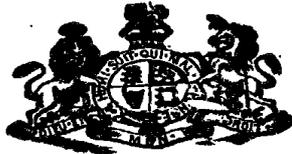


N<sup>o</sup> 24,345



A.D. 1893

Date of Application, 18th Dec., 1893

Complete Specification Left, 18th Sept., 1894—Accepted, 27th Oct., 1894

PROVISIONAL SPECIFICATION.

Improvements in or in connection with the Stage, and Slide thereon,  
and other Adjustable Parts of Microscopes.

I, JAMES POWELL SWIFT of 81 Tottenham Court Road, London, W. Manufacturer of Philosophical and Scientific Instruments, do hereby declare the nature of this invention to be as follows :—

In microscopes as heretofore constructed it is well known that the stage on which  
5 the object for examination is placed has imparted thereto two movements in separate directions usually rectangular movements (after the manner of the well known slide rests for lathes) the movement in each direction being effected by a dovetail shaped piece on the one part sliding in a dovetail shaped guideway in the other part and means to slide one part on the other usually a screw or racking  
10 motion.

This dovetail slide is also used for the extension movement for focussing and equivalent or other means to the above have also been tried.

Now my object is to dispense with these dovetail slides or the like and in place thereof I arrange construct and mount these parts which are movable upon one  
15 another (and to which my improvements are applicable) that same bear upon one another through the medium of rollers or wheels as and for the purposes hereinafter explained.

My present invention is as follows :—

Describing first the stage and its adjustable parts carried thereon—the stationary  
20 table which is fixed to the supporting frame in any suitable manner has a V-shaped or other suitable groove on each side edge in which groove operate one or more wheels or rollers carried each side of the travelling carriage.

This carriage consists of a framework or single transverse bar which at each end carries suitable supports or bearings wherein said rollers are mounted.

25 One such roller on one side is arranged in a bearing mounted and combined with a spring or springs in such manner that said roller is normally kept tightly pressed in said groove and this roller (or one of the others) has a milled head fixed to the axis thereof by which same is revolved and thereby the whole carriage caused to travel backwards or forwards over the table.

30 In place of the aforesaid groove I may use other mechanically equivalent arrangements—for instance I may form a rail or edge down each side of the table and make the aforesaid rollers or wheels with a flange or flanges thereon (*i.e.* the wheels or rollers grooved on their periphery) so as to be thereby guided and kept on said rail or edge.

35 This transverse carriage carries two or other suitable number of bevel edged rollers close down to the table—the axes of these rollers bearing worm wheels each of which gears with a worm on a worm shaft mounted in said carriage and revolved by a milled head on the end.

Also this carriage bears a spring arm extending forwards but kept pressed  
40 inwards (towards the aforesaid bevel wheels) by a spring or springs and this spring arm bears also one or more bevel edged wheels which cause sufficient pressure between same and the said bevel wheels on the carriage to thus impart a crosswise motion to the object (or to the slide carrying same) *i.e.* transverse to the motion of the aforesaid carriage itself.

[*L'ice 8d.*]

*Impts. in the Stage, and Slide thereon, and other Adjustable Parts of Microscopes.*

By using bevel edged wheels the object (or slide carrying same) which may be correspondingly bevel edged is held down and prevented from rising off the table—nevertheless I do not confine myself to use only bevel edged wheels in this part of the instrument.

It will readily be seen that roller bearings or wheel bearings as aforesaid may be used where applicable for the bearings of other adjustable parts of the instruments and so do away with the heavy dovetail slide bearings and accessories as heretofore usual.

Dated this 18th day of December 1893.

TONGUE & BIRKBECK,  
34, Southampton Buildings, Chancery Lane, London, W.C.,  
Agents for the Applicant.

## COMPLETE SPECIFICATION.

## Improvements in or in connection with the Stage, and Slide thereon, and other Adjustable Parts of Microscopes.

I, JAMES POWELL SWIFT of 81 Tottenham Court Road, London, W. Manufacturer of Philosophical and Scientific Instruments, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

In microscopes as heretofore constructed it is well known that the stage on which the object for examination is placed has imparted thereto two movements in separate directions usually rectangular movements (after the manner of the well-known slide rests for lathes) the movement in each direction being effected by a dovetail shaped piece on the one part sliding in a dovetail shaped guideway in the other part and means to slide one such part on the other usually a screw or racking motion.

This dovetail slide is also used for the extension movement for focussing and equivalent or other means to the above have also been tried.

Now my object is to dispense with these dovetail slides or the like and in place thereof I arrange construct and mount these parts which are movable upon one another (and to which my improvements are applicable) that same bear upon one another through the medium of rollers or wheels as and for the purposes hereinafter explained.

My present invention is as follows:—

Describing first the stage and the adjustable slide carried thereon—the stationary table or platform which is fixed to the supporting frame in any suitable manner (and which is usually termed the “stage”) has a V-shaped or other suitable groove (or grooves) on each side edge in which groove (or grooves) operate one or more wheels or rollers carried each side of the travelling carriage or “slide.”

This carriage or slide consists of a frame or single transverse bar which at each end carries suitable supports or bearings wherein said rollers are mounted.

If desired one (or more) such roller on one side may be arranged in a bearing mounted and combined with a spring or springs in such manner that said roller is normally kept tightly pressed in said groove or grooves and this roller (or one of the others) has a milled head fixed to the axis thereof by which same is revolved and thereby the slide is caused to travel longitudinally over the table.

In place of the aforesaid groove I may use other mechanically equivalent arrangements—for instance I may form a rail or edge or series of parallel grooves and edges on one or both sides of the table and make the aforesaid rollers or wheels with a flange or flanges thereon (*i.e.* the wheels or rollers grooved V-shaped or otherwise suitably formed on their periphery) so as to be thereby guided and kept on said rail or edge or series of grooves and edges.

*Impts. in the Stage, and Slide thereon, and other Adjustable Parts of Microscopes.*

This transverse carriage or slide carries two or other suitable number of rollers (advantageously bevel-edged or otherwise suitably formed) close down to the stage—the axes of these rollers bearing worm wheels each of which gears with a worm on a worm shaft mounted on said carriage and revolved by a milled head on one or  
 5 both ends thereof. Also this carriage bears a spring arm (or equivalent device) extending forwards but kept pressed inwards (towards the aforesaid bevel friction wheels) by a spring or springs and this spring arm bears also one or more bevel-edged wheels which cause sufficient pressure between same and the said friction wheels on the carriage to thus impart a crosswise or transverse motion to the object  
 10 (or to the glass slide carrying same) *i.e.* transverse to the longitudinal motion of the aforesaid slide itself.

By using bevel edged wheels the object or glass slide which may be correspondingly bevel edged is held down and prevented from rising off the table—nevertheless I do not confine myself to use only bevel edged wheels in this part of  
 15 the instrument.

It will readily be seen that roller bearings or wheel bearings as aforesaid may be used where applicable for the bearings of other adjustable parts of the instruments and so do away with the heavy dovetail slide bearings and accessories as heretofore usual.

20 And in order that my invention may be easily understood and readily carried into practice I will proceed to further describe same with reference to the drawings hereunto annexed.

## DESCRIPTION OF THE DRAWINGS.

25 Fig. 1 is a perspective view showing an ordinary "horseshoe" stationary table or stage having the side edges of the latter specially formed and adapted to receive my novel slide—said stage being shown detached from the microscope.

Fig. 2 is a perspective view of a microscope having the apparatus shown in Fig. 1 applied thereto.

30 G is the stage having the lugs G<sup>1</sup> G<sup>1</sup> formed thereon by which same is mounted to the body of the microscope by the pivots G<sup>2</sup> passing through the holes G<sup>3</sup> in said lugs G<sup>1</sup> as usual—or in any other suitable or convenient manner.

H is a V-shaped groove on one side of the stage while the other side of the said stage has a series of grooves I in which latter operates a friction wheel J mounted in a spring bearing L and having a series of grooves thereon corresponding to I.

35 K is a milled head rigidly fixed on the same shaft or axis as J by which means the latter is rotated—this shaft being journalled in a suitable bearing L and sleeve L<sup>1</sup> on same this bearing being pivotally connected to and carried on the slide M—the spring L<sup>2</sup> mounted at L<sup>3</sup> to the slide M normally keeping the bearing L and friction wheel J pressed towards the edge of the table G.

40 The opposite end M<sup>1</sup> of this slide M carries oppositely extending arms in which are journalled the 2 bevel-edged wheels N which latter travel in the aforesaid V-shaped groove H and by reason of the distance apart of said two wheels N thereby impart great steadiness and accuracy in the longitudinal movement of said slide M when the same is caused to travel upon the platform G by rotation of the  
 45 milled head K.

The transverse movement is imparted to the glass slide or object glass O in the following manner:—

P is a milled head fixed on the shaft P<sup>1</sup> journalled in the bearing blocks P<sup>2</sup> and having two endless screws or worms Q Q<sup>1</sup> thereon the latter gear with the worm wheels R R<sup>1</sup> which are fixed to the axis of and thereby revolve the friction wheels S S<sup>1</sup>. These rollers S S<sup>1</sup> are advantageously bevelled that is to say of a less circumference at the bottom edge than the top edge thereof so as to thus prevent the glass slide O from rising off the stage G.

55 The wheels R S and R<sup>1</sup> S<sup>1</sup> respectively are journalled in bearings formed for same on the slide M as shown by throwing up portions M<sup>x</sup> of the said slide M for this purpose.

*Impts. in the Stage, and Slide thereon, and other Adjustable Parts of Microscopes.*

T is an "idle" pressure roller (the edge of which may be bevelled same as the driven rollers S S<sup>1</sup> or otherwise suitably formed as desired) pivotted to the arm U which latter is pivotted at U<sup>1</sup> to the said slide M suitable spring pressure being applied to this arm U so as to normally force same and the roller T thereon towards the aforesaid friction rollers S S<sup>1</sup> for instance by a suitable flat spring such as V fixed on the back of the slide M see Figs. 1 and 2. 5

The operation of this stage is as follows:—

To place the glass slide O in position the spring arm U is pressed back by the end so as to permit said slide O to be placed in position between the idle pressure roller T and friction rollers S S<sup>1</sup> and upon release of the said arm U the spring pressure will firmly press said slide O against the said friction rollers S S<sup>1</sup> so that when the latter are revolved thereby the glass slide O will be very slowly and very accurately moved transversely across the face of the stage G while the rotation of the milled head K as already described will cause the slide M and with it the glass slide O to be accurately moved longitudinally on said stage G. 10 15

If desired the milled head P can be placed on the other end of the shaft P<sup>1</sup> which would then be prolonged to receive same (or such shaft may have a milled head P at each end thereof) so that the operator can with one hand readily cause either the longitudinal or transverse motion desired to be imparted to the object glass O. 20

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is:—

1. The combination with the stage of a microscope of a slide thereon having wheel or roller bearings adapted to travel on said stage a groove or tongue or grooves and tongues formed on or near the side edges on said stage to receive and guide thereon said wheel or roller bearings a spring mounted bearing for one or more of said rollers on said slide to ensure close fitting of said wheels or rollers on the said stage and means provided on one of said wheels or rollers to revolve same by hand and thereby cause the slide to travel in a longitudinal direction on said stage. 25 30

2. The combination with the stage of a microscope of a slide thereon having wheel or roller bearings adapted to travel on the side edges of said stage a groove or tongue or grooves and tongues formed on said side edges to receive and guide thereon said wheel or roller bearings a spring mounted bearing for one or more of said rollers on said slide to ensure close fitting of said wheels or rollers on the said side edges and means provided on one of said wheels or rollers to revolve same by hand and thereby cause the slide to travel in a longitudinal direction on said stage substantially in the manner and for the purposes hereinbefore described. 35

3. In a slide adapted to be moved longitudinally on the stage of a microscope—the combination of a friction roller or friction rollers horizontally mounted in said slide so as to revolve above said stage in a parallel plane therewith and present the periphery of each such roller to the edge of the glass slide or object glass lying flat on said stage hand-operated means to revolve said roller or rollers a spring arm or spring mounted bar carried on said slide an idle roller or idle rollers horizontally mounted on said arm or bar in the same plane as and opposite to the said friction roller or rollers and adapted to bear against one edge of the object glass or glass slide and press the opposite edge thereof against the said friction roller or rollers so as to thereby impart transverse motion thereto when said friction rollers are revolved. 40 45 50

4. In a slide adapted to be moved longitudinally on the stage of a microscope the combination of two or more friction rollers horizontally mounted in said slide so as to revolve above said stage in a parallel plane therewith hand-operated mechanism to simultaneously revolve said rollers a lever arm pivotted to said slide the free end of which arm extends in front of said friction rollers an idle roller pivotted to said free end and adapted to revolve in the same plane as the said 55

*Impts. in the Stage, and Slide thereon, and other Adjustable Parts of Microscopes.*

friction rollers and a spring adapted to press the free end of said arm towards the glass slide or object glass which glass slide lies flat on the stage with its edges between said idle roller and friction rollers and which is by the former forced against the latter so as to be thereby moved along transversely when the latter are revolved substantially in the manner and for the purposes hereinbefore described.

5 5. The combination with a microscope stage having the longitudinal sides thereof adapted to receive wheel or roller bearings thereon of a slide consisting of a transverse bar extending across said stage on which same is adapted to travel a wheel or roller or rollers journaled to said bar at one end thereof and adapted to travel and be guided on one longitudinal side of said stage a wheel or roller or rollers journaled in a spring bearing on the other end of said bar and adapted to travel and be guided on the opposite side of said stage means to impart rotary motion to one of such rollers by hand to thereby cause longitudinal motion to the said bar and means provided on said slide to impart transverse movement to the object glass or glass slide resting on said stage.

10 6. The combination with a microscope stage having the longitudinal side edges thereof adapted to receive wheel or roller bearings thereon of a slide consisting of a transverse bar extending across said stage on which same is adapted to travel a wheel or roller or rollers journaled to said bar at one end thereof and adapted to travel and be guided on one edge of said stage a wheel or roller or rollers journaled in a spring bearing on the other end of said bar adapted to travel and be guided on the opposite edge of said stage means to impart rotary motion to one of such rollers by hand to thereby cause longitudinal motion to the said bar and means provided on said slide to impart transverse movement to the object glass or glass slide resting on said stage substantially in the manner and for the purposes hereinbefore set forth.

25 7. The combination with a microscope stage having the longitudinal side edges thereof adapted to receive wheel or roller bearings thereon of a slide consisting of a transverse bar extending across said stage on which same is adapted to travel a roller or rollers journaled to said bar at one end thereof and adapted to travel and be guided on one edge of said stage a roller or rollers journaled in a spring bearing on the other end of said bar and adapted to travel and be guided on the opposite edge of said stage means to impart rotary motion to one of such rollers to thereby cause longitudinal motion to the said bar a transverse worm shaft journaled on said bar rollers driven by said worm shaft and adapted to bear against one edge of the object glass and a spring arm or device carried on said transverse bar bearing another roller adapted to engage and press tightly against the opposite edge of the glass slide or object glass to thus impart transverse motion to the said glass slide or object glass when said friction rollers are revolved.

30 8. The combination with a microscope stage having the longitudinal side edges thereof adapted to receive wheel or roller bearings thereon of a slide consisting of a transverse bar extending across said stage on which same is adapted to travel a roller or rollers journaled to said bar at one end thereof and adapted to travel and be guided on one edge of said stage a roller or rollers journaled in a spring bearing on the other end of said bar and adapted to travel and be guided on the opposite edge of said stage means to impart rotary motion to one of such rollers to thereby cause longitudinal motion to the said bar a transverse worm shaft journaled on said bar rollers driven by said worm shaft and adapted to bear against one edge of the object glass and a spring arm carried on said transverse bar bearing an idle roller adapted to engage and press tightly against the opposite edge of the glass slide or object glass to thus impart transverse motion to the said glass slide or object glass when said friction rollers are revolved substantially in the manner and for the purposes hereinbefore described.

40 9. The combination with a microscope stage such as G having the longitudinal side edges thereof adapted to receive and guide thereon wheel or roller bearings of a slide moving on wheel or roller bearings on said stage said slide consisting of a transverse bar such as M wheels such as N journaled at one end thereof and

*Impts. in the Stage, and Slide thereon, and other Adjustable Parts of Microscopes.*

adapted to travel in the side edge such as H of the stage G a roller such as J journalled in a spring mounted bearing such as L and adapted to travel in the opposite side edge such as I of the stage G a milled head such as K fixed to the axis of said roller J to thereby revolve same by hand a worm shaft such as P<sup>1</sup> journalled on said bar M a milled head such as P on said worm shaft by which to revolve same by hand worms such as Q Q<sup>1</sup> on said shaft P<sup>1</sup> to impart motion to worm wheels such as R R<sup>1</sup> respectively fixed on the axes of friction wheels such as S S<sup>1</sup> carried in the said bar M an arm such as U pivotted to the bar M an idle roller such as T on the free end of said arm U and a spring such as V adapted to force the said free end of U and idle roller T towards said friction wheels S S<sup>1</sup> all substantially in the manner and for the purposes hereinbefore described and illustrated in the drawings hereunto annexed.

10. In a microscope the combination with the stage thereof of a slide constructed and arranged to act substantially in the manner and for the purposes hereinbefore described and illustrated in the drawings hereunto annexed.

11. Constructing the sliding parts of microscopes with wheel or roller contact surfaces or bearings substantially in the manner hereinbefore described and illustrated by way of example with reference to a slide having wheel or roller bearings on the longitudinal side edges of the stage of a microscope.

Dated this 15th day of September 1894.

TONGUE & BIRKBECK,  
34, Southampton Buildings, Chancery Lane, London, W.C.,  
Agents for the Applicant.

