

W. LÖW.
 APPARATUS FOR CINEMATOGRAPHICALLY TAKING FILM NEGATIVES OF SUCCEEDING
 SECTIONS THROUGH AN OBJECT.
 APPLICATION FILED APR. 15, 1915.

1,169,843.

Patented Feb. 1, 1916.

2 SHEETS—SHEET 1.

Fig. 1

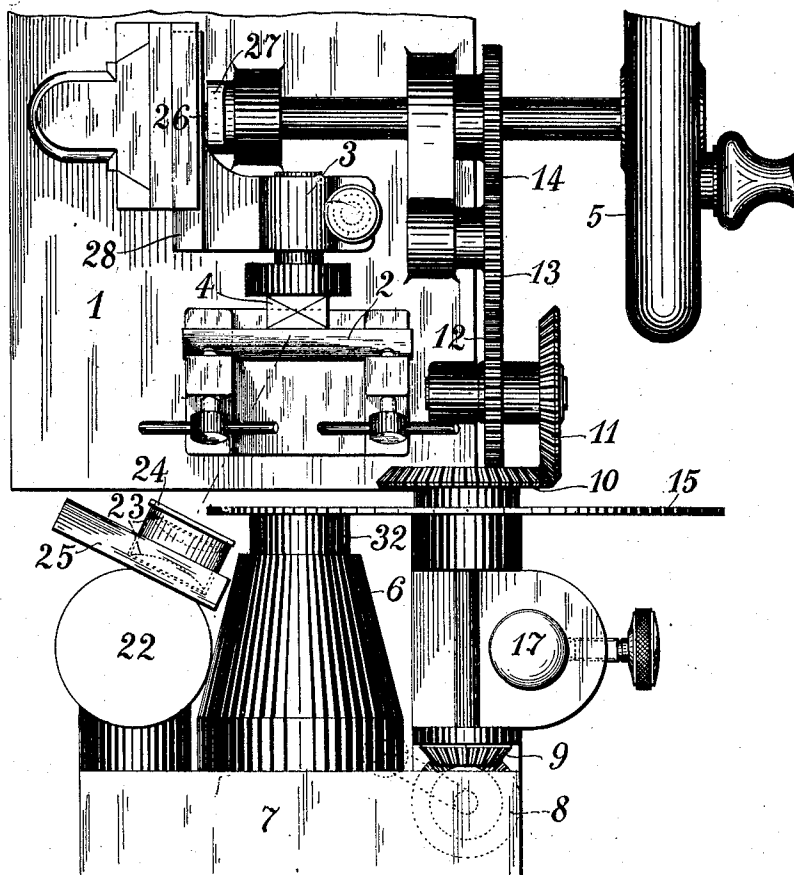
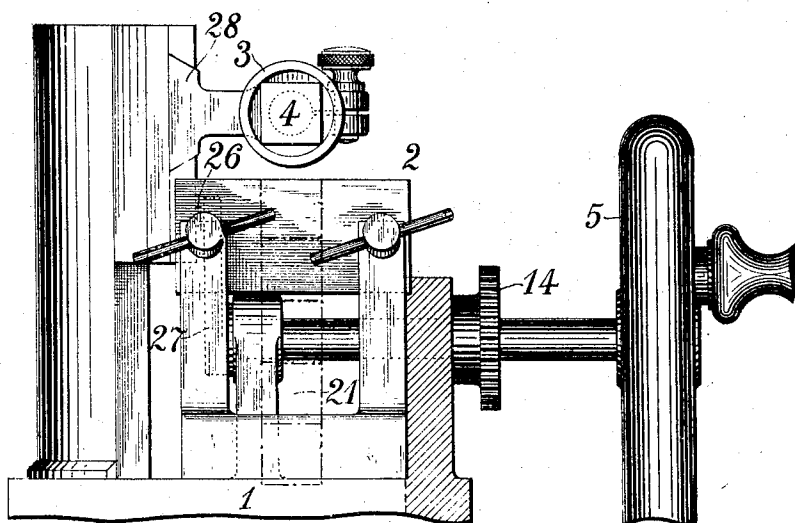


Fig. 2



Witnesses:-

J. F. Schilling
 Hermann Hunsdy

Inventor:-

Wilhelm Löw
 by J. F. Schilling
 his attorney.

W. LÖW.
 APPARATUS FOR CINEMATOGRAPHICALLY TAKING FILM NEGATIVES OF SUCCEEDING
 SECTIONS THROUGH AN OBJECT.
 APPLICATION FILED APR. 15, 1915.

1,169,843.

Patented Feb. 1, 1916.

2 SHEETS—SHEET 2.

Fig. 4

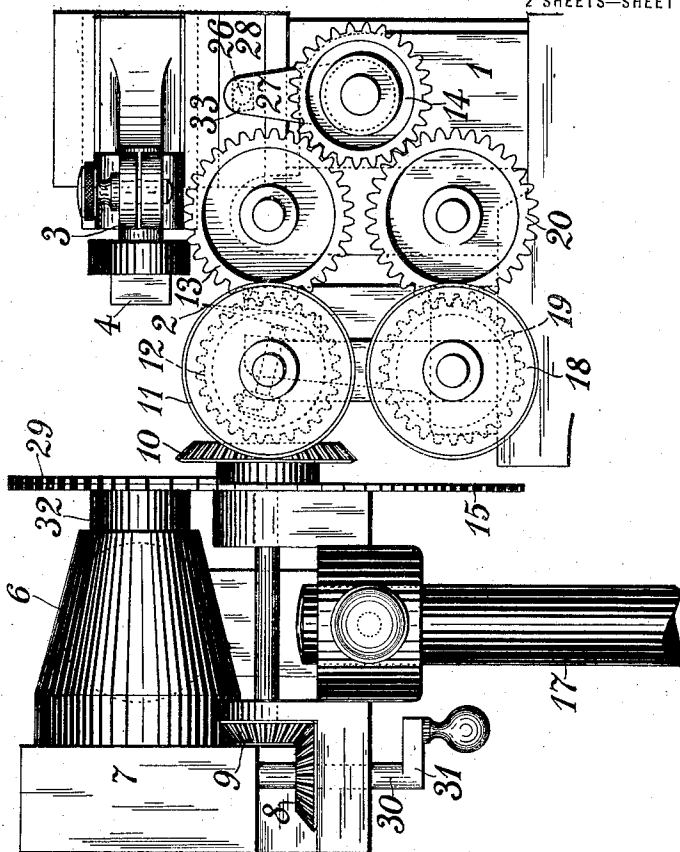
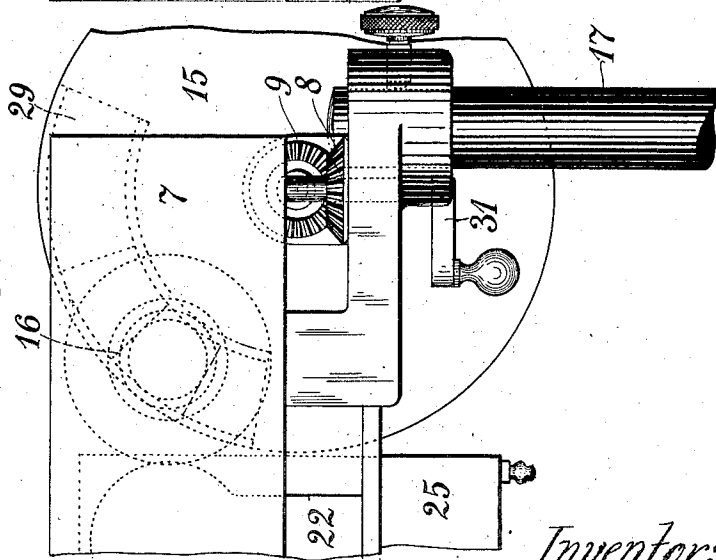


Fig. 3



Witnesses:-

D. F. Schilling
 Hermann Knoch

Inventor:-

Wilhelm Löw
 by D. F. Schilling
 his attorney.

UNITED STATES PATENT OFFICE.

WILHELM LÖW, OF HEIDELBERG, GERMANY.

APPARATUS FOR CINEMATOGRAPHICALLY TAKING FILM-NEGATIVES OF SUCCEEDING SECTIONS THROUGH AN OBJECT.

1,169,843.

Specification of Letters Patent.

Patented Feb. 1, 1916.

Application filed April 15, 1915. Serial No. 21,527.

To all whom it may concern:

Be it known that I, WILHELM LÖW, a subject of the German Emperor, and residing at Heidelberg, Germany, have invented certain new and useful Improvements in Apparatus for Cinematographically Taking Film-Negatives of Succeeding Sections Through an Object, of which the following is a specification.

The present invention has reference to an improvement in the art of cinematography, and relates more particularly to an improved method and apparatus for cinematographically taking film negatives of succeeding sections through an object, as largely used in scientific investigations, for instance in preparing anatomical, botanical or the like slides, and the invention essentially resides in the manner in which the apparatus for making such sections, the microtome, is positively coupled to the film and shutter operating mechanism of the cinematographic apparatus, the camera, so that the latter makes an exposure every time and immediately after the microtome has sliced a microsection off the object. Such a synchronized apparatus can then be used either in making what is called a section-ribbon, that is a continuous band of successive, edgewise adhering microsections, and then photographing each individual depending section as it passes in front of the lens, or in successively photographing the freshly bared surfaces of the object every time a section is sliced off. This latter method is the more reliable since the freshly cut surfaces are always sure to be in focus, while in the section-ribbon method the microsections are apt to be relatively displaced more or less.

In the accompanying drawings, there is shown a preferred construction of apparatus, which allows either one of these methods to be carried out, and it shows Figure 1 a plan view of the apparatus, comprising cinematographic apparatus and microtome, with the rear part of the latter cut away; Fig. 2 a front elevation of the microtome; Fig. 3 a front elevation of the camera, and Fig. 4 a side elevation of the entire apparatus.

The microtome 1 is provided with a fixed knife 2 and a vertically reciprocating clamp or holder 3 for the object 4. On turning the hand-wheel 5, the holder with the object makes a complete reciprocation for each complete rotation of the wheel 5. Simul-

taneously the object is advanced horizontally toward the knife the predetermined thickness of a section during the first part of the down-movement of the holder, before the object has reached the knife edge, as is well known in the art. Thus for each rotation of the handwheel a section is sliced off the object. After the up-movement of the holder has ceased and before the next down-movement commences, the object remains stationary for a brief space during which the exposure is made by the camera 6.

The dark box 7 of the camera contains the customary reels, the wheel train and other parts for feeding the film band, operating the shutter and for other purposes, and the wheel train is connected through bevel wheels 8, 9, 10 and 11, and the spurs 12, 13 and 14 with the shaft of the handwheel 5, and also with the revolving shutter 15 in such timed relation that on each rotation of the handwheel the shutter also revolves once and the film is advanced through the space of one picture negative. When the object 4 remains momentarily stationary in its uppermost position, the film also remains stationary, while the aperture or window 16 in the shutter 15 passes in front of the lens 32 of the apparatus 6. On the shutter continuing its rotation, the lens 32 is covered up and the object now starts on its down-movement, the knife slicing off a fresh section and the film band advancing the requisite distance. The shutter covers the lens until the object holder has again come to rest in its uppermost end-position, when the filmband also remains stationary again; the window 16 of the shutter frees the lens and a fresh exposure is made.

The camera can be displaced to a limited extent on the vertical pillar 17 in any suitable manner. In its upper end position (Figs. 3 and 4) in which the bevel wheel 10 meshes with the wheel 11, its lens 32 faces and is focused on the object 4, so that after each slicing operation, the successively revealed surfaces of the object are photographically taken.

If in place of the object surfaces the microsections are to be taken in succession as they are being sliced off, the microtome is tilted somewhat toward the camera so that the individual microsections, which adhere with their edges to one another in the making and form a so-called section-ribbon (see

dotted lines in Fig. 2), freely depend from the edge of the knife, and the camera is slid along its pillar 17 into the lower end-position, in which the bevel wheel 10 meshes with the wheel 18, when operative connection is had with the microtome through wheels 10, 18, 19, 20 and 14. The lens 32, in this position of the camera, is then focused on the space 21 (Fig. 2) of the section-ribbon.

At one side of the camera is provided a device for illuminating the object 4 or irradiating the transparent sections at 21: It consists of a source of light, for instance an electric lamp 22 with condenser 23, diaphragm 24 and cooler 25. In order to retain the object sufficiently long in its position of rest during the exposure, the stud 26 on crank arm 27 (Figs. 1 and 4) engages in a slot 33 of the sliding carriage 28 which supports the object holder 3. Thus, the object remains temporarily stationary in its uppermost as well as in its lowermost position, of which however only the former stop is used for the purposes of this invention.

For preventing the taking of pictures before everything is ready, the window 16 of the revolving shutter may ordinarily be kept closed by a slide 29, which serves also to adjust the width of the window.

Instead of starting and maintaining the operation of the described mechanism by the handwheel 5 of the microtome, any other suitable rotary part may be hand or power driven, for instance the crank 31 fixed on the shaft 30 of the camera train.

What I claim is:

1. In an apparatus for cinematographically taking film negatives of succeeding sections through an object, in combination, a motion picture camera including interdependent film feeding and shutter mechanisms, a microtome, and means positively coupling said film feeding and shutter mechanisms to said microtome and operating them in timed relation.

2. In an apparatus of the type set forth, in combination, a motion picture camera unit including interdependent film feeding and shutter mechanisms, a microtome unit, and motion transmission mechanism, positively coupling the said two units in such manner that an exposure is made on the film, through the shutter, of an object presented by said microtome every time the microtome has operated on this object.

3. In an apparatus of the type set forth, in combination, a motion picture camera including interdependent film feeding and shutter mechanisms, a microtome, means comprising a train of wheels for operatively coupling said camera and said microtome in synchronism, and means for focusing said camera on different levels relative to said microtome.

4. In an apparatus of the type set forth, in combination, a motion picture camera including film feeding mechanism and a revolving shutter; a microtome including a reciprocating object holder; and means operatively coupling said film feeding mechanism and said shutter to said object holder in such timed relation that an exposure is made on the film through said shutter every time and only after said object holder has temporarily come to rest in the focus of said camera.

5. In an apparatus of the type set forth, in combination, a motion picture camera unit including interdependent film feeding and shutter operating mechanisms; a microtome unit including a reciprocating object holder; means for intercoupling the said two units in timed relation; means for adjusting the vertical focusing level of said camera relative to said microtome; and means in connection with said camera for illuminating or irradiating the object to be photographed.

In testimony whereof I affix my signature.

WILHELM LÖW.