means of its head I the main slide D is caused to move longitudinally back and forth on the base-plate, according to the direction of rotation of the hollow screw-shaft G.

K indicates a bevel-pinion secured to the longitudinal shaft F, substantially midway between its ends. This bevel-pinion is provided with a long cylindrical shank, which bears in the cylindrical bore of the slide, thus obtaining an extended bearing in the slide. The pinion K meshes with and drives a bevel-pinion K', which is secured to the inner end of a screw-shaft L, the inner end of which is journaled in the front side of the slide D. The bearing for the screw-shaft L is preferably as shown in Fig. 5 of the drawings, from which it will be seen that the pinion K' is provided with a shank *l*, which projects into an axial hole in the inner end of the screw-shaft L, the shank being pinned or keyed in said hole. The shank *l* of the pinion passes through a bearing-opening in a bearing-block *l'*, which is detachable from the slide D and is secured thereto, as by means of screws *l''*. By thus constructing the bearing the pinion-shank can be passed through the bearing-opening in the bearing-block into the screw-shaft and keyed therein, so as not to have any end play in the bearing-block. The bearing-block can then be adjusted in the opening provided therefor in the slide, so as to secure the correct meshing of the bevel-pinions K and K'. In order to maintain a nice contact between the bevel-pinions and prevent lost motion, the shaft F is provided with a collar *k* near the bearing-cap *e'*, between which and the collar is a spring-washer *k'*, which tends to force the pinion K toward the pinion K'. To limit this end movement of the shaft and prevent end play, the outer end of the milled head *f* is provided with a circular depression *k²*, in which is seated a nut *k³*, screwed on the screw-threaded end of the shaft. By turning the nut the milled head can be adjusted as desired on the shaft. It is then fixed, as by a set-screw *k⁴*.

The outer screw-threaded portion of the screw-shaft L projects through a screw-threaded nut or bearing *m*, secured to a secondary slide M, which is preferably in the form of a bar, arranged in front of the main slide D, parallel therewith. This secondary slide is provided, preferably near its ends, with rearwardly-projecting horizontal slide arms or stems N N', which slide in horizontal bearings *n n'* on the main slide D.

O represents a rigid holding-finger for the specimen-slide, secured at or near one end of the slide-bar M, and P represents a spring holding-finger secured at or near the oppo-

site end of the slide-bar. The specimen-slide is held between the rigid and spring holding fingers O and P, as usual, and rests directly upon the microscope-stage. Each of the holding-fingers for the specimen-slide is preferably provided with a bearing-block *o*, which bears against the front face of the secondary slide M in front of an elongated slot or opening *o'* therein.

Q represents a flat spring-plate arranged on the rear side of the secondary slide-bar M, the spring-bar being secured to the bearing-block *o* by means of screws or the like *q*, passing through the slot into the bearing-block. This slide construction permits the holding-fingers to be roughly adjusted on the secondary slide-bar so as to grasp the specimen-slide and avoids the use of set-screws or the like for holding the fingers.

The main slide and the secondary slide are each preferably provided with a graduated scale and vernier. The vernier for the main slide is indicated at R, the graduations being made on a block secured to the front edge of the base-plate A and which extends up in front of the main slide D and has a horizontal upper portion sliding on the top of the main slide in front of a graduated scale-plate *r*, secured thereon. The vernier graduations for the secondary slide are shown at S, being made on the top of the main slide adjacent to the slide-arm N' of the secondary slide. The slide-arm N' is preferably provided with an upper flat face for the scale indications.

By having the milled heads H and I for the operating-shafts F and G adjacent to each other and on the same axis the operator can readily grasp and manipulate either head and shaft, and consequently move the object-slide in the desired direction without diverting his attention or gaze from the specimen under examination. Both the main and secondary slides being operated by screws there is practically no play or lost motion between the parts, and a very fine and accurate adjustment can be had, much finer and more accurate than can be secured by means of a rack-and-pinion connection. The described manner of journaling the operating-shafts F and G permits the same to aline themselves relative to each other and prevents any binding of the shafts upon each other. The operator can, if both hands are free, by grasping the milled head I for the hollow shaft and the milled head *f* at the opposite end of the operating-shaft F simultaneously move both the main and secondary slides, thus obtaining an oblique or compound movement of the object-slide in any direction, which permits the desired adjustment to be had very quickly.

I claim as my invention—

1. The combination of a base, a slide movable thereon, a second slide movable in a direction at an angle to the line of movement of the first slide, concentric rotatable shafts, a screw connection between one of said shafts

and one slide, and a screw connection between the other shaft and the other slide, substantially as set forth.

2. The combination of a base, a slide movable thereon, a second slide movable in a direction at an angle to the line of movement of the first slide, a rotatable shaft journaled in said first slide and having operating parts at opposite ends thereof, a hollow shaft concentric with said first shaft and having an operating part adjacent to one of the operating parts of the first shaft, and operative connections between each of said shafts and one of said slides, substantially as set forth.

3. The combination of a base, a slide movable thereon, a second slide carried by the first slide and movable toward and from the same, a shaft journaled on said first slide, a hollow shaft concentric with said first shaft and having a screw-threaded engagement with said first slide, a screw-shaft journaled in said first slide and having a screw-threaded engagement with said second slide, and gearing connecting said first shaft and said screw-shaft, substantially as set forth.

4. The combination of a base, a slide movable thereon, a hollow shaft journaled in one end of said slide, a shaft extending through said hollow shaft and journaled in the opposite end of said slide, adjacent operating-heads each secured to one of said shafts for

operating the same, a screw-threaded connection between said hollow shaft and said slide, a second slide carried by the first slide and movable toward and from the same, a screw-shaft journaled on said first slide and having a screw-threaded engagement with said second slide, and bevel-gears connecting said second-mentioned shaft and said screw-shaft, substantially as set forth.

5. The combination with a microscope-stage provided with separated holes, of a mechanical stage provided with a base having separated posts depending therefrom and detachably engaging in said holes in the microscope-stage, one of said posts being adjustable relative to the other, substantially as set forth.

6. The combination with a mechanical stage slide-bar provided with an elongated slot, of a holding-finger for a specimen-slide bearing against one side of said slide-bar, and a spring bearing against the opposite side of said slide-bar and secured to said finger by means passing through said slot, substantially as set forth.

Witness my hand this 1st day of November, 1901.

CARL F. DIECKMANN.

Witnesses:

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