

A. WOLLENSAK.  
PHOTOGRAPHIC SHUTTER.

(Application filed Jan. 25, 1901.)

(Model.)

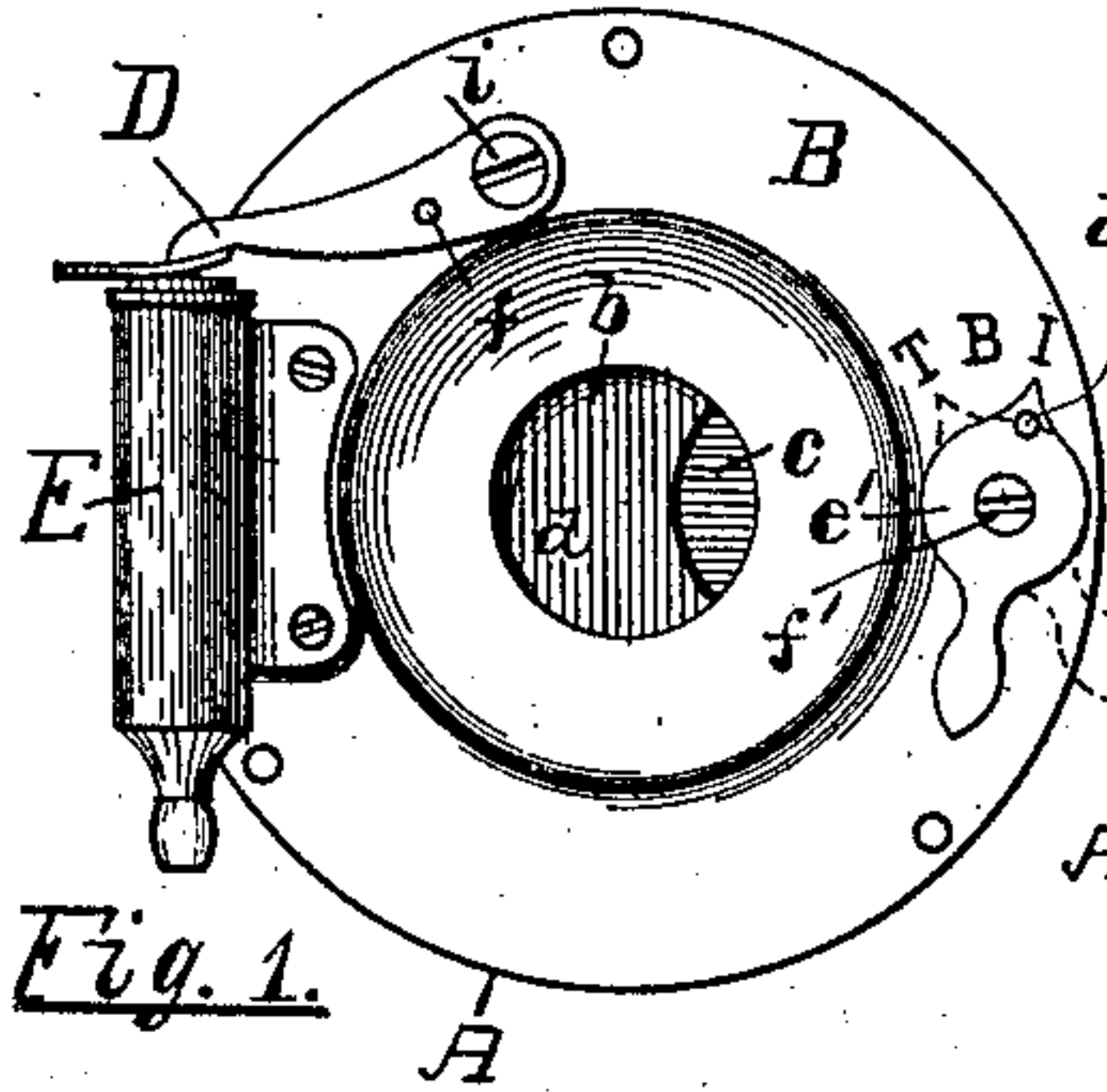


Fig. 1.

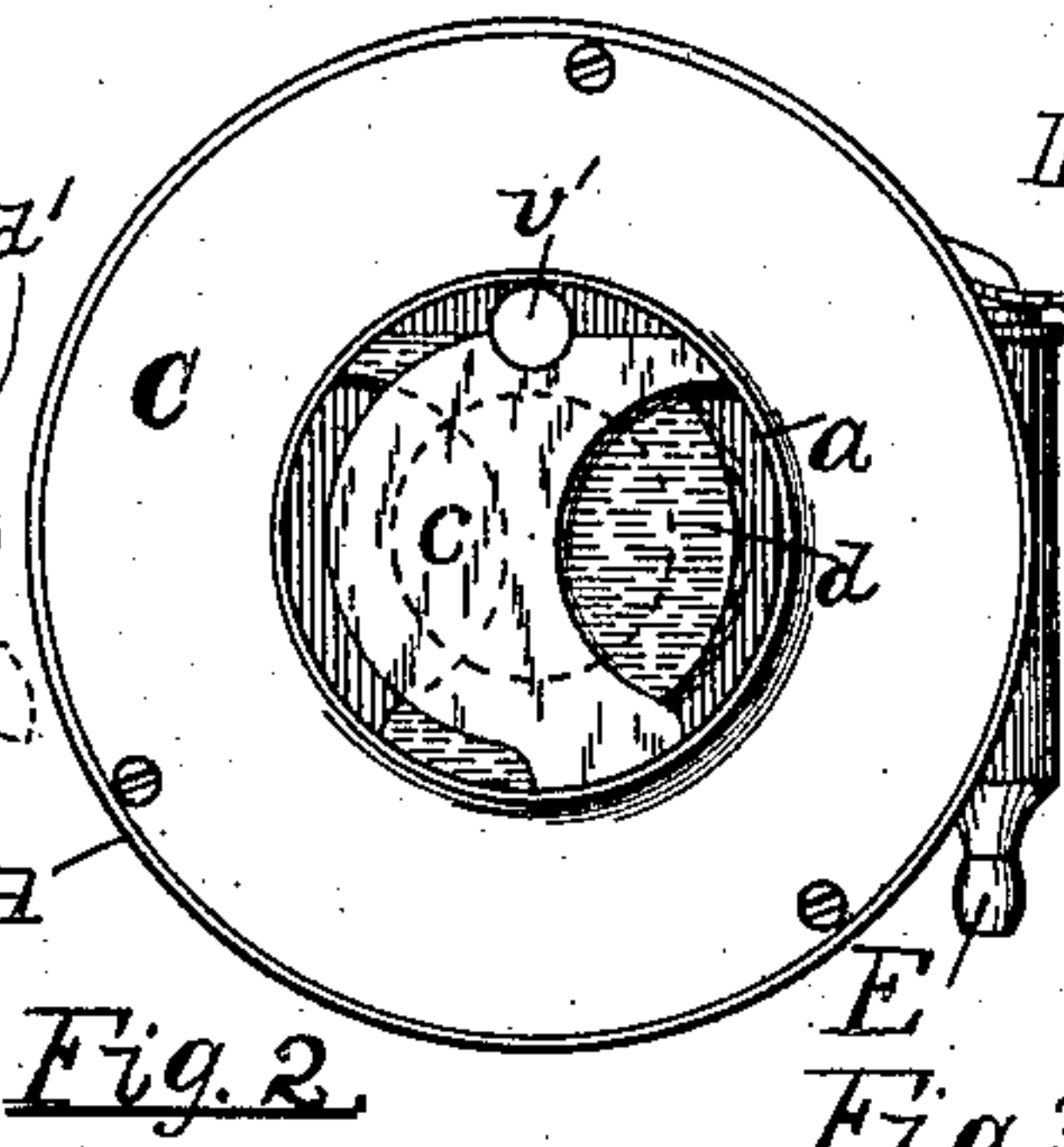


Fig. 2.

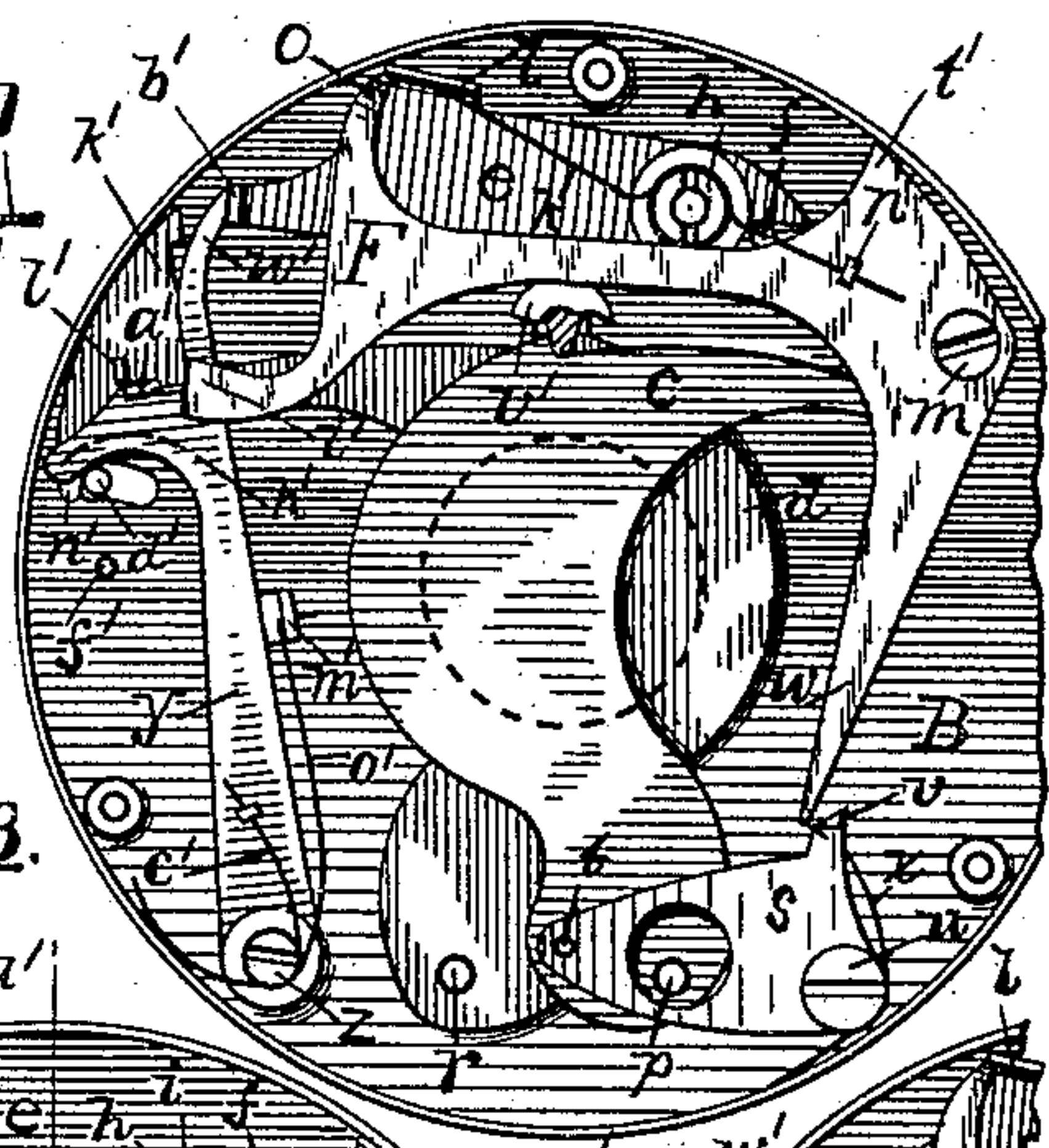


Fig. 3.

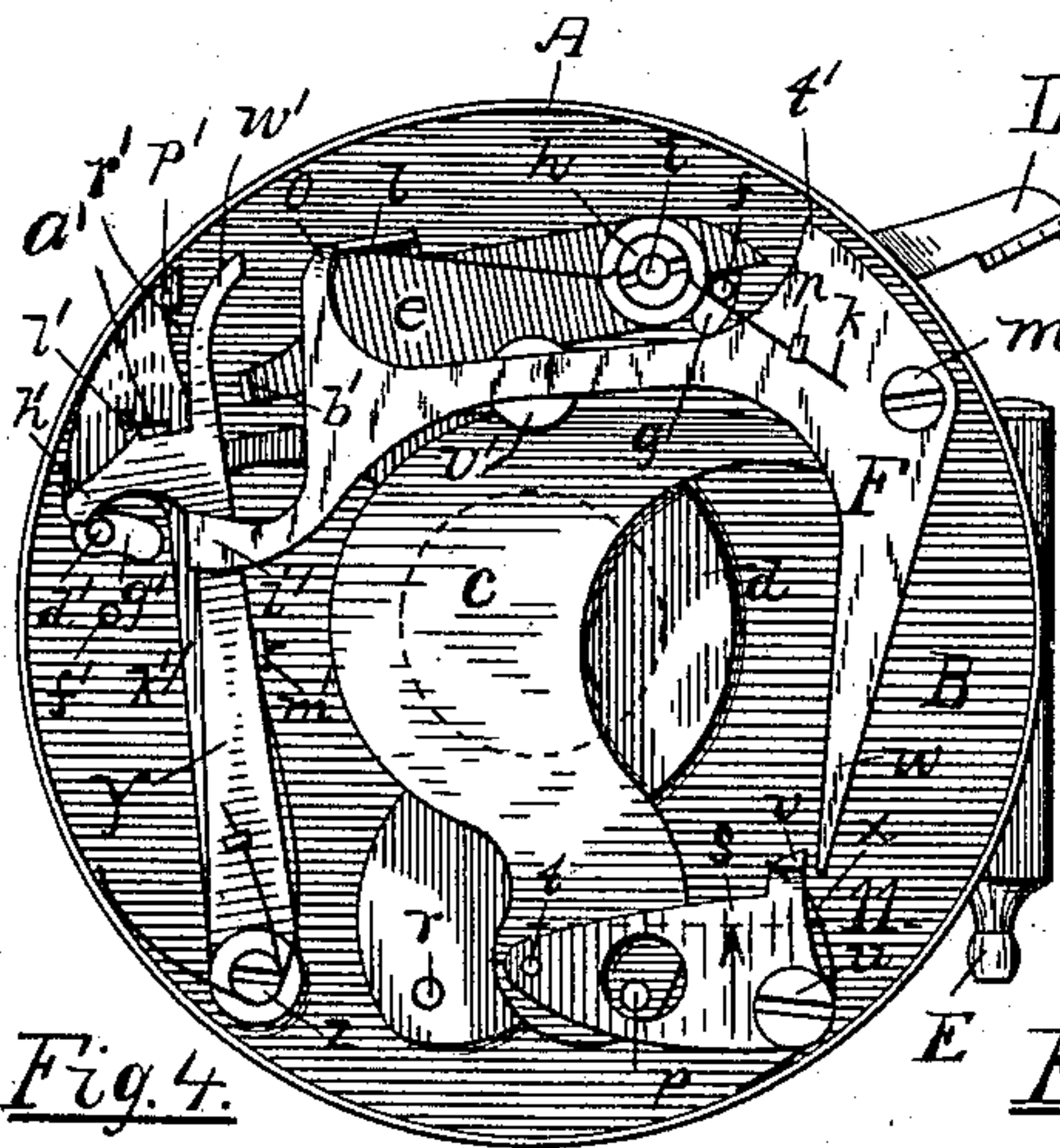


Fig. 4.

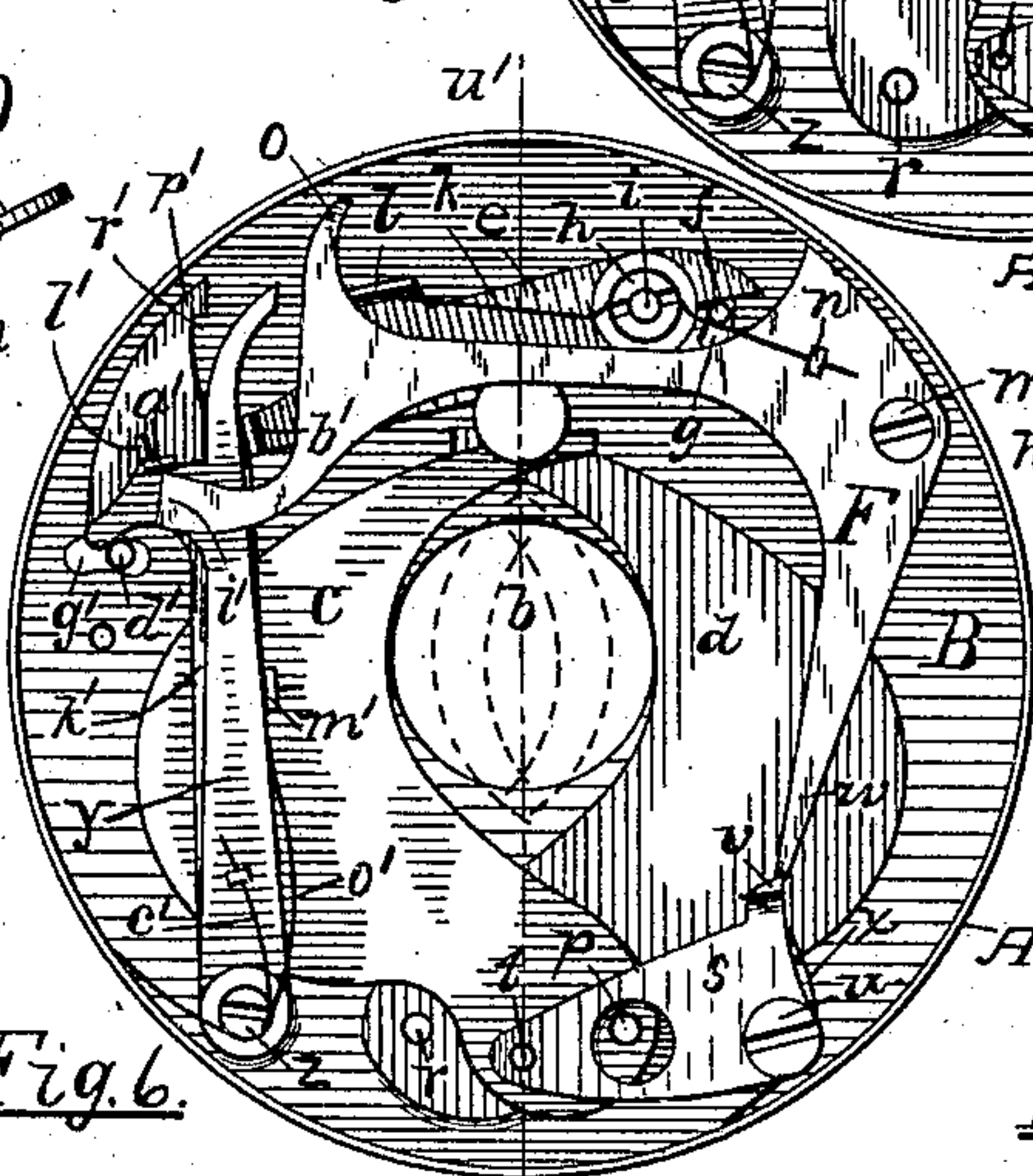


Fig. 6.

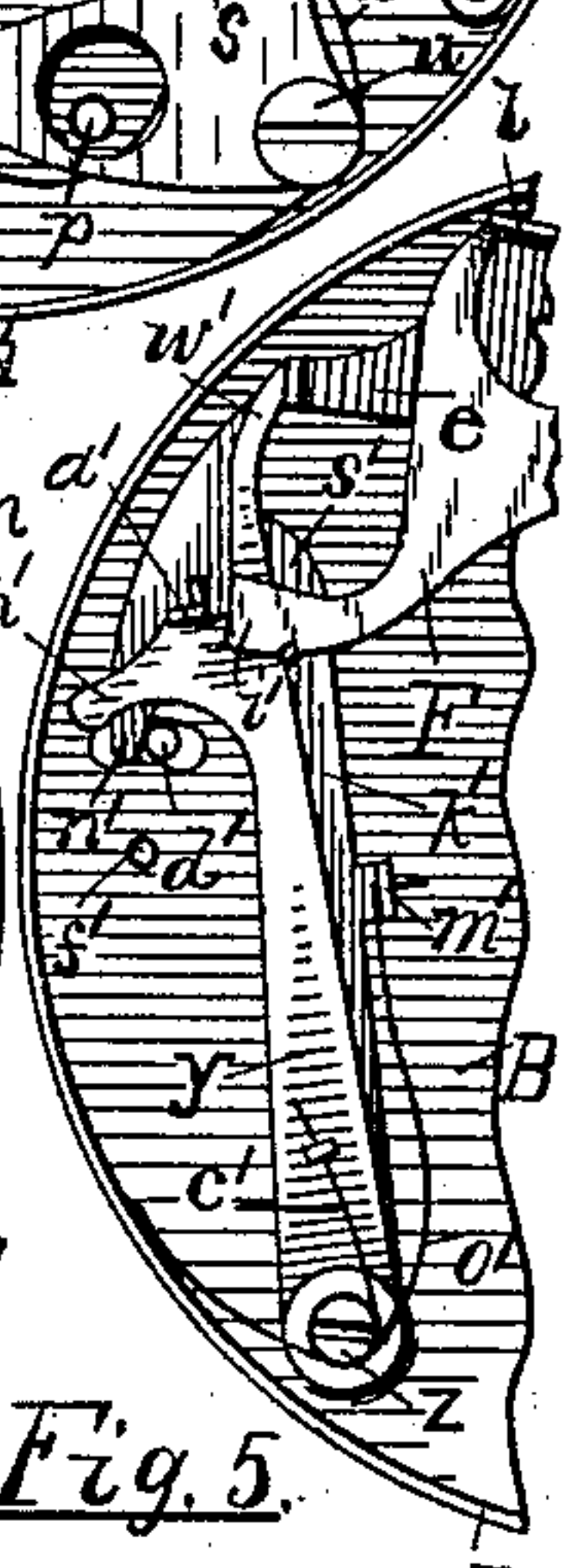


Fig. 5.

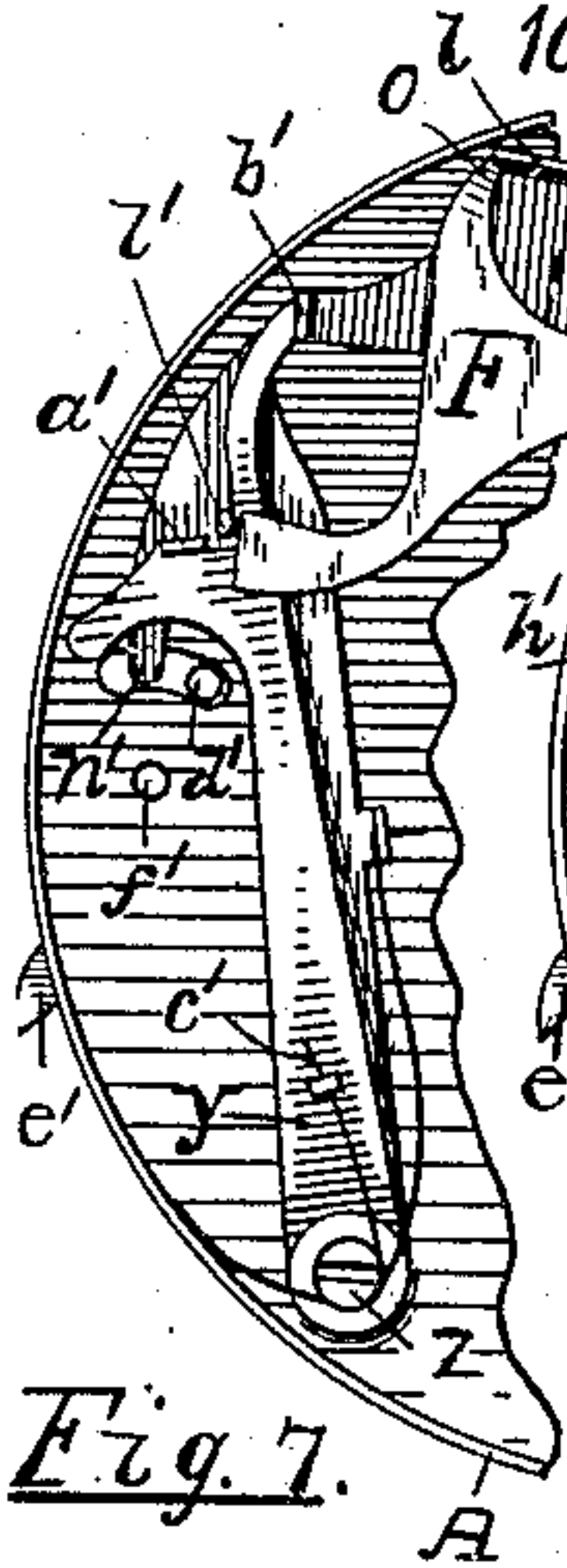


Fig. 7.

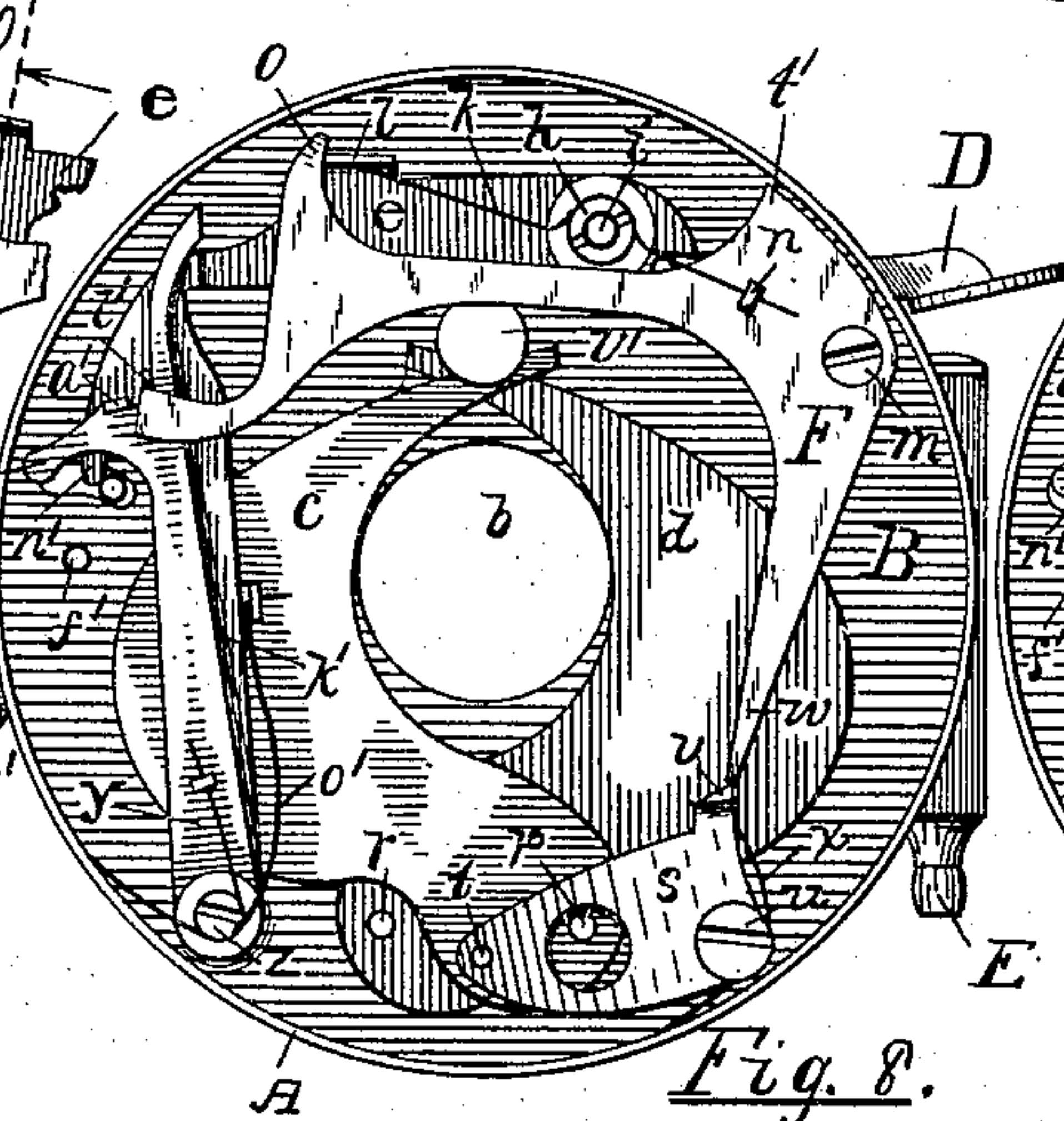


Fig. 8.

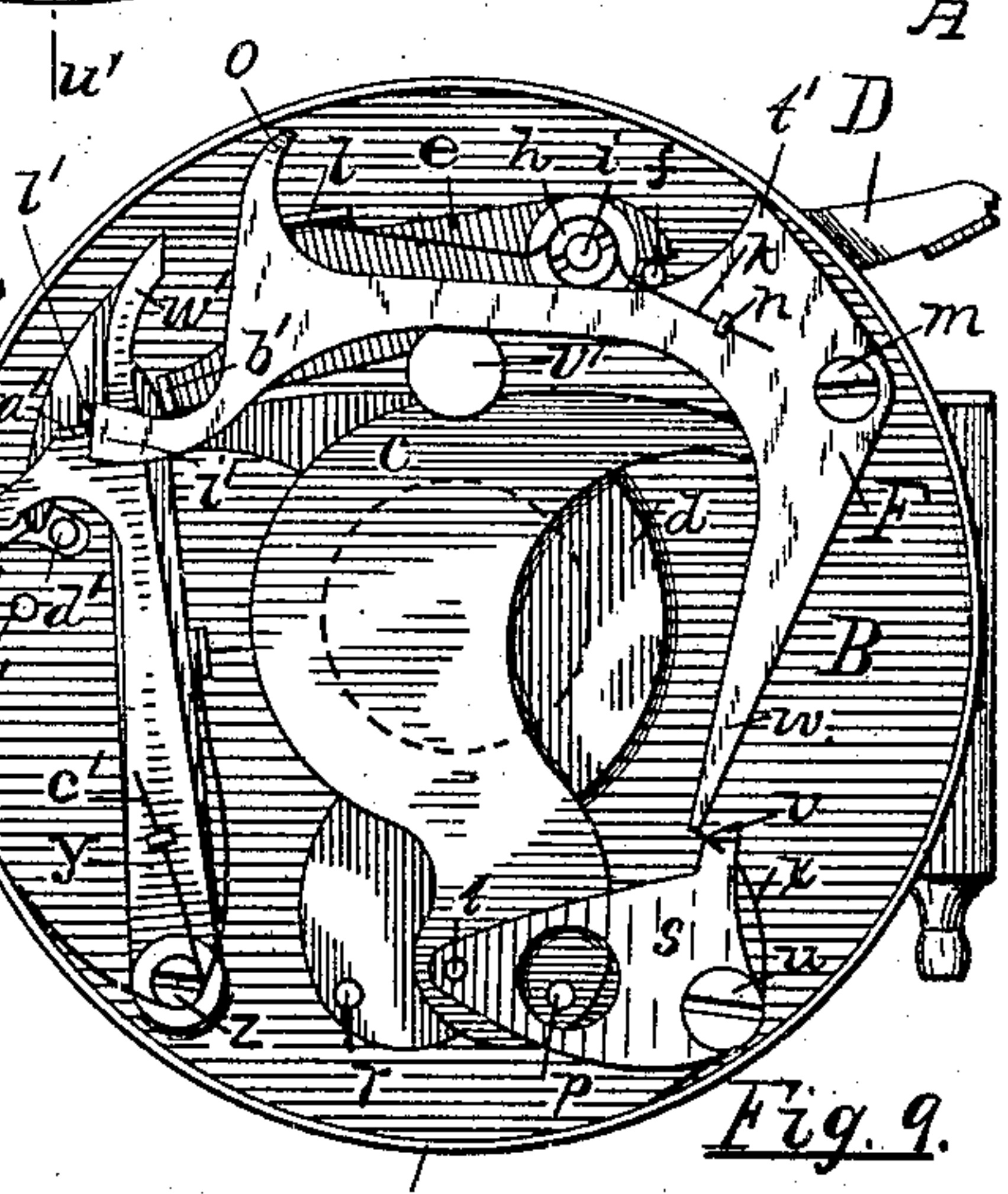


Fig. 9.

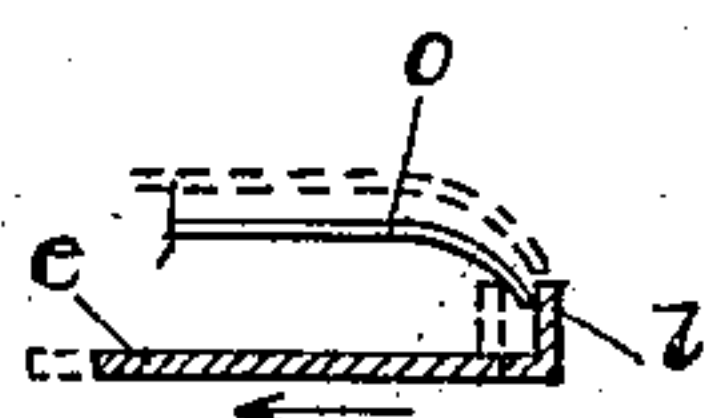


Fig. 10.

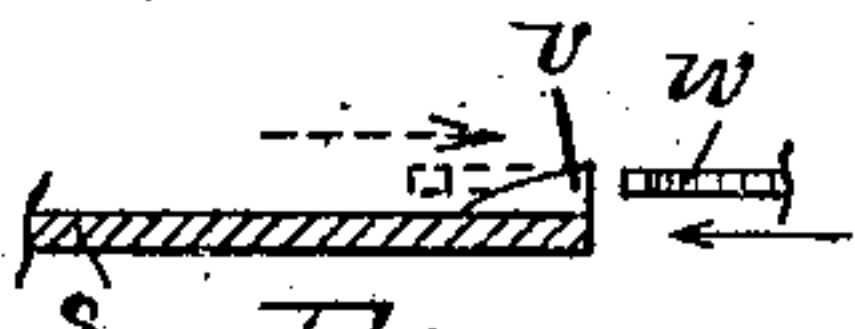


Fig. 11.

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# UNITED STATES PATENT OFFICE.

ANDREW WOLLENSAK, OF ROCHESTER, NEW YORK.

## PHOTOGRAPHIC SHUTTER.

SPECIFICATION forming part of Letters Patent No. 679,134, dated July 23, 1901.

Application filed January 25, 1901. Serial No. 44,730. (Model.)

*To all whom it may concern:*

Be it known that I, ANDREW WOLLENSAK, of Rochester, in the county of Monroe and State of New York, have invented a new and useful  
5 Improvement in Photographic Shutters, which improvement is fully set forth in the following specification and shown in the accompanying drawings.

My invention is a photographic shutter for  
10 general work, the main object of the invention being to produce such a device of simpler and fewer parts than many heretofore in use and a shutter that may be cheaply manufactured and furnished to the user at a compara-  
15 tively low price.

The invention is hereinafter fully described, and more particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a  
20 front view of the device, and Fig. 2 a rear view. Fig. 3 shows the interior of the device viewed from the rear, the rear plate or cover being removed, the various parts being in normal positions for instantaneous exposures.  
25 Fig. 4 is a similar view showing the positions of the parts at the instant preceding the exposure for instantaneous work. Fig. 5 shows the normal positions of the sway arms and levers for bulb exposures. Fig. 6 shows the po-  
30 sitions assumed by the parts of the device during a bulb exposure. Fig. 7 shows the normal positions of parts for time exposures. Fig. 8 shows the positions assumed by the parts while a time exposure is in progress.  
35 Fig. 9 shows the positions of the interior parts immediately after the termination of a time exposure. Fig. 10 is a cross-section of the actuating-lever, taken on the dotted line 10 in Fig. 7. Fig. 11 is a section of the exposure-  
40 lever on the dotted line 11 in Fig. 4. Figs. 1 and 2 are drawn full size, Figs. 3 to 9, inclusive, to a scale one and one-half size, and Figs. 10 and 11 to larger scales.

Referring to the figures, A is a circular me-  
45 tallic case of common form for inclosing the interior parts of the shutter covered in front by a plate B, Fig. 1, and at the rear by a plate C, Fig. 2, both being formed with central exposure-openings, the latter plate having a  
50 threaded flange *a*, of usual form, to screw onto the camera.

*b*, Figs. 6 and 8, is the central exposure-opening through the shutter, adapted to be closed by pivotal overlapping blades *c d*, adjacent to and parallel with the inner face of  
55 the front plate B.

*e* is a pivotal actuating-lever for the interior parts, operated by an exterior thumb-lever D, Fig. 1, held pivotally, at *i*, to the plate B, in position to be operated by the plunger  
60 of an air-pump E, of common construction, secured to the front plate B. The thumb-lever D is provided with a pin *f*, Figs. 1, 3, and 6, extending through a slot *g* in the plate B, in position to engage the actuating-lever *e*  
65 and turn it upon the axial stud *h*, into which the pivot-screw *i* of the thumb-lever D is threaded. The lever D normally rests upon the pump-plunger, as shown in Fig. 1, but may be raised, as shown in Figs. 4 and 9, by  
70 the thumb of the operator or by bulb-pressure to tilt the actuating-lever *e*.

A master operating-lever F, Figs. 3 to 9, is provided within the case, pivoted upon a stud *m*, rigid in the plate B. A slender spring  
75 *k*, held upon the stud *h*, has two branches, one engaging the lever *e* and the other engaging the lever F in a rest *n*, which spring tends to keep said levers in normal positions. (Shown in Fig. 3.) The master-lever is  
80 formed with four branches, two at either end, each having an operating terminal, one, *t'*, meeting the wall of the case A, constituting a stop for the lever. The branch *o* is bent downward at its end, as shown in Fig. 10, in  
85 position to be engaged by a projecting part *l* of the actuating-lever *e*, so when turned downward by the thumb-lever, as stated, the master-lever will be carried with it, as clearly  
90 shown in Fig. 4.

The closing blades *c d* are pivoted, respectively, on studs *p r*, rigid with the plate B, being immediately controlled by an exposure-lever *s*, a pin *t*, rigid in said lever, engaging the blades between the pivot-bearings *p r*.  
95 The lever *s*, pivoted on a fixed stud *u*, is formed with a projection or tip *v* in position to be engaged by the branch *w* of the master-lever as the latter is turned by the spring *k*, as above stated. The tip *v* is inclined or  
100 slanted, as shown in Fig. 11, so that when the branch *w* passes it by the action of the



actuating-lever *e* the exposure-lever *s* will not be moved, the branch *w* yielding laterally and merely gliding past the tip without affecting anything; but when the arm or  
 5 branch *w* moves toward the left it will tilt the lever *s*, as shown in Fig. 6, and so open the blades *c d* to effect an exposure. Normally the branch *w* of the master-lever stands to the left of the tip *v*, (see Fig. 3;) but when  
 10 the master-lever is depressed by the lever *e* the branch will pass to the right of the tip, as shown in Fig. 4, without affecting the exposure-lever *s*; but when the master-lever returns to its normal position by the action  
 15 of the spring *k* the lever *s* will be turned, as appears in Fig. 6, and cause an instantaneous opening and closing of the exposure-opening *b*, the closing of the blades *c d* being effected by the action of a spring *x*, actuating the  
 20 lever *s*.

The levers *e* and *F* are eccentrically pivoted, on account of which the bearing between them shifts as they move together and finally terminates, (see positions in Fig. 4,) the latter lever being released and returned to its  
 25 normal position by the spring *k*. This releasing of the master-lever does not take place until after the branch *w* passes to the right of the tip *v* of the lever *s*, (see Fig. 4,) so that  
 30 a return of the master-lever by the spring *k* will serve to open the blades, as stated. When the actuating-lever *e* is depressed by the thumb-lever, the tension of the spring *k* is materially increased both as to its pressure  
 35 against the actuating-lever and the master-lever *F*, the spring being free to turn on the stud *h*. As the levers *e* and *F* descend, the pressure of the spring on the latter lever increases, so that by the time it is released or  
 40 escapes from the lever *e* the spring will be sufficiently strained to return the lever *F* to its normal position by a quick motion, notwithstanding that in its return it encounters the resistance of the spring *x* on the exposure-  
 45 lever *s*. On account of this construction the spring *k* may be very light, which is desirable, as it renders the operating of the shutter lighter to the touch than if a heavier single spring were employed to control the master-  
 50 lever. Normally the projecting part *l* of the lever *e* is above the branch *o* of the master-lever; but when the latter is released from the lever *e*, as stated, the terminal of the branch *o* moves above the part *l*, as appears  
 55 in Fig. 6, and in returning to its normal relative position the part *l* must crowd by the branch *o*. This returning of the lever *e* when below the branch *o* is provided for, as shown in Fig. 10. The branch *o* bends normally  
 60 down to be engaged by the part *l* when moving toward the left, but when moving in the opposite direction said part glides under the branch *o*, the latter springing back, as indicated, to let it pass without affecting the mas-  
 65 ter-lever.

The closing blades *c d* lap across each other

and cross the vertical diametrical line of the exposure-opening, (see dot-and-dash line *u' u'*, Fig. 6,) one blade turning to the left and the  
 70 other turning equally to the right when an exposure is made. The blade *d*, which turns to the right, is pivoted at *r* on the left of said vertical line, and the blade *c*, which turns to the left, is pivoted at *p* at the right of said  
 75 line, the two blades being independent of each other and having a shear motion. The pin *t* of the exposure-lever *s* engages both blades at a point on said line *u' u'*, midway between the pivots *r p*, turning each blade independently and exactly alike to open or close the  
 80 exposure-opening. This construction of the parts causes the partial openings made between the blades during their forward and backward motions to be always central across the exposure-opening, as indicated by dotted  
 85 curved lines in Fig. 6. This is an important matter, particularly in instantaneous work, as it produces better results and more accurate pictures are obtained, for when the blades thus evenly open and close the shaft of light  
 90 from the object photographed is kept at all times during the two periods of the actual motions of the blades central upon the plate. If the blades were to open more rapidly at the  
 95 top, for instance, and consequently close more tardily there, the upper part of the plate would be exposed to the light much longer in proportion to the duration of the whole exposure than the lower part, which would necessarily result  
 100 in an imperfect picture. For longer exposures—as in timework, for example—this difference in the manner of forming the opening would not be important, as all parts of the plate in case of the imperfect method of making the  
 105 exposure would be exposed practically during the same interval of time. The blades are confined at their upper free ends in a rigid guide *v'*, which also constitutes a stop for the blades, the latter being formed with shoulders,  
 110 as shown in Fig. 1, to meet the stud. This stop, being distant from the pivot-bearings of the blades and on the opposite side of the centers of gravity of the blades from the bearings, prevents the blades from rebounding and  
 115 partially reopening the exposure when suddenly closed, as is liable to be the case when the stops and the pivotal bearings are on the same side of the centers of gravity of the blades, as in some shutters.

For bulb exposures a sway-arm *y* is brought  
 120 into use by turning a setter *e'*, Fig. 1, the arm being held upon a pivot *z*, rigid with the plate *B*. This setter, held to turn on a stud *f'*, rigid with said plate, is provided with a pin *d'*, Figs. 1, 3, and 5, reaching through a  
 125 slot *g'* in the plate to engage a branch *h'* of the arm. The latter is normally urged toward the right by a spring *c'*, but is held and controlled by said pin *d'*. This arm is formed with a projection *a'* and is curved at its free  
 130 end to engage and coact with the extreme end *b'* of the lever *e*. (See Figs. 3, 6, and 8.) In



bulbwork the actions of the levers *e*, *F*, and *s* and of the blades *c* *d* are the same as described for instantaneous work save that when the lever *F* is released from the lever *e* it does not immediately return, its branch *i* being caught under the projection *a'* of the arm *y*. (See Fig. 6.) A complete return of the master-lever is necessary to release the lever *s* and terminate the exposure, which is effected by releasing the bulb and permitting the lever *e* to return to its place. In doing this said lever presses the concave part *w'* of the arm, crowding the latter back to free the master-lever from the projection *a'*, which terminates the exposure, which actions of the parts will be fully understood by viewing Fig. 6. In these actions of the parts the actuating-lever *e* continuously controls the arm *y*, the control of the master-lever by said arm being while the latter is permitted to turn to the right by the actuating-lever. The latter moves the master-lever while turning in one direction and the sway-arm while turning in the opposite direction.

For time exposures the setter *e'*, Fig. 1, is further turned to point to "T," "B" and "I," respectively, being indicated for bulb and instantaneous work. This further turning of the setter with its pin *d'* permits a second sway-arm *k'*, Figs. 5 and 6, to come into play, acting with the primary arm *y*, it being also pivoted on the stud *z*, independent of the levers *e* *F*. This arm *k'* is formed with a projection *l'* and branch *n'*, the latter to be engaged by the setting-pin *d'* to control the arm, a spring *o'* pressing a projection *m'* of the arm serving to hold the latter normally to the right. In Fig. 7 is shown the normal positions of the two sway-arms, the master-lever and the actuating-lever for timework, the setter being turned to indicate "T." In this position of the parts the projection *l'* of the secondary sway-arm is adjacent to the branch *i'* of the master-lever, the extreme end *p'*, Fig. 6, of said arm meeting the end *b'* of the actuating-lever being thus temporarily held back against the action of the spring *o'*. If now the thumb-lever be raised to effect an exposure, the parts will assume substantially the positions shown in Fig. 6; but upon releasing said lever said parts will take the positions shown in Fig. 8. In this instance neither of the levers *e* *F* is in its normal position, the former being caught under the bend *w'* of the primary sway-arm and the lever *F* caught under the projection *l'* of the secondary sway-arm, the exposure thus continuing. To terminate the exposure, the thumb-lever, having returned about half-way to its normal position on the pump, is again raised, which will release the master-lever, this being effected by the descending lever *e* pressing a swell *s'* of the arm *k'*, pushing the latter with its projection *l'* back from the master-lever, all parts momentarily assuming the positions shown in Fig. 9. A releas-

ing now of the thumb-lever will permit the parts to again assume the positions shown in Fig. 7 normal for timework.

The sway-arm *k'* is formed with a terminal part *p'*, Figs. 4 and 6, which, when the parts are in position for timework, normally meets the end *b'* of the actuating-lever as a stop against the action of the spring *o'*. Beneath the part *p'* is a recess *r'*, which permits of the arm *k'* turning slightly toward the right when the lever *e* descends into position to have the projection *l'* engage the master-lever, as stated. In these various actions of the sway-arms and the actuating and master levers the arms are engaged by the actuating-lever and in turn engage the master-lever, said actions being alternated. Furthermore, the master-lever is intermediate between the sway-arms or detents at one end of said lever and the exposure-lever at the opposite end of the master-lever and simultaneously engages both.

With this shutter the iris diaphragm in common use may be employed when found desirable.

What I claim as my invention is—

1. In combination with the exposure mechanism of a photographic shutter a pivotal master-lever formed with two branches at either end, each branch having an operating-terminal, and means for turning said master-lever on its bearing, substantially as shown and described.
2. A photographic shutter comprising a pivotal spring-actuated master-lever, an actuating-lever for the master-lever, a pair of closing blades and an exposure-lever for controlling them, the exposure-lever and the master-lever having directly-engaging projections, substantially as shown and described.
3. In combination with the exposure mechanism of a photographic shutter, an eccentrically-pivoted pivotal master-lever, and an eccentrically-pivoted actuating-lever to engage and move the master-lever, the bearing of the actuating-lever upon the master-lever being adapted to shift as to area during the movements of said levers, substantially as and for the purpose set forth.
4. In combination with the exposure mechanism of a photographic shutter a master-lever to operate the exposure mechanism, and an actuating-lever for controlling the master-lever, and a controlling-spring common to both levers, substantially as and for the purpose specified.
5. In combination with the exposure mechanism of a photographic shutter a master-lever to operate the exposure mechanism, and an actuating-lever for controlling the master-lever, and a controlling-spring having one branch engaging the master-lever and another branch engaging the actuating-lever, substantially as and for the purpose specified.
6. The combination, in a photographic shutter, with the exposure mechanism, of a spring-



actuated master-lever, and an actuating-lever for the master-lever, and an exterior thumb-lever to operate the actuating-lever coaxial with said actuating-lever, substantially as and for the purpose specified.

7. In combination with the exposure mechanism of a photographic shutter, a pivotal master-lever having branched end and adapted for operating the exposure mechanism, and an actuating-lever held to turn either way on its bearing and adapted to move the master-lever when turning in one direction and to pass it unaffected when turning in the other direction, the master-lever being adapted to escape from the actuating-lever when both are moving together, substantially as shown and described.

8. In a photographic shutter a pair of closing blades, a master-lever adapted to turn either way upon its bearing, an exposure-lever for controlling the closing blades, the master-lever being adapted to move the exposure-lever when turning in one direction and to pass without moving it when turning it in the other direction, and means for actuating the master-lever, said master-lever and actuating-lever being eccentrically pivoted to form a shiftable bearing between them, substantially as and for the purpose specified.

9. In a photographic shutter a pair of coacting closing blades lapping across each other and across a diametrical line of the exposure-opening, each blade being held upon a pivot bearing on the side of said diametrical line opposite from that occupied by the body of the blade, and means for turning said blades upon their bearings, substantially as shown and described.

10. A photographic shutter having a pair of coacting blades crossing each other and a diametrical line of the exposure-opening, each blade being held upon a pivot bearing on the side of said diametrical line opposite that occupied by the body of the blade, and an actuator for said blades having a bearing upon each of the latter between said pivot-bearings, and means for moving said actuator, substantially as shown and described.

11. A photographic shutter having a pair of closing blades lapping across each other, each held at one end upon a fixed pivotal bearing, and a stop for said blades at the ends opposite said pivotal bearings, and means for operating said blades, substantially as and for the purpose set forth.

12. In combination with the exposure mechanism of a photographic shutter, a master-lever for operating the exposure mechanism and an actuating-lever for the master-lever, a spring-controlled sway-arm adapted to be engaged by the actuating-lever and to engage the master-lever, said sway-arm being held pivotally independent of the lever mechanism, and means for operating the actuating-lever, substantially as shown and described.

13. In combination with the exposure mechanism

of a photographic shutter, a master-lever for operating the exposure mechanism and an actuating-lever for the master-lever, a spring-controlled sway-arm adapted to be engaged by the actuating-lever and to engage the master-lever, the engagement of the sway-arm by the actuating-lever and of the master-lever by the sway-arm being alternated, substantially as shown and described.

14. In combination with the exposure mechanism of a photographic shutter, a master-lever for operating the exposure mechanism and an actuating-lever for the master-lever, a spring-controlled sway-arm adapted to be engaged by the actuating-lever and to engage the master-lever, the actuating-lever causing the sway-arm to move twice during the operation of making an exposure, with interval between, and the action of the sway-arm upon the master-lever being between said two movements of the sway-arm, substantially as and for the purpose specified.

15. In combination with the exposure mechanism of a photographic shutter, a master-lever for operating the exposure mechanism and an actuating-lever for the master-lever, adapted to move the latter temporarily and release it, and a spring-pressed sway-arm controlled by the actuating-lever adapted to engage and detain the master-lever after released by the actuating-lever, and means for operating the actuating-lever, substantially as shown and described.

16. In combination with the exposure mechanism of a photographic shutter, a master-lever and an actuating-lever to move the master-lever, a sway-arm having a projection to engage the master-lever, a spring to control the sway-arm, the actuating-lever being adapted to move the sway-arm against the action of the spring to disengage the master-lever, substantially as shown and described.

17. In combination with the exposure mechanism of a photographic shutter, a master-lever and an actuating-lever to move the master-lever, a sway-arm having a projection to engage the master-lever, a spring to control the sway-arm, the actuating-lever being adapted to move the sway-arm against the action of the spring to disengage the master-lever, the actions of the actuating-lever upon the sway-arm being alternated, substantially as set forth.

18. In combination with the exposure mechanism of a photographic shutter, a master-lever, and an actuating-lever adapted to move either way upon its bearing, a sway-arm having a projection to engage the master-lever, and a spring to control the sway-arm, the actuating-lever being adapted to move the master-lever while turning in one direction and to move the sway-arm while turning in the opposite direction, substantially as set forth.

19. The exposure mechanism of a photographic shutter in combination with a master-lever, an actuating-lever to control the



master-lever, a primary sway-arm in position to engage the master-lever and to be engaged by the actuating-lever, a secondary sway-arm adapted to engage the master-lever and  
 5 be disengaged therefrom by the actuating-lever, and means for operating the actuating-lever, substantially as shown and described.

20. The exposure mechanism of a photographic shutter in combination with a master-lever, and an actuating-lever, a primary  
 10 and a secondary sway-arm copivotal and held to act independent of the lever mechanism, said sway-arms both being adapted to engage the master-lever and to be controlled by  
 15 the actuating-lever, and means to operate the latter, substantially as set forth.

21. A photographic shutter comprising a master-lever and an actuating-lever to control the master-lever, a pair of closing blades  
 20 and an exposure-lever for controlling the closing blades, and a sway-arm adapted to control the master-lever, the latter being intermediate between said sway-arm and the exposure-lever and simultaneously engaging  
 25 both, and means for operating the actuating-lever, substantially as specified.

22. In combination with the exposure mechanism of a photographic shutter a master-lever and an actuating-lever to control the master-lever, and copivotal spring-actuated sway-  
 30

arms to engage the master-lever and be engaged by the actuating-lever, and a shiftable stop-pin for controlling the sway-arms, and means for operating the actuating-lever, substantially as set forth.

23. The exposure mechanism of a photographic shutter in combination with a master-lever and a coacting actuating-lever, a primary and a secondary sway-arm held to turn independent of the lever mechanism, said sway-arms being copivotal and adapted  
 40 to engage the master-lever and be controlled by the actuating-lever, and means for operating the latter, substantially as set forth.

24. In combination with the exposure mechanism of a photographic shutter, a master-lever and an actuating-lever for engaging and moving the master-lever, both of said levers being eccentrically pivoted on different pivots, the bearing between said levers being  
 45 adapted to cease or terminate while moving, substantially as described and shown.

In witness whereof I have hereunto set my hand, this 18th day of January, 1901, in the presence of two subscribing witnesses.

ANDREW WOLLENSAK.

Witnesses:

ENOS B. WHITMORE,  
 M. B. SMITH.

DISCLAIMER.

679,134.—*Andrew Wollensak*, Rochester, N. Y. PHOTOGRAPHIC SHUTTER. Patent dated July 23, 1901. Disclaimer filed November 22, 1911, by the assignee, *Wollensak Optical Company*.

Enters this disclaimer—

“To the following claims of said Letters Patent, 2, 3, 8, 12, 13, 14, 15, 16, 17, 18, 21, and 24.”

[OFFICIAL GAZETTE, *December 5, 1911.*]