

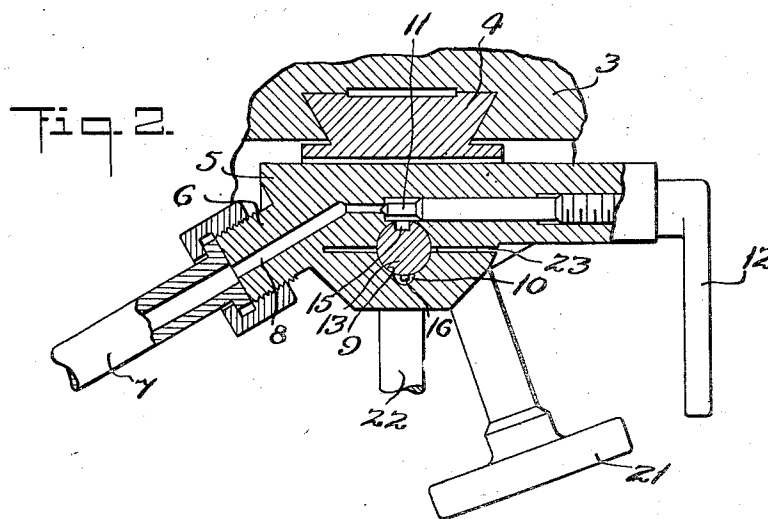
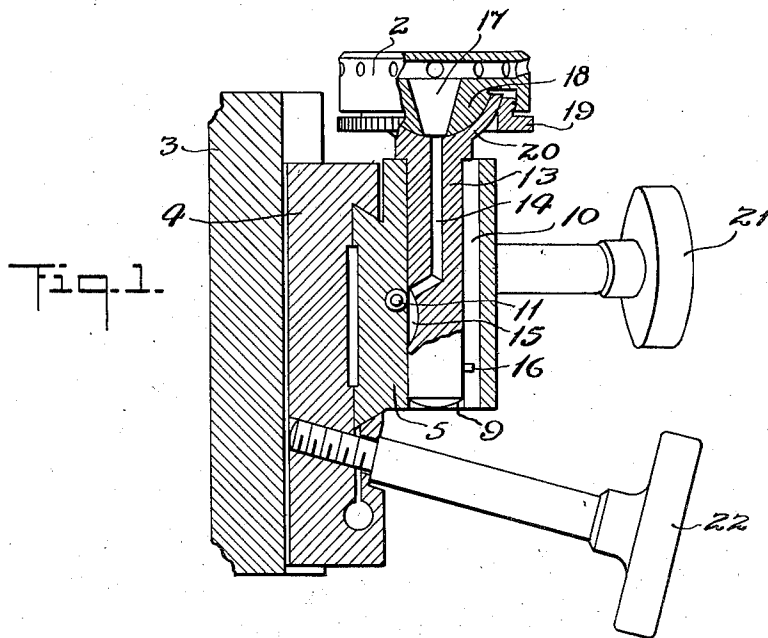
March 25, 1952

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2,590,725

MICROTOMES

Filed Aug. 23, 1949



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UNITED STATES PATENT OFFICE

2,590,725

MICROTOMES

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Application August 23, 1949, Serial No. 111,784
In Germany April 25, 1949

7 Claims. (Cl. 62—1)

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This invention relates to microtomes, and more particularly to improved conduit means for supplying a cooling fluid to the stage of a microtome.

Microtomes are used for the cutting of minute sections of various objects, such as organic tissues, for subsequent microscopic examination, and it is frequently found advantageous to freeze such objects before cutting. Heretofore, the cooling fluid conduit and the valve regulating the flow of the cooling fluid from a supply source to the cutting platform formed part of the stage of such microtomes. This arrangement has considerable disadvantages since it necessitates the replacement of the entire complex unit with each object and requires that the conduit which is part of the stage be disconnected from and the conduit of the newly emplaced stage be connected with the supply source of the cooling fluid. The known microtome arrangement thus comprises a complicated stage construction which is particularly cumbersome when objects have to be carried on the stage from a distant place. It also requires a time interval for connecting the conduit of each stage to the cooling fluid supply source which may be in excess of that safely permissible under delicate working conditions.

In accordance with the present invention, there is provided a microtome comprising a stand, a removable stage adapted to be cooled, and cooling fluid conduit means in the stand and leading to the stage to be cooled.

It is an object of the present invention to provide a microtome with a removable stage which may be cooled automatically upon placing it in the microtome stand.

It is another object of this invention to provide a simply constructed stage for microtomes which can be handled and replaced in the microtome without difficulty or delay.

It is a further object of the invention to provide an improved and simplified conduit system for supplying a cooling fluid to the stage of a microtome.

Another object of the invention is to provide an economical microtome apparatus having a conduit system for supplying a cooling fluid in its stand, the instrument being adapted for use with any number of different stages which connect automatically with the conduit system of the stand.

The above objects and advantages of the invention may be accomplished by providing a microtome comprising a stand with conduit means for a cooling fluid connected to any desired source thereof, a hollow space in the stand and in com-

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munication with the cooling fluid conduit, said space being adapted to receive the stage of the microtome, and a regulating valve in the conduit means for regulating the cooling fluid flow.

The cooling fluid, generally CO₂, may be supplied from any suitable container and reaches the stage table to be cooled through conduit channels of relatively narrow cross section, entering a relatively large space immediately below the stage table whereby the suddenly expanded gas is cooled considerably.

In a modification of the invention the hollow space adapted to receive the stage may be a cylindrical borehole and the stage may be provided with a base accurately fitting into said borehole. In this embodiment of the invention, the cooling fluid supply conduit communicates with the interior of the borehole and the base of the stage is provided with further conduit means adapted to register with the first-named conduit means upon insertion of the base in the borehole. The second conduit means in the stage base leads to a cooling chamber underneath the stage platform. Automatic means for registering the two conduits upon insertion of the stage in the stand may also be provided. In order to facilitate horizontal adjustment of the stage platform, the platform may be journaled in its base by means of a ball and socket joint, the joint being provided with an axial bore of larger diameter than the diameter of the conduit means in the base whereby the conduit means remains in communication with the cooling chamber when said platform and chamber are tilted in said joint.

The above and other features, objects and advantages of the present invention will become more apparent from the following description of a now preferred embodiment thereof, reference being had to the accompanying drawing which is given merely as an illustration and not as a limitation upon the scope of the invention, and in which

Fig. 1 is a vertical section, and

Fig. 2 is a horizontal section through a part of a microtome constructed in accordance with this invention.

Referring now to the drawing, there is shown microtome stage 2 carried by fixed stand 3 upon which there is mounted vertically adjustable sliding carriage 4 and horizontally adjustable sliding carriage 5. Carriage 5 is provided with a connecting element 6 (see Fig. 2) which is attached to cooling fluid supply line 7. The latter supply line leads to a supply source (not shown) of a suitable cooling fluid, such as carbon dioxide.

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Carriage 5 has a borehole 9 which communicates with supply line 7 by means of channel 8. The latter carriage also has a slot 23 extending on both sides of the borehole. A screw 21 passes through said slot whereby, upon turning of the screw, the slot and borehole 9 may be suitably tightened. Handle 22 serves to lock the horizontal carriage in any desired position. Borehole 9 is provided with longitudinal groove 10. A valve 11 regulates the flow of the cooling fluid from channel 8 to borehole 9 and is operated by adjusting lever 12.

Stage 2 is mounted on cylindrical base 13 which has a longitudinal bore 14 ending in an enlarged opening 15 in the wall of the base. Base 13 is ground to fit accurately into borehole 9 and is provided with guide pin 16 fitting into groove 10 and assuring automatic registration of the conduit means upon insertion of the stage in the stand, as will be more fully explained hereinafter. The bottom of cooling chamber 17 is exteriorly formed as hemisphere 18 and is attached to the ball socket 20 of base 13 by means of threaded annulus 19 whose inner surface is also spherically ground.

The stage of the microtome according to this invention is of simple construction and can be conveniently handled. It may be readily used, for instance, for receiving directly organic tissues obtained from a patient undergoing an operation, and to transport the said tissues placed on the stage directly to the microtome without having to transfer the tissues.

The operation of such a microtome is equally simple: base 13 is merely inserted in borehole 9 and by means of guide pin 16 and groove 10 the conduit means 14, 15 of the base is automatically registered with conduit means 8, 7 in the stand, the regulating valve 11 being provided at the juncture. The base is then clamped into the borehole by means of screw 21 and cooling is initiated by opening valve 11 by means of lever 12, whereby the cooling fluid will enter the conduit means 15, 14 and cooling chamber 17. The vertically and horizontally adjustable carriages 4 and 5, as well as ball and socket joint 18, 19, 20, serve to position the object to be cut in respect to the cutting tool (not shown).

While the invention has been described with reference to a preferred embodiment shown in the drawing, it is to be understood that the same has been given for purposes of illustration only and not as a limitation upon the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. In a microtome, the combination of a support having a vertically disposed elongated bore, said support having a cooling fluid supply passageway communicating with said bore at a point intermediate the ends of the latter, and said bore being provided with a vertically disposed groove extending longitudinally of said bore and being in spaced relation to the mouth of said passageway, a removable stage having a cooling chamber and including a stem slidably receivable in said bore, a projecting lug on said stem slidably receivable in said groove, a fluid passageway in said stem communicating at its upper end with said chamber and having an entry opening at its lower end in the exterior surface of said stem between the upper and lower ends of such stem, the entry opening of said stem passageway and said lug being so positioned on said stem, that when said stem and lug are slidably inserted in said bore and groove, respectively, the entry opening

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will move into registry with the mouth of said supply passageway to bring said supply passageway into communication with said stem passageway, and means for securing said stem on said support with the passageways in communication.

2. In a microtome, the combination of a support having an elongated bore, said support having a cooling fluid supply passageway with a discharge opening in the surface of such bore at a point intermediate the ends of said bore, a removable stage having a cooling chamber and including a stem slidably receivable in said bore, a fluid passageway in said stem communicating at one end with said chamber and having at its other end an entry opening in the exterior surface of said stem between the ends thereof, and detachable interlocking guide means on said support and stem for guiding such entry opening into registry with such discharge opening when said stem is slidably inserted into said bore to bring said supply passageway into communication with said stem passageway, and means for detachably securing said stem on said support with the passageways in communication.

3. In a microtome, the combination of a support having an elongated bore and having a cooling fluid supply passageway with a discharge opening in the surface of said bore at a point intermediate the ends of said bore, a removable stage having a cooling chamber and including a stem slidably receivable in said bore, a fluid passageway in said stem communicating at one end with said chamber and having at its other end an entry opening in the exterior surface of said stem between the ends thereof, a guide member on said stem and a guide member within said bore, said guide members being detachably interlockable to guide the sliding movement of said stem within said bore to bring such entry opening into registry with such discharge opening and thereby to bring said supply passageway into communication with said stem passageway, and means for detachably securing said stem on said support with the passageways in communication.

4. In a microtome, the combination of a support having an elongated bore and having a cooling fluid supply passageway with a discharge opening in the surface of said bore at a point intermediate the ends of said bore, a removable stage having a cooling chamber and including a stem slidably receivable in said bore, a fluid passageway in said stem communicating at one end with said chamber and having at its other end an entry opening in the exterior surface of said stem between the ends thereof, detachable interlocking guide means on said support and stem for guiding the sliding movement of said stem into said bore to bring such entry opening into registry with such discharge opening and thereby to bring said supply passageway into communication with said stem passageway, means for detachably securing said stem on said support with the passageways in communication, valve means in said support adjacent to the discharge opening and controlling the flow of fluid from said supply passageway through such discharge opening, and means operable to control said valve means.

5. In a microtome, the combination of a support having an elongated bore and having a cooling fluid supply passageway with a discharge opening in the surface of said bore at a point intermediate the ends of said bore, a removable stage having a cooling chamber and including a stem slidably receivable in said bore, a fluid

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passageway in said stem communicating at one end with said chamber and having at its other end an entry opening in the exterior surface of said stem between the ends thereof, said entry opening having a greater area than the cross-sectional area of said stem passageway, being elongated and extending longitudinally of said stem, detachable interlocking guide means on said support and stem for guiding the sliding movement of said stem into said bore to bring such elongated entry opening into registry with such discharge opening and thereby to bring said supply passageway into communication with said stem passageway, and means for detachably securing said stem on said support with the passageways in communication.

6. In a microtome, the combination of a support having an elongated bore and having a cooling fluid supply passageway with a discharge opening in the surface of said bore at a point intermediate the ends of said bore, means supporting said support for adjustable movement along a straight path, means supporting said support and said first mentioned means for adjustable movement along a path at right angles to said straight path, means for securing said support in adjusted position, a removable stage having a cooling chamber, and including a stem slidably receivable in said bore, a fluid passageway in said stem communicating at one end with said chamber and having at its other end an entry opening in the exterior surface of said stem between the ends thereof, detachable interlocking guide means on said support and stem for guiding the sliding movement of said stem into said bore to bring such entry opening into registry with such discharge opening and thereby to bring said supply passageway into communication with said stem passageway, and

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means for detachably securing said stem on said support with the passageways in communication.

7. In a microtome, the combination of a support having an elongated bore and having a cooling fluid supply passageway with a discharge opening in the surface of said bore at a point intermediate the ends of said bore, a removable stage unit including a stem slidably receivable in said bore and provided at its upper end with a concave seat, a stage having a convex seating surface seated in said concave seat and having a cooling chamber provided with an opening in said convex seating surface, and means for securing said stage on said stem seat, a fluid passageway in said stem communicating at its upper end with the opening of said chamber and having at its other end an entry opening in the exterior surface of said stem between the ends thereof, detachable interlocking guide means on said support and stem for guiding the sliding movement of said stem into said bore to bring such entry opening into registry with such discharge opening and thereby to bring said supply passageway into communication with said stem passageway, and means for detachably securing said stem on said support with the passageways to communication.

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