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MAGNETIC MOUNTING DEVICE FOR A MICROTOME

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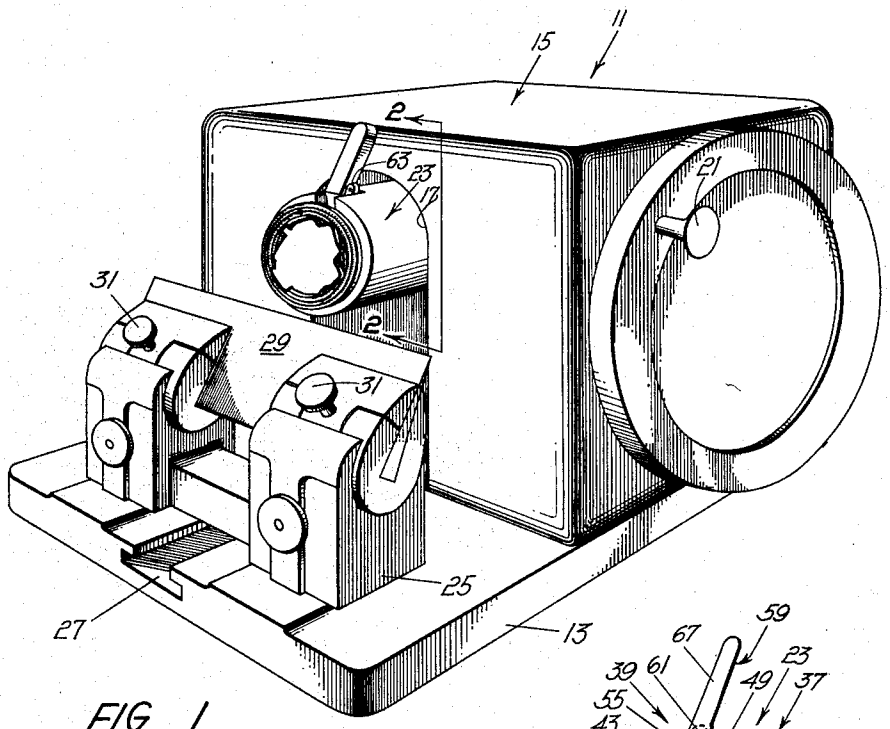


FIG. 1

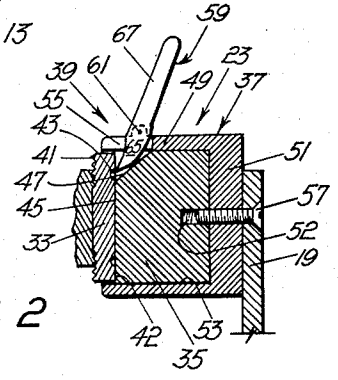


FIG. 2

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MAGNETIC MOUNTING DEVICE FOR A MICROTOME

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This invention relates to a magnetic chuck device for mounting non-ferrous workpieces and, more particularly, to such a device which is particularly adapted to mount an organic specimen so that sections may be sliced therefrom.

Instruments which are adapted to slice a thin section from a specimen to facilitate microscopic examination thereof conventionally include a mounting head on which the specimen is carried, a cutting instrument such as a knife blade, and an operating mechanism for effecting relative movement between the mounting head and the cutting instrument so as to cause sections to be sliced from the specimen. Since it is essential for effective microscopic examination that the section be of uniform thickness, the surface of the specimen from which the section is to be sliced is desirably positioned as nearly parallel as possible to the path of relative movement between the specimen and cutting instrument during the cutting operation.

Occasionally, after a number of sections have been sliced and the specimen has been removed from the mounting head, it is necessary to remount the specimen to obtain additional sections sliced along a plane exactly parallel to the plane along which the previous slices were taken. In such a case, the specimen must be remounted in exactly the same position as it was mounted originally.

Under the present practice, it is relatively difficult to position a specimen on the mounting head exactly as desired, especially when the specimen is embedded in a paraffin block of non-uniform dimensions. Also, even if the specimen has been positioned accurately for one sectioning operation, there is generally no way of assuring that it can be remounted in an identical position at a later date should further sections be needed. Finally, present practices for assuring an accurate positioning or repositioning of the specimen are generally quite time-consuming as well as unreliable.

Accordingly, the principal object of the present invention is to provide a device for mounting a specimen for sectioning, which device insures proper orientation of the specimen.

An additional object of the invention is to provide a device by means of which a specimen can be easily and quickly mounted for sectioning.

A further object of the invention is to provide a device by means of which a specimen can be easily and quickly mounted for sectioning in a precise position, removed from its mounted position, and remounted in an identical position for further sectioning.

Other objects and advantages of the invention will become apparent with reference to the following description and accompanying drawing.

In the drawing:

FIGURE 1 is an isometric view of a microtome provided with a mounting device embodying various features of the present invention; and

FIGURE 2 is an enlarged elevational view of the device shown in FIG. 1, as viewed in the direction of the arrows 2—2 of FIG. 1.

Referring now to FIG. 1, there is illustrated a microtome 11 including a rectangular base 13, on the rearward portion of which is carried a box-like enclosure 15 having an elongated vertically disposed opening 17 in its forward wall. An operating mechanism (not shown) is disposed within the enclosure 15 and is adapted to cause an

element 19 thereof (FIG. 2) to reciprocate vertically when a handle 21 is rotated. The mounting device 23 hereinafter described, is secured to the element 19 and projects outwardly of the enclosure through the elongated vertically disposed opening 17 and reciprocates with the element 19 when the instrument is operated.

A knife support 25 is carried in a guideway 27 on the forward portion of the base 19 and has mounted at its upper end a knife blade 29. The blade 29 is secured to the support 25 by set screws 31 which permit adjustment of the blade to various angles relative to the vertical as occasion may demand.

The device 23 by which the specimen is mounted on the microtome or similar sectioning instrument comprises in the illustrated embodiment a soft iron disk or plate 33 to which the specimen is secured and which is in turn attached to the element 19 of the microtome by a magnet 35 carried within a housing 37 attached to the element. Means 39 are provided for separating the disk and magnet when it is desired to remove the specimen from the instrument.

More specifically, the disk 33, as illustrated, is of a circular configuration and is preferably formed of a soft iron, steel, or other magnetic material which will be effectively held in place by the magnet 35. The specimen is preferably frozen to a face of the disk 33. After the sections have been sliced from the specimen, the specimen and disk are refrigerated until it has been determined if further sections are needed.

The face of the disk to which the specimen is frozen is preferably roughened, as by a series of concentric grooves 41, to insure that the specimen will properly adhere thereto. The other face 42 of the disk, which is shown as flat but which may be curved if desired, is machined to a smooth finish so that it will be capable of an intimate engagement with the face of the magnet, and is provided with a single circular groove 43 which cooperates with the means 39 to facilitate separation of the disk and magnet.

The magnet 35, which is preferably a permanent magnet but which may be an electromagnet if desired, is of a generally cylindrical shape and includes a forward end face 45 which is preferably machined to provide a smooth seating surface for the disk 33. A notch 47 is provided in the edge of the end face 45 to permit access by the means 39 to the rear face 42 and groove 43 of the disk, thereby permitting the disk and magnet to be easily separated in the manner hereinafter described.

The housing 37, within which the magnet 35 is carried is open at its forward end to permit the disk 33 to be seated against the end face 45 of the magnet. The housing 37 is preferably formed of a non-magnetic material such as brass, and includes a cylindrical side wall 49 and a generally circular rear end wall 51 which define a chamber 53 to receive the magnet. A portion of the cylindrical side wall 49 is removed adjacent the forward edge thereof to provide a slot 55 which extends through the side wall and, when the magnet is properly positioned within the chamber, registers with the notch 47 of the magnet.

It is to be noted that the depth of the chamber 53 is greater than the axial length of the magnet 35 so that when the magnet is disposed within the chamber, its end face 45 on which the disk 33 is seated is located inwardly of the outer edge of the housing side wall, with the side wall 49 extending past the end face 45 to provide a backstop which prevents the disk from sliding laterally across the magnet face 45. Accordingly, the disk will not fall from the magnet face by gravity or be dislodged from the magnet by forces imparted to the disk during the slicing operation.

The magnet 35 is secured within the housing 37, and both the magnet and housing are secured to the element

19 of the microtome, by a fastener such as a machine screw 57 which extends forwardly through each of the elements 19 and the end wall 51 of the housing and into a tapped hole 52 provided in the rearward end of the magnet 35. The screw 57 thus secures the magnet in a fixed position relative to the element 19.

The disk 33 is disengaged from the face 45 of the magnet by the means 39 which, in the illustrated embodiment, includes a lever 59 pivotally mounted intermediate its ends on a pin 61 carried by a pair of spaced ears 63 projecting upwardly from the side wall 49 of the housing on opposite sides of the slot 55. The lever 59 includes a depending tapered and slightly curved finger 65 which extends through the slot 55 and notch 47 to a position immediately behind the disk 33 when the disk is in place, with the tip of the finger occupying the single groove 43 of the disk. The opposite end of the lever 59 forms an upstanding arm 67 by means of which the lever is pivoted. When the arm 67 is swung rearwardly, the finger is moved forwardly, thus urging the disk away from the face 45 of the magnet to a position wherein it may be grasped by an operator.

It is to be noted that in the assembled device, the end face 45 of the magnet is in a fixed position relative to the element 19 of the mircotome and hence will travel in a fixed path as the element moves. Also, when the disk is seated on the face 45, it will also occupy a predetermined fixed position and no further adjustment is necessary.

In addition, the position of the disk on the face 45 of the magnet will be exactly the same each time it is seated thereon. Hence, if the disk is removed from the magnet and later replaced to obtain additional sections, its subsequent position will be exactly the same as its initial position.

It should be apparent that by using the above-described apparatus, a specimen can be easily and quickly mounted on the slicing instrument and removed therefrom with equal facility when desired. Accordingly, what was once a time-consuming operation can be accomplished in a relatively short period of time.

While various features of the invention have been shown and described, it should be apparent that various structural modifications might be made therein without departing from the scope of the invention, as set forth in the following claims.

I claim:

1. In combination, a microtome including an element reciprocally movable when said microtome is operated, an open-ended housing connected to said reciprocally movable element, a magnet secured within said housing and including a face accessible through the open end of said housing, a disk formed at least partially of a magnetic material positionable on said face of said magnet, one face of said disk being provided with a roughened surface to which a specimen will readily adhere, the other face of said disk being provided with a groove, means effective to limit sliding movement of said disk transversely of the said face of said magnet, and means for disengaging said disk from said magnet face, said lattermentioned means comprising a lever pivotally mounted on said housing and including a finger extending intermediate said disk and magnet and engageable with said groove, whereby pivotal movement of said lever in a given direction will move said disk away from said magnet.

2. A microtome for sectioning frozen specimen comprising, a cutting instrument, a specimen support, means for effecting relative reciprocal movement between the specimen support and the cutting instrument, an open-ended housing having side walls connected to said specimen support, a permanent magnet disposed within said housing inwardly of the terminal portion of said side walls, said magnet having an outwardly presented face, and a plate formed of a ferro-magnetic material adapted to be received within said housing and retained adjacent to the outwardly presented face of the magnet in flux-conducting engagement therewith, said plate being provided with a roughened surface to which a specimen will readily adhere when frozen, the terminal portion of said side walls limiting sliding movement of said plate relative to said outwardly presented face of said magnet.

3. A microtome for sectioning frozen specimen comprising, a cutting instrument, a specimen support, means for effecting relative reciprocal movement between the specimen support and the cutting instrument, a permanent magnet affixed to said specimen support, said magnet having an outwardly presented face, a plate formed of a ferro-magnetic material adapted to be retained adjacent to the outwardly presented face of the magnet in flux-conducting engagement therewith, said plate being provided with a roughened surface to which a specimen will readily adhere when frozen, means for limiting sliding movement of said plate relative to said outwardly presented face of said magnet, and means for engaging said plate to facilitate disengagement of said plate from said magnet.

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