(No Model.)

H. G. SEDGWICK.

SLOW MOTION ATTACHMENT FOR MICROSCOPES.

No. 528,211. Patented Oct. 30, 1894.

Fig. 1.

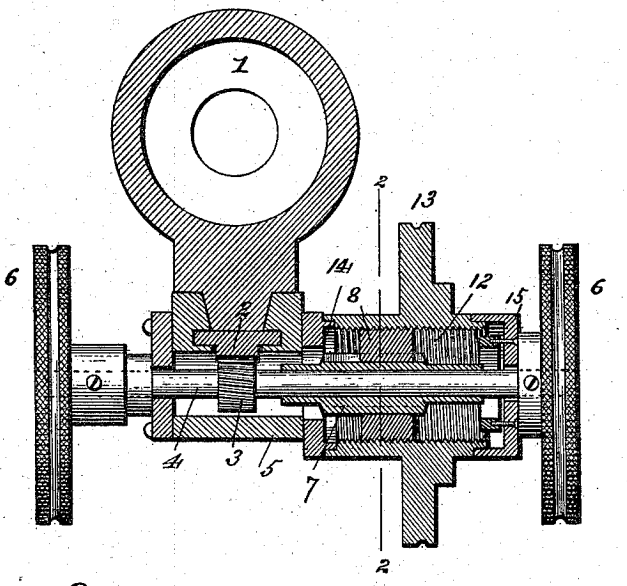


Fig. 2.

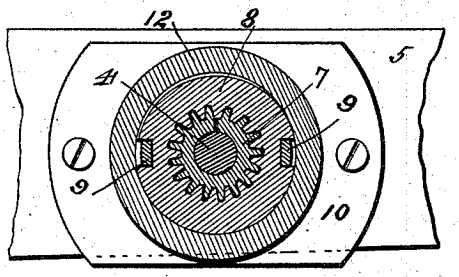


Fig. 3.

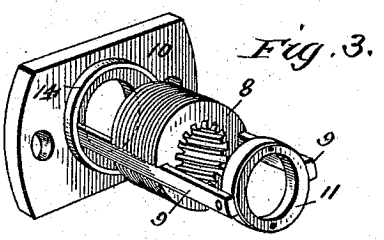


Fig. 4.

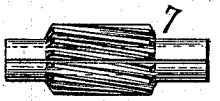


Fig. 5.

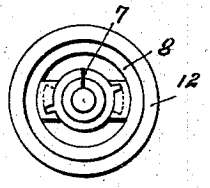
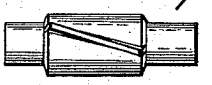


Fig. 6.



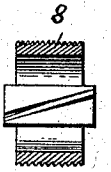


Fig. 7.

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UNITED STATES PATENT OFFICE.

HIRAM G. SEDGWICK, OF NASHVILLE, TENNESSEE.

SLOW-MOTION ATTACHMENT FOR MICROSCOPES.

SPECIFICATION forming part of Letters Patent No. 528,211, dated October 30, 1894.

Application filed February 10, 1894. Serial No. 499,783. (No model.)

To all whom it may concern:

Be it known that I, HIRAM G. SEDGWICK, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Slow-Motion Attachments for Microscopes and other Instruments, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a slow-motion attachment for use on microscopes and other instruments using or requiring rack-and-pinion adjusting devices, the essential object of the invention being to provide a simple and inexpensive attachment that may be readily attached to and detached from the pinion-shaft without in the least mutilating any of the parts or changing their construction.

The device is adapted for attachment to the pinion-shaft that is used for effecting the coarse motion. It is attached on one of the projecting ends of the shaft, outside of the instrument, whereby it may be readily attached to all the compound microscopes now in use without mutilating them or changing their construction or taking them apart, and this whether they be provided with other fine adjustments or not.

The attachment will be best understood by describing the preferred construction; but I wish it distinctly understood that I do not confine myself to the construction and arrangement herein shown and described as the same may be varied greatly without departing from the scope of the invention in the least.

In the drawings, Figure 1 is a transverse sectional view showing my attachment applied to a microscope; Fig. 2, a transverse section on line 2—2 of Fig. 1, this view being slightly enlarged; Figs. 3 and 4, detail views; and Figs. 5, 6 and 7 detail sections showing a slightly modified form of spiral pinion.

Referring to the drawings by numerals, 1 is the microscope tube; 2, the usual rack carried thereby; 3, the usual pinion carried by the shaft 4 and meshing in said rack, said shaft being journaled in the arm 5 of the usual frame and carrying at its ends the usual milled operating heads 6.

On the shaft 4, between one of the milled-heads and the adjacent face of arm 5, is mounted the attachment, which consists essentially of a pinion 7 provided with external spiral ribs or threads and mounted on the shaft in such a manner as to have only a frictional engagement therewith, whereby the shaft and pinion may revolve independently or in unison. To obtain this frictional engagement in the simplest manner the pinion is split lengthwise on one side to allow it to be expanded slightly and slipped over the end of the shaft, the width of the slit being just sufficient to cause it to hug the shaft with the desired friction and at the same time without materially mutilating the spiral ribs. Working on this spiral-pinion is an endwise-movable sleeve or tube 8, which is internally ribbed to correspond to the spiral ribs on the pinion and is externally screw-threaded at a suitable pitch. To prevent this tube 8 from rotating and at the same time permit it to freely slide endwise, it has one or more longitudinal grooves or ways cut in its exterior in which work stationary keys 9, which project out horizontally from a plate 10 secured by screws, rigidly but removably, to the side of the microscope or other instrument, the ends of said keys being preferably connected by a ring 11.

To slide the tube 8 back and forth on the keys, a tube 12 is fitted over it, this tube being internally threaded to correspond with the threads on said tube 8 and being also provided with a milled operating-head 13, which latter is preferably a trifle larger than the adjacent operating-head on the main shaft. The inner end of the tube 12 fits over an annular flange 14 on plate 10 and its outer end fits snugly within a stationary cap 15, whereby the tube is not only kept true but is also prevented from being thrown by the screw against the adjacent milled head 6. The cap 15 is slipped over the shaft and is secured rigidly to the ends of the keys, or ring as shown.

To rapidly and coarsely adjust the tube of the microscope or other instrument, the heads 6 are revolved in the usual manner. During the operation of coarsely adjusting the tube by said heads the fine adjustment parts all remain inert, the pinion-shaft being permitted to rotate independently of the spiral-pinion by reason of the frictional engagement

therewith and the spiral-pinion itself being prevented from rotating by being interlocked with the non-rotatable sleeve; but when the head 13 is rotated to effect the fine adjustment of the microscope tube, the threads on the interior of the outer tube 12, engaging with the threads on tube 8, cause the same to move endwise on the keys, and this endwise movement of the non-rotatable part 8 imparts a slight rotative movement to the pinion shaft through the medium of the spiral-pinion, this pinion gripping the shaft with sufficient tightness to positively rotate it. Thus it will be seen that the slow-motion parts are only operated when the power is applied to the head 13, the fast-motion parts operating precisely in the same way as ususl and wholly independently.

The spiral-pinion or "twisted-gear" 7 may contain any number of teeth from one upward, according to the degree of accuracy desired. As shown in Fig. 5 two teeth or ribs only are employed, two spirally curved grooves being formed in the interior of the endwise movable part to engage said ribs; but where great accuracy is required, the ribs will be disposed entirely around the pinion as in Fig. 2, as in that case the ribs on one side counteract or take up the loose motion on the opposite side, as is apparent.

The advantages of this invention over prior devices of its kind are obvious to any one skilled in the art. Heretofore, slow-motions have not been made in the form of an "attachment," attachable and detachable at will, but have always been made permanent parts of the microscope or other instruments, having been made at the time the instruments were made, and instruments not provided with the slow-motions had to be sent to the shop and dismantled to have them put on. Then again the slow-motions heretofore used have been too expensive to be put on any but the finer machines. These serious drawbacks have been long recognized by instrument makers and many attempts have been made to obviate them without material success; but it is believed the present invention overcomes said objections, since it may be readily attached to any instrument using a rack-bar and pinion without mutilating or dismantling the instrument and by any person of ordinary intelligence. It will be seen that the device is adapted for attachment directly to the coarse-motion shaft in the space that usually exists on all instruments between the side of the instrument and the usual milled-head.

To attach the device it is simply necessary to remove one of the milled-heads and slip the parts of the device on the shaft and then replace the milled-head. Of course, a couple of small screw-holes must be made in the instrument for the reception of the securing-screws. Thus it will be seen that the application of this device to any of the instruments now in use—whether they be provided with other more complicated slow-motions or not—involves but a small expense and but little trouble.

Besides the advantages of simplicity and general applicability, thus obtaining the slow-motion through the medium of the same shaft and pinion that effects the fast-motion it has other advantages perhaps more important. In the most practical devices heretofore in use, the slow-motion has generally been obtained by means of a double-slide arrangement and micrometer screws, as is well known, but this arrangement of two slides is defective for use with high-power objectives for the simple reason that it is a practical impossibility to obtain perfect parallelity of the working-faces of the slides, in consequence of which the object is frequently thrown or shifted about the field when the slow-motion is resorted to. This "side" or "upward-thrust," as it is called, is more nearly obviated by using but one sliding surface and effecting both the course and fine adjustment of the tube through the single pinion, as is evident.

I have found in practice that a higher degree of accuracy can be obtained with my simple device than can be obtained with the expensive compound-slide devices heretofore used. It will be seen that simply by increasing or diminishing the pitch of the threads on the sleeves and the spiral-ribs on the pinion, almost any degree of fineness and precision in slow-motion may be obtained, according to the character of the instrument.

It will be understood that this attachment is applicable to instruments other than microscopes. For instance, it may be used on telescopes, photographic cameras, stereopticons, and other instruments where rack-and-pinion movements are used and a slow-motion is desired. It will therefore be understood that wherever I use the term "instrument" in the claims and in the specification I mean any instrument to which the device is applicable.

Having thus fully described my invention, what I claim is—

1. In a slow-motion attachment for microscopes and other instruments, the combination of the rack-bar and pinion and the shaft carrying the pinion, another pinion mounted on the shaft, a non-rotatable part engaging the latter pinion and adapted to rotate it, and means for imparting an endwise movement to said non-rotatable part, substantially as described.

2. In a slow-motion attachment for instruments, the combination of the rack-bar and pinion and shaft, a spirally-ribbed pinion on said shaft, a part embracing the said pinion and provided with internal teeth engaging said spiral ribs, and means for moving said part, substantially as described.

3. In a slow-motion for instruments, the combination of a rack-bar and pinion, a shaft carrying said pinion and provided with means for imparting the coarse-motion, another

pinion mounted on said shaft and adapted to rotate with or independently of it, and means for rotating said pinion, whereby both the coarse and fine adjustments are effected through the same shaft and pinion, substantially as described.

4. The combination of a rack bar, a pinion engaging the same, a shaft carrying said pinion, means on the shaft for imparting the coarse motion, and slow-motion devices attached directly to said shaft, said devices consisting essentially of a pinion mounted directly on the shaft and means for rotating said pinion, whereby the coarse motion and the slow motion may be imparted to the rack-bar through the same rack and pinion and shaft substantially as described.

5. The combination of a rack-bar and pinion, a shaft, carrying said pinion and also means for imparting the coarse motion, and a slow-motion attachment applied directly on said shaft and adapted to rotate it, said attachment consisting essentially of a pinion having a frictional engagement with the shaft for the purpose described and means for rotating said pinion and locking it against rotation when the coarse motion is used, substantially as described.

6. The combination of a rack-bar and pinion and shaft and a slow-motion attachment consisting essentially of a slitted pinion having a frictional engagement with the shaft, and means for rotating the pinion to obtain a fine adjustment, substantially as described.

7. The combination with a rack-bar and pinion, a shaft carrying the pinion and also means for imparting the coarse motion, and a slow-motion attachment consisting essentially of a spirally ribbed pinion mounted on the shaft, an endwise movable part engaging the pinion and adapted to rotate it, and means for moving said endwise movable part, substantially as described.

8. The combination of a coarse-motion shaft and a slow-motion attachment therefor, consisting essentially of a spirally ribbed pinion mounted on the shaft and adapted to rotate with or independently of it, a non-rotatable part provided with corresponding internal ribs or grooves, and means for moving the latter part, substantially as described.

9. The combination of a coarse-motion shaft, a slow-motion attachment consisting essentially of a pinion mounted directly on the shaft and adapted to rotate with or independently of it, an endwise movable part engaging said pinion and adapted to rotate it, said part being screw-threaded externally, and an external sleeve internally threaded to engage said endwise movable part, substantially as described.

10. The combination of the coarse-motion shaft and means for rotating it, a slow-motion attachment consisting of a pinion or sleeve mounted directly on said shaft, an endwise movable part engaging said pinion and threaded externally, key-ways engaging said non-rotatable part, a sleeve embracing said non-rotatable part and carrying an operating head, substantially as described.

11. The combination with the coarse-motion shaft and means for rotating it, a slow motion attachment consisting of a pinion applied directly to the shaft and provided with one or more spiral grooves, a tube or sleeve embracing said pinion and engaging its spiral ribs and being externally threaded, key-ways engaging said tube and preventing it rotating, an external sleeve threaded internally and engaging said tube, and a stop cap supported by said key-ways, substantially as described.

12. The combination with a microscope or other instrument carrying a slidable bar, a shaft journaled in the instrument and carrying a pinion engaging said bar, and means carried by the shaft for imparting coarse motion thereto, of a slow-motion attachment mounted directly on said shaft, whereby the coarse motion and the slow-motion may be imparted to the slide through the same rack and pinion and shaft, substantially as described.

13. The combination of an instrument, a rack bar, a pinion engaging said rack bar, a shaft carrying said pinion and provided with coarse motion operating devices, of a slow-motion device consisting essentially of a rotatable part carried by said shaft and adapted to rotate with it, said part being provided with one or more spiral ribs or grooves, and an endwise movable part engaging said spiral ribs or grooves and adapted to rotate said rotatable part and its shaft, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HIRAM G. SEDGWICK.

Witnesses:

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WM. R. DAVIS.