F. MEYER.

DEVICE FOR THE FINE ADJUSTMENT OF MICROSCOPES.

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1,106,956. Patented Aug. 11, 1914.

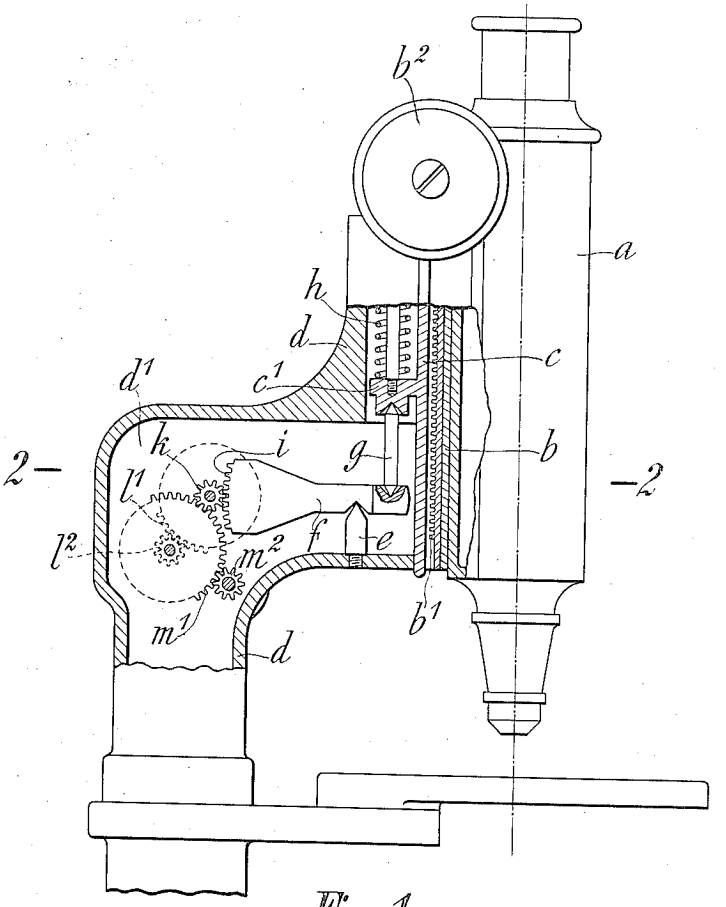

Fig. 1

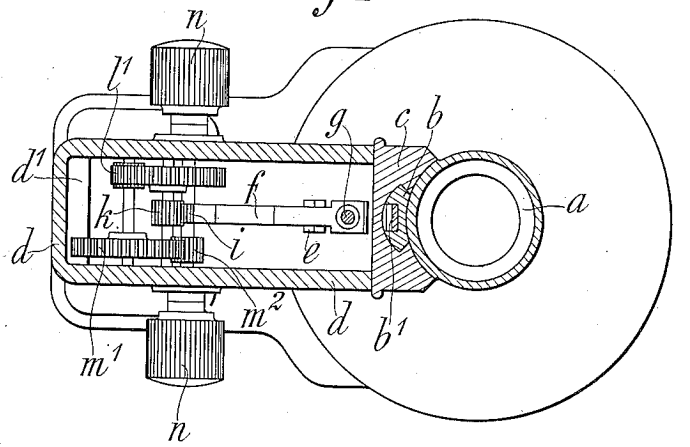

Fig. 2

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DEVICE FOR THE FINE ADJUSTMENT OF MICROSCOPES.

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To all whom it may concern:

Be it known that I, FRANZ MEYER, a citizen of the German Empire, residing at Jena, Germany, have invented a new and useful Device for the Fine Adjustment of Microscopes, of which the following is a specification.

The invention relates to a device for the fine adjustment of the tube, necessary with microscopes. In practice a number of constructions are used for this adjustment, all of which agree in principle in this respect, that the motion of the tube is effected with the aid of a carefully cut micrometer-screw. For microscopes of small and medium power it suffices with such constructions, for the drive of the screw or of its nut to be effected by a milled disk; for those of greater power the necessary more accurate adjustment is obtained by connecting the screw or the nut with a worm wheel and actuating the latter by means of a worm. All these constructions have the drawback, that the manufacture of the micrometer-screw is comparatively costly on account of the careful work that must be put into it. The constructions with direct drive of the micrometer-screw have the further disadvantage, that the actuating disks for the coarse and fine adjustment lie in two planes, which are perpendicular to one another, which results in the instrument being awkward to work with. While in the constructions with worm and wormwheel this may be easily avoided, the total elimination of back-lash presents considerable difficulties. Various attempts have been made with these latter constructions to render any play, which may appear, harmless by means of springs; through the constantly acting spring-pressure, however, the lubricating material is gradually pressed away from the faces of the teeth, whereby in time a hard, uneven travel is caused. If, however, by as accurate work as possible, the worm gearing is to be made entirely without play, it will prove very costly. These difficulties and drawbacks are avoided in the new adjusting device, by effecting the motion of the tube not by means of a screw or worm, but with the aid of toothed gearing. For this purpose the tube, which is guided in a straight line in the well-known manner, is connected with a lever disposed within the fixed support, which lever carries a toothed segment, which is concentric with the fixed center of rotation of the lever, and engages by means of the said segment with a multiple toothed wheel gearing; the device is actuated by the last shaft of the gearing, which is carried through to the outside, by means of one or of two milled edged disks. In order to avoid all back-lash, the tube will be pressed in the usual way by a spring bearing against the fixed support onto the lever, by which means all the gear wheels will contact with one another permanently with the same tooth faces. Experiments have shown, that the friction in the guiding bearings of the driving shaft entirely suffices to render the device self stopping. In order to make accuracy in the manufacture of the toothing possible, spur-wheel gearings will be employed in most cases.

In the annexed drawing a constructional form of the invention is shown as applied to a normal microscope, Figure 1 being an elevation of the upper part of the microscope, the new device being shown partly in section, and Fig. 2 being a cross-section on line 2—2 of Fig. 1.

A microscope tube a is in the first place provided with a well-known, frequently constructed device for its coarse adjustment. A guide bar b, which is screwed to the tube a, carries a rack b^1, which engages with toothed gearing not visible in the drawing, on the shaft of which are fixed two milled edged disks b^2, one of which just covers the other in Fig. 1. The bar b slides in a slot in a guiding piece c, which carries the bearing of the toothed gearing of the coarse adjustment and at the same time forms the movable part of the fine adjustment device. For this purpose the part c is formed as a slide and is guided on a fixed support part d in a straight line parallel to the axis of the tube. The motion-giving device for the fine adjustment is mounted in a hollow space d^1 of the support d. On a knife-edge e fixed to the support d there rests a lever f, which is in the plane of symmetry of the microscope and one end of which supports the slide c by its projection c^1 by means of a connecting bar g, which is journaled at both ends in centers. By means of a spring h the slide c is pressed permanently onto the lever f. The other end of the lever f carries a toothed segment i and engages by means of the latter with toothed gearing k, the motion of which is strongly magnified by a double spur-wheel

gearing consisting of the pairs of wheels l^1, l^2 and m^1, m^2. The gearing shafts are journaled in the casing d; the shaft of the small driving wheel m^2 is produced at both ends to the outside and carries two milled heads n.

I claim:

In a microscope a tube, a tube-carrier and a stand, means for a coarse adjustment and means for a fine adjustment between the said tube and the said stand, the latter means comprising a lever fulcrumed within the said stand, a toothed segment on the said lever, having its center in the fulcrum of the said lever, multiple toothed wheel gearing journaled in the said stand and meshing with the said segment, means for actuating the said gearing and spring-controlled connecting means between the lever and the tube-carrier, adapted to transmit the movements of the lever to the tube-carrier.

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