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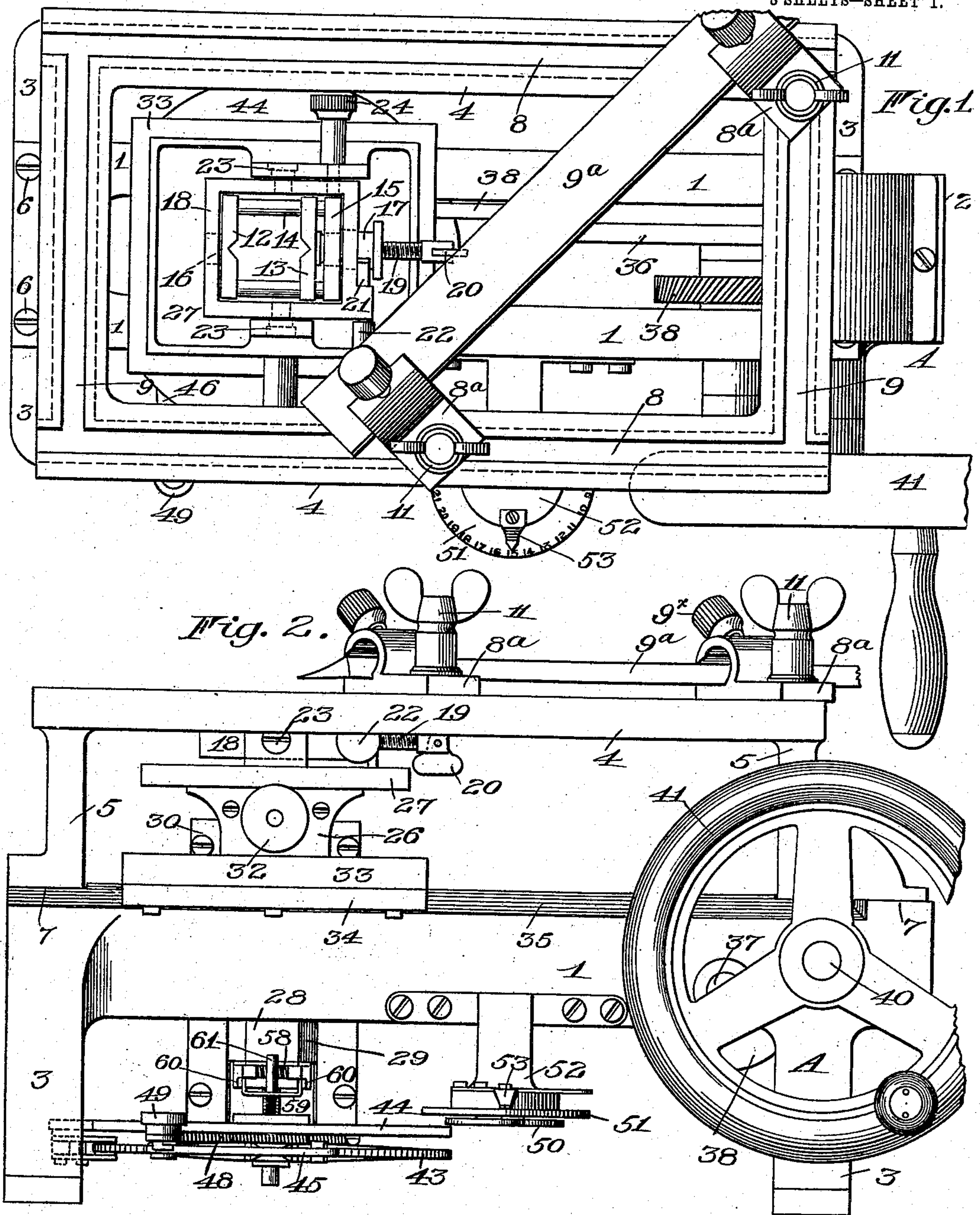
MICROTOME.

APPLICATION FILED DEC. 28, 1907.

930,686.

Patented Aug. 10, 1909.

3 SHEETS—SHEET 1.



Witnesses  
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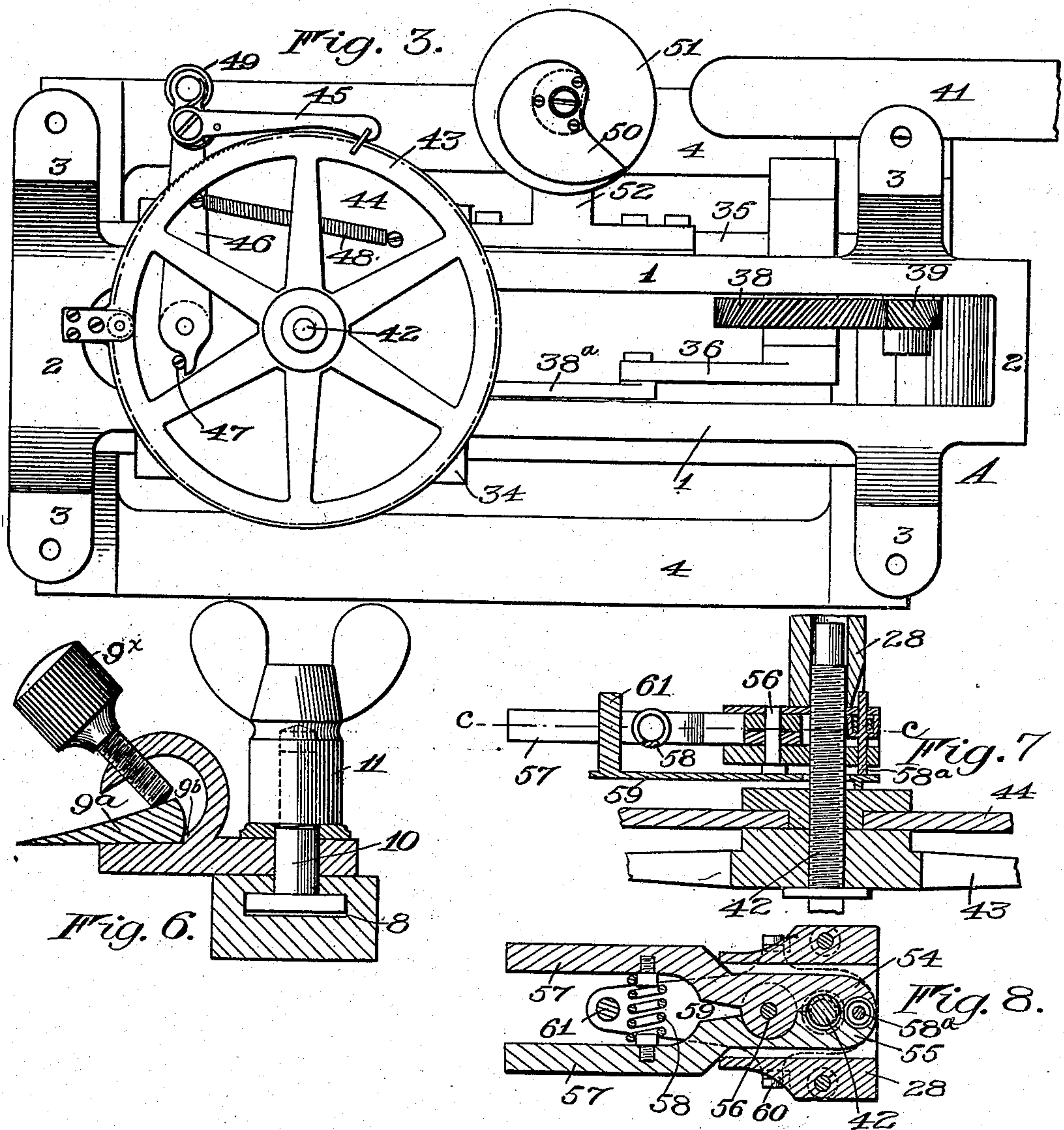
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3 SHEETS—SHEET 2.



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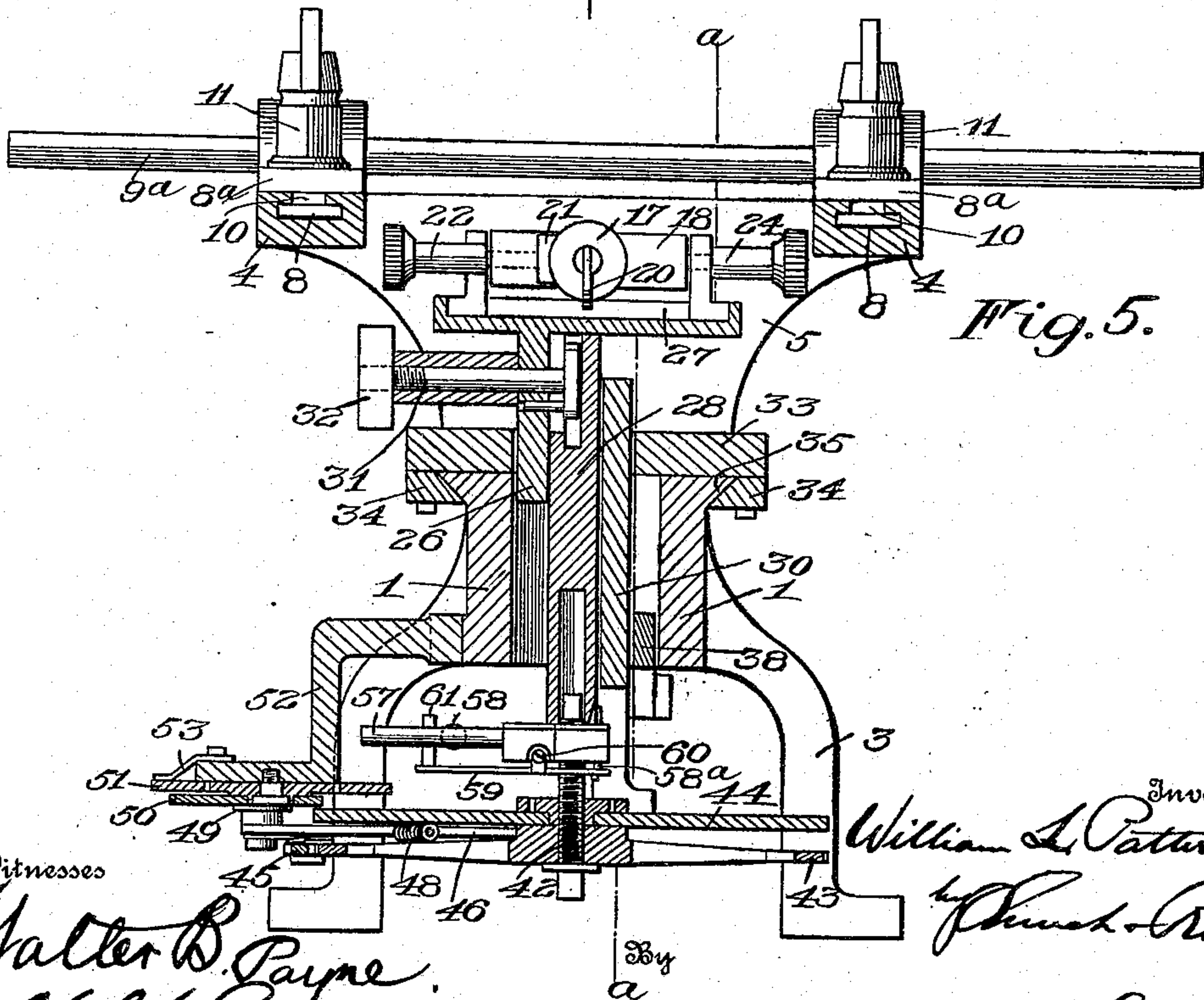
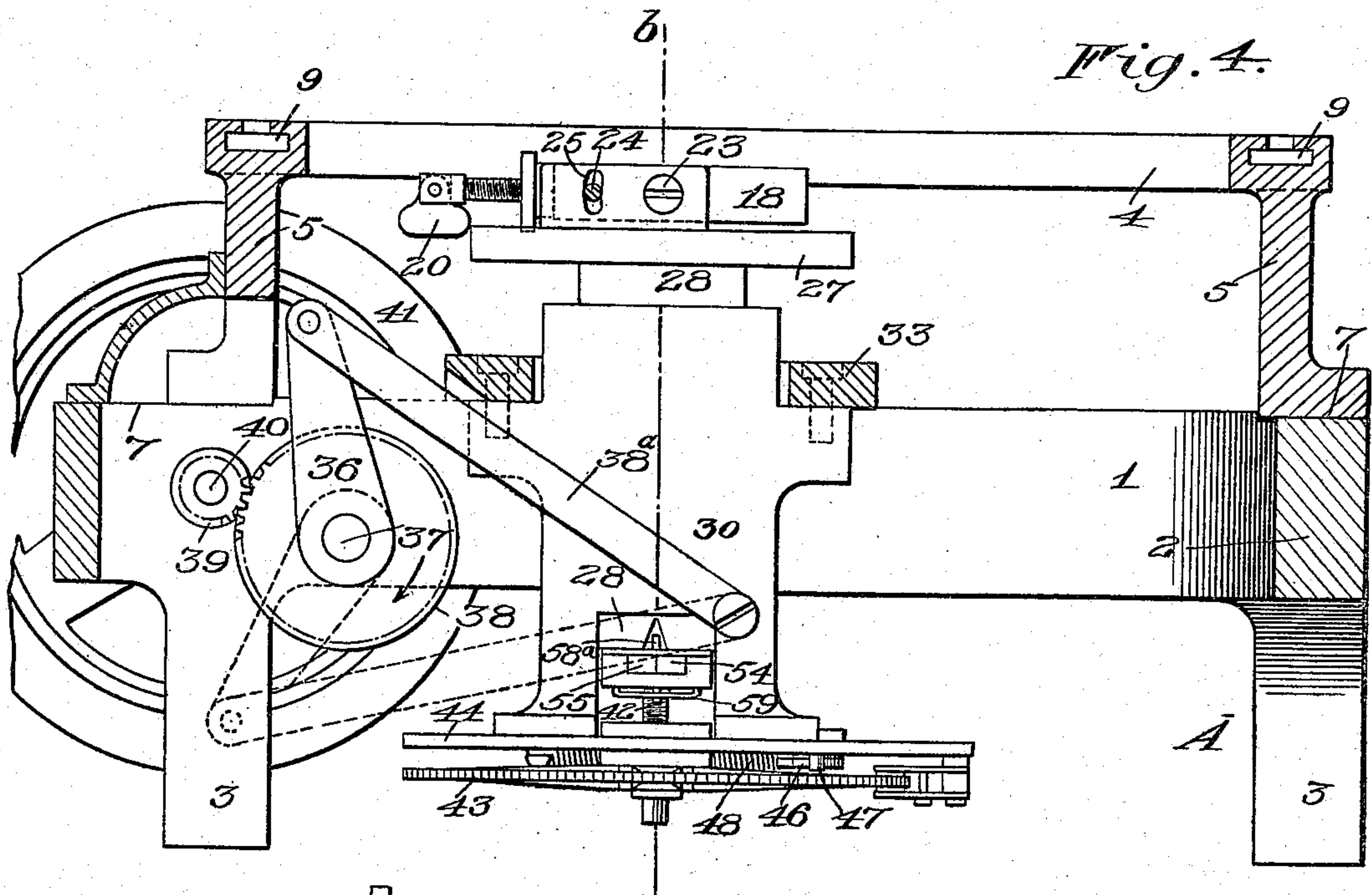
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

WILLIAM L. PATTERSON, OF ROCHESTER, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS,  
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## MICROTOME.

No. 930,686.

Specification of Letters Patent.

Patented Aug. 10, 1909.

Application filed December 28, 1907. Serial No. 408,436.

*To all whom it may concern:*

Be it known that I, WILLIAM L. PATTERSON, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Micro-  
tomes; and I do hereby declare the follow-  
ing to be a full, clear, and exact description  
of the same, reference being had to the ac-  
companying drawings, forming a part of  
this specification, and to the reference-num-  
erals marked thereon.

The present invention relates to micro-  
tomes or machines of the type which will cut  
objects into very thin sections for use in  
microscopic examinations, and it has for an  
object to provide a construction in which  
vibrations and the working loose of the  
parts are reduced to a minimum.

Another object is to arrange the working  
parts so that they will be protected from  
liquids dripping from the object, thus insur-  
ing a perfect working of the machine.

To these and other ends the invention con-  
sists in certain improvements and combina-  
tions of parts all as will be hereinafter more  
fully described, the novel features being  
pointed out in the claims at the end of the  
specification.

In the drawings: Figure 1 represents a  
plan view of a machine constructed in ac-  
cordance with this invention. Fig. 2 repre-  
sents a front elevation of the same machine.  
Fig. 3 represents a bottom view. Fig. 4 rep-  
resents a section on line *a—b* Fig. 5, the  
knife and its holders being removed. Fig. 5  
represents a section on line *b—b* Fig. 4.  
Fig. 6 represents a section through the knife,  
one of its holders and a portion of its frame.  
Fig. 7 represents a detail section of the ob-  
ject feeding mechanism, and Fig. 8 repre-  
sents a section on line *c—c* Fig. 7.

Referring more particularly to the draw-  
ings, A indicates a main frame comprising  
preferably two longitudinally extending  
pieces 1 connecting two end pieces 2 having  
supports 3, all of which may be formed by a  
single casting. Supported on the main frame  
is a knife frame consisting in the present in-  
stance of a rectangular top 4 and integral  
supports 5 at the ends thereof bolted at 6 to  
the main frame and seated in depressions 7  
on the top of the main frame. The top of  
the knife frame is formed with longitudinal  
grooves 8 and transverse grooves 9, both of  
which are preferably of the shape of an in-

verted T in cross section, thus permitting  
the knife holders 8<sup>a</sup> to be shifted so that the  
knife 9<sup>a</sup> held by screws 9<sup>x</sup> against shoulders  
9<sup>b</sup> thereon may be secured at great or small  
angles to the line of movement of the object  
to be sliced, the knife holders being turnable  
on headed bolts 10 which enter the grooves  
and are drawn against the upper walls  
thereof by thumb nuts 11. Of course, the  
grooves may be replaced by any other means  
which will permit this adjustment of the  
knife on all sides of the frame.

Arranged to travel beneath the knife is  
the object clamp which preferably comprises  
a fixed jaw 12 and a movable jaw 13 guided  
on rods 14 connected by a cross piece 15  
which with the fixed jaw and rods forms a  
frame. This frame carries a pair of trun-  
nions 16 and 17 journaled on a frame 18,  
the trunnion 17 being hollow and internally  
threaded to receive an adjusting screw 19  
journaled in the movable jaw and having a  
thumb piece 20 hinged so that it may drop  
below the top portion of the knife frame, a  
brake shoe 21 operated by a thumb screw  
22 being arranged to engage a trunnion 17  
and to hold the trunnion against turning.  
The frame 18 before mentioned has pivots  
23 on opposite sides thereof connecting it  
to a suitable carrier in order that the object  
clamp may turn about an axis at right angles  
to the direction of reciprocation of the  
clamp, while clamp screw 24 working  
through a curved slot 25 in the carrier and  
engaging the carrier and the frame 18 serves  
to hold the latter against turning.

The clamp carrier is preferably com-  
posed of two relatively adjustable members,  
the upper member 26 being formed with a  
receptacle 27 arranged beneath the clamp  
in order to catch any drippings from the  
object; and the lower members 28 having  
guide faces 29 movable vertically on guide  
faces on the guide member 30 of a recipro-  
catory carriage to be hereinafter described,  
the adjustment between the upper and the  
lower members of the carrier being pref-  
erably accomplished by a headed bolt 31 on  
the upper member operated by a thumb nut  
32 and working in a T slot in the lower  
member.

The reciprocatory carriage comprises the  
guide member 30 working between the two  
longitudinally extending pieces 1, and a  
supporting plate 33 traveling on the upper



surface of the pieces 1 and having the guide member secured thereto, the supporting plate being held against lateral movement by guides 34 coöperating with downwardly converging guide faces 35 integral with the sides of the pieces 1.

The reciprocation of the clamp or object holder carriage is effected preferably by means of a crank arm 36 secured to a shaft 37 and to a pitman 38<sup>a</sup> which is pivoted to the carriage at a point in a horizontal plane below the plane of the crank shaft 37 in order that greater power may be obtained on the cutting movement or the movement of the carriage toward the crank shaft than on the movement in the other direction. Rotation of the crank shaft may be obtained by large and small oblique toothed gears 38 and 39, the former being mounted on the crank shaft and the latter being mounted on a drive shaft 40, on which may be arranged a drive wheel 41.

In order that the object may be advanced toward the knife after each cut I may employ the step-by-step feeding mechanism, as shown, which comprises a nut (to be hereinafter described) arranged on the clamp carrier and a screw 42 working therein and intermittently rotated by a toothed wheel 43, the wheel being journaled on and below a shield or disk 44 secured to the lower portion of the guide member 30. With the wheel 43 a spring pressed pawl lever 45 engages, the latter being mounted on an arm 46 pivoted to the under surface of the shield and held against a stop 47 by a coil spring 48 also secured to the under side of the shield. The end of lever arm 46 carries a roller or stud 49 adapted to coöperate with an adjustable stop 50 preferably in the form of a rotary cam secured to the under surface of a thumb disk 51 which is journaled on a hanger 52 extending from the side of the main frame. The thumb disk is provided with a scale on its upper face and an index or pointer 53 coöperates with the scale to determine the position of the stop, the divisions of the scale representing microns. When the reciprocatory carriage is moved the step-by-step feeding mechanism moves therewith and the roller 49 coöperates with the stop 50 at one end of the movement, causing the pawl lever 45 to engage the teeth of the wheel 4 and rotate the latter, thus effecting a movement of the carrier toward the knife. As the carriage moves in the other direction roller 49 moves away from the stop 50 and the spring 48 causes the dog 45 to ride over the teeth of wheel 43.

In order to obtain a rough adjustment of the object toward the knife, the nut before mentioned is divided or split into two members 54 and 55 having a common pivot 56 and operating extensions 57 between which is arranged a helical spring 58 tending to

move the members together about the screw 42. When the extensions 57 are pressed to release the screw, 42, a spring pressed plunger 58<sup>a</sup> or other locking device is projected between them on the opposite side of their pivot and locks them in a separated position, and they are released from this position by a trip preferably in the form of a lever 59 having upward extensions pivoted at 60 to the lower member 28 of the carrier. One end of the trip engages the plunger 58 while the other end is provided with an upwardly extending finger piece arranged between the extensions 57, a depression of the finger piece serving to elevate the spring pressed latch or plunger 58<sup>a</sup>.

In operation, the knife is set at the proper angle to the direction of movement of the object to be sliced, being arranged at a slight angle when the material is brittle and a great angle when the material is tenacious; and the object is secured in the clamp which is then adjusted at an angle, to cut a desired section or sections of the object. The rough adjusting device is operated to release the nut from the feed screw and to elevate the carrier so that the object is in proper position. Upon the rotation of the drive shaft the object will be reciprocated and after each cutting will be automatically fed upwardly a distance equal to the thickness of the slice to be cut, the slices being removed from the knife after each cutting.

A microtome constructed in accordance with this invention is very strong and durable, as all danger of the parts working loose is practically obviated. The knife is supported at both ends on a frame which is rigid with the frame on which the object carriage moves, and if the parts are properly adjusted, there is no chance for the relation of the object and the knife being accidentally changed. Further, the horizontal arrangement of the stationary knife frame permits of its being supported at both ends of the movement of the object carriage and in this manner all vibrations are reduced to a minimum.

I claim as my invention:

1. In a microtome, the combination with a main frame having horizontal guides, of a suitably supported stationary knife, a carriage movable on the guides, an object carrier adjustable on the carriage, feeding mechanism for moving the carrier toward the knife, a drive shaft journaled on the main frame, a small oblique toothed gear thereon, a crank shaft, a large oblique toothed gear on the crank shaft, meshing with the small gear, and a pitman connected to the crank shaft and to the carriage.

2. In a microtome, the combination with a main frame embodying a pair of longitudinally extending pieces, of a horizontally arranged knife supported above said longi-



5 tudinally extending pieces, a carriage ar-  
ranged between and guided on said longi-  
tudinally extending pieces, an object carrier  
vertically adjustable on the carriage, an ob-  
ject clamp arranged on the carrier above the  
longitudinally extending pieces, feeding  
mechanism for moving the object carrier  
toward the knife, arranged below the longi-  
tudinally extending pieces, a crank shaft  
10 journaled on one of the longitudinally ex-  
tending pieces, a crank arm arranged there-  
on between said pieces, and a pitman con-  
necting the crank arm with the carriage.

15 3. In a microtome, the combination with  
a main frame and a suitably-supported hori-  
zontally-arranged knife, of a reciprocatory  
carriage guided on the main frame, means  
for reciprocating the carriage, an object car-  
rier vertically adjustable on the carriage, a  
20 disk shaped shield supported on the carriage,  
a toothed disk arranged beneath and jour-  
naled on the shield, a screw secured to the  
shield and turning in the object carrier, a  
pawl for actuating the toothed disk, and a  
25 stop for actuating the pawl.

4. In a microtome, the combination with  
a knife and an object holder, one of which

reciprocates relatively to the other, of a step-  
by-step feeding mechanism for feeding the  
object holder to the knife after each recipro- 30  
cation embodying a split nut and a screw, a  
spring for maintaining the members of the  
nut in engagement with the screw, a device  
for locking said members out of engagement  
with the screw, and a trip for operating said 35  
locking device.

5. In a microtome, the combination with  
a knife and an object holder, one of which  
reciprocates relatively to the other, of a step- 40  
by-step feeding mechanism for feeding the  
object holder to the knife after each recipro-  
cation embodying a screw and a split nut  
having its members pivoted and provided  
with operating extensions, a locking device  
adapted to enter between the members on 45  
the side of the pivot opposite the extensions,  
and a trip pivoted between its ends, one of  
which controls the locking device and the  
other of which is arranged in proximity to  
the extensions.

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Witnesses:

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