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MICROTOME KNIFE

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Fig. 1

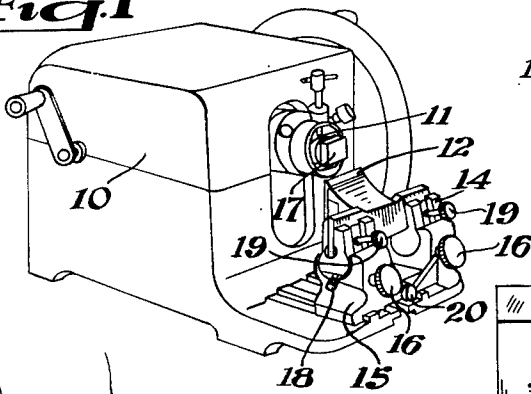


Fig. 3

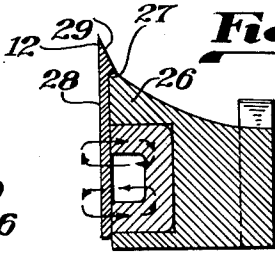


Fig. 6

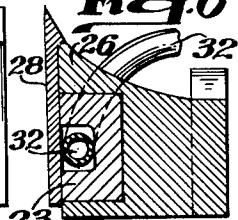


Fig. 7

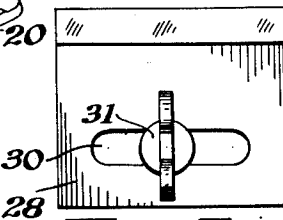


Fig. 5

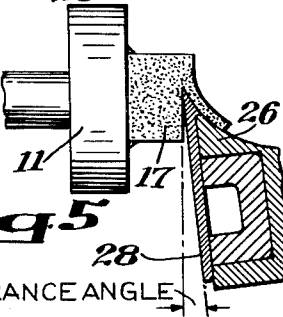


Fig. 2

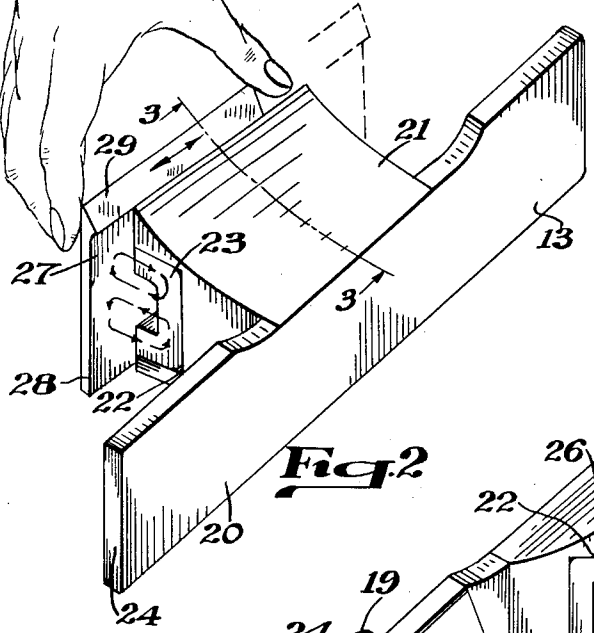
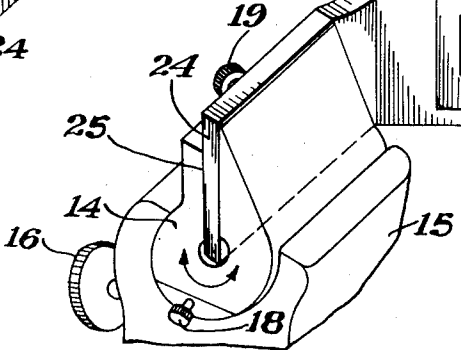


Fig. 4



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MICROTOME KNIFE

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6 Claims. (Cl. 88—40)

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This invention relates broadly to microtomes and more specifically to improvements in knives and knife holders therefor.

One of the objects of the invention is to provide a knife which may be adjusted laterally relative to a mounted specimen in the machine without disturbing the pre-adjusted position of the knife holder.

Another object of the invention is to provide a ledge in a side wall of the knife which is adapted for engagement with a web in the holder for the support thereof and secondary clamping instrumentalities to retain the blade in its adjusted position upon the web.

Another object of the invention is to provide a blade which may be discarded after the cutting edge becomes dull.

Another object of the invention is to provide a blade which is formed with a relatively thick body at the base of the facet in order to resist flexure and the vibrational strains imposed upon the cutting edge and a thin section in the portion of the body which is supported by the holder.

A further object of the invention is to provide a microtome blade and support which is stable and lightweight in operation.

A still further object of the invention resides in the provision of a microtome blade and support which may be readily positioned for trimming and finishing while retaining cutting adjustments.

Further objects of the invention reside in the provision of a knife and holder which are sturdy of structure, economic of manufacture, efficient of operation, and an assembly which is susceptible of use on machines now in use without modification thereof.

Other objects and advantages, more or less ancillary to the foregoing, and the manner in which all the various objects are realized will appear in the following description, which, considered in connection with the accompanying drawings, sets forth the preferred embodiment of the invention.

Referring to the drawings:

Fig. 1 is a view in perspective of a microtome embodying the invention;

Fig. 2 is a view in perspective of the improved knife and holder therefor;

Fig. 3 is a transverse section through the holder and knife, the section being taken on a plane indicated by the line 3—3 in Fig. 2;

Fig. 4 is a view in perspective of the holder and a fragmentary portion of the cradle therefor;

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Fig. 5 is a cross sectional view of the knife and holder and a portion of the specimen support;

Fig. 6 is a cross sectional view of a knife and holder and a coolant conduit therefor; and

Fig. 7 is an elevational view of an alternative form of knife.

As illustrated in Fig. 1, the microtome, which is chosen herein as illustrative of one of the forms of machines upon which the improved knife and holder may be used, comprises a housing 10 having the customary gearing thereon (not shown) for moving the specimen holder 11 in a vertical reciprocatory path and at the same time feeding the holder outwardly against a stationary knife 12.

The improved knife holder 13 is mounted in a cradle 14 which is supported in a slide 15 seated on ways in an extended base portion of the housing 10. The slide is provided with set screws arranged to clamp the cradle and knife holder in the adjusted position, the screws 16 being provided to support the cradle in angular relation to the specimen 17, the screws 18 for the retention of the cradle against horizontal movement, the screws 19 for the securement of the knife holder within the cradle, and the screws 20 for the retention of the slide 15.

The knives heretofore in use were formed from a solid bar of steel of a length no less than the width of the cradle 14, such blades being locked in place by the screws 19; hence, when it was necessary to shift the blades laterally to present a sharp edge to the work it was necessary to manipulate the screws 19 and frequently readjust the screws 16 and 18.

In the present invention the knife holder is substituted for the massive body of the blade formerly in use, the screws 19 and other adjustments being employed in the same manner to perform the same function. It is a particular feature of the structure of the invention that the knife holder is stable and fixed with respect to the machine and that the blade is firmly supported against vibration without reliance upon massiveness.

The preferred embodiment of the holder as illustrated in Fig. 2 comprises plate 20 having a boss 21 in the central portion of a face thereof which is formed with a groove 22 therein for the reception of a permanent magnet 23. The holder is constructed from a non-ferrous metal such as aluminum, and the prismoidal ends 24 thereof are configured for engagement in a groove 25 in the cradle (Fig. 4). The upper face of the boss 21 is concave and directed downwardly to form

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a slide for the ribbons of tissue sliced from the specimen and to serve as a work area for the operator. The upper face of the boss terminates in a sharp web 26 which supports an undercut ledge 27 in the upper portion of the knife 28 subjacent the facet 29. The area of the face of the knife below the ledge 27 is substantially equal to that of the inner face of the boss and the body of the blade as well as the ledge is relatively thick in order to resist flexure and such vibrational strains as are imposed thereon.

In operation, the slide is adjusted to support the knife forwardly of the specimen and in spaced relation therewith. The cradle is next adjusted to provide the requisite clearance angle for the knife and the slicing operation may then be performed. It will be noted that when the work piece or specimen is brought into contact with the knife, the thrust thereon will maintain the ledge 27 in seated relation with the web 26. When the cutting edge of the knife becomes worn, the blade may be shifted sideways by exerting sufficient pressure against the end thereof to overcome the magnet, such adjustment being made without disturbing the angular position of the holder or cradle, or the transverse adjustment thereof. After the edge of the knife has become dull throughout its length it may be discarded since the amount of steel therein and the original economical method of manufacture does not justify the cost of resharpening.

If desired, the knife may be formed with a slot 30 therein and a thumb screw 31 may be employed in substitution of the magnet 23, Fig. 7. When the specimen is mounted in a cube of paraffin as is customary when handling certain types of material, the knife and holder may be chilled by placing a small piece of solid carbon dioxide within the channel of the magnet or groove therefor, or securing a tube 32 therein which is coupled with a circulated coolant, Fig. 6. Such practice insures the production of the proper sectioning of the specimen and avoids the sticking ordinarily caused by the paraffin.

Although the foregoing description is necessarily of a detailed character, in order that the invention may be completely set forth, it is to be understood that the specific terminology is not intended to be restrictive or confining, and that various rearrangements of parts and modifications of detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

I claim:

1. In a microtome, a plate comprising two extended end portions adapted to be secured in the knife holder of the microtome and a central portion having an upper face and a front face, a blade adapted to be held against the front face of the said plate, the said blade having a cutting edge along the upper extremity thereof and including a ledge as an integral part of the blade and disposed along the cutting edge, the ledge comprising a laterally projecting portion for engaging the central portion of the plate along the upper face thereof to constrain the vertical movement of the blade with respect to the plate and the upper face of the ledge having a smooth surface extending from the cutting edge to the upper face of the said plate and the surface of the upper face of the plate forming a smooth extension of the surface of the upper face of the ledge, and means for holding the said blade against the front face of the said plate, the engaging portions of the said plate and the said

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blade being of uniform cross section along the length thereof to permit longitudinal sliding movement of the blade relative to the said plate.

2. In a microtome, a plate comprising two extended end portions adapted to be secured in the knife holder of the microtome and a central portion having an upper face and a flat front face, a blade having a flat surface for engaging the front face of the said plate and a cutting edge along the upper extremity thereof, the said blade including a ledge as an integral part thereof and disposed along the cutting edge, the ledge comprising a laterally projecting portion for engaging the central portion of the plate along the upper face thereof to constrain the vertical movement of the blade with respect to the plate and the upper face of the ledge having a smooth surface extending from the cutting edge to the upper face of the said plate and the ledge having a thin lateral extremity so that the surface of the upper face of the plate merges smoothly with the surface of the upper face of the ledge, and means for holding the said blade against the front face of the said plate, the engaging portions of the said plate and the said blade being of uniform cross section along the length thereof to permit longitudinal sliding movement of the blade relative to the said plate.

3. In a microtome, a plate having two extended end portions adapted to be secured in the knife holder of the microtome and a boss projecting from the plate and disposed between the ends of the plate, the said boss having an upper face and a flat front face, a blade adapted to be held against the front face of the said boss, the said blade including a ledge as an integral part of the blade and disposed along the upper extremity thereof, the ledge having a laterally projecting portion for engaging the upper face of the boss to constrain the vertical movement of the blade with respect to the boss, and the surface of the upper face of the boss forming a smooth extension of the surface of the upper face of the ledge, and means for clamping the said blade against the front face of the said boss comprising a longitudinal slot in the blade and a screw extending through the slot and into the boss to permit longitudinal adjustment of the blade relative to the plate.

4. In a microtome, a plate having two extended end portions adapted to be secured in the knife holder of the microtome, and a boss projecting from the plate and disposed between the ends of the plate, the said boss having an upper face and a flat front face, a blade adapted to be held against the front face of the said boss, the said blade including a ledge as an integral part of the blade and disposed along the upper extremity thereof, the ledge having a laterally projecting portion for engaging the upper face of the boss to constrain the vertical movement of the blade with respect to the boss, and the surface of the upper face of the boss forming a smooth extension of the surface of the upper face of the ledge, and a permanent magnet mounted in said boss, the said magnet having a vertical cross section substantially uniform throughout the length thereof mounted in said boss for clamping the blade firmly to the front face of the boss while permitting longitudinal sliding movement of the blade relative to the boss.

5. In a microtome having a knife holder and a plate with extended end portions adapted to be secured in the knife holder, said plate having a

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central portion with a front face adapted to be engaged by the blade and an upper face having a smooth surface, a blade comprising a body having a cutting edge along the upper extremity thereof and a ledge integral with the body along the edge at one side of the body, the upper surface of the said ledge forming a smooth extension from the cutting edge to the upper face of the plate, and the blade being of uniform cross section along the length thereof to permit longitudinal sliding movement of the blade relative to the plate.

6. In a microtome having a knife holder and a plate with extended end portions adapted to be secured in the knife holder, said plate having a central portion with a front face adapted to be engaged by the blade and an upper face having a smooth surface, a blade comprising a flat body having a cutting edge along the upper extremity

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thereof and a ledge integral with the body along the edge at one side of the body, the upper surface of the said ledge forming a smooth continuation of the cutting edge and the ledge having a thin lateral extremity so that the upper surface of the ledge merges smoothly with the surface of the upper face of the plate, the blade being of uniform cross section along the length thereof to permit longitudinal sliding movement of the blade relative to the said plate.

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