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A.D. 1907

(Under International Convention.)

Date claimed for Patent under Patents Act, 1901,
being date of first Foreign Application (in } 19th Feb., 1906
France),

Date of Application (in the United Kingdom), 18th Feb., 1907

At the expiration of twelve months from the date of the first Foreign Application,
the provision of Section 1 (2) of the Patents Act, 1901, as to inspection of
Specification, became operative

Accepted, 19th Dec., 1907

COMPLETE SPECIFICATION.

"Improvements in or relating to Shutters for Photographic Apparatus"

I, WILHELM KENNGOTT, Engineer, of 64 Rue de Saintonge, Paris, France, 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:—

5 This invention relates to a photographic shutter of the type described in the Specification of British Letters Patent No. 1740/1905 and which comprises time exposure parts and instantaneous exposure parts independent of each other. The device according to this invention is characterised by the fact that the spring which operates the instantaneous exposure parts and also the lever which
10 sets the same, are unemployed during the operation of the time and bulb exposure parts, the entire movement of these latter being effected by the lever which disengages the shutter when instantaneous exposures are desired. Owing to this arrangement it will be obvious that even should the said spring be set prior to making a time or bulb exposure no effect will be noticeable except the
15 return of the instantaneous operating lever to its unset position.

Other features of this invention will appear from the following description, reference being had to the accompanying drawings in which:—

20 Figure 1 is a front elevation of the apparatus with the cover removed the sectors of the shutter proper being shown merely in broken lines so as to render the figure clearer.

Figure 2 is a view of the inner face of the cover showing the iris diaphragm.

Figure 3 is a vertical cross-section on the line A—A of Figure 2.

The casing 1, preferably made in one piece of some light material such as cast and turned aluminium, carries in its interior:

25 1. A spring drum 2, which can be wound up or set from the outside by means of a key or lever 3.

2. A cam 28 enabling the time of opening of the shutter to be fixed as desired from a number of seconds down to the quickest time, for instance, $\frac{1}{300}$ of a second.

30 3. A disengaging device controlled by an outside lever 4 this device being used for releasing the shutter for time exposure and snapshots.

[Price 8d.]



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The casing 1 also contains a piston cylinder 5 by means of which the disengagement can be effected by means of a pneumatic release and it is combined with a pneumatic brake or dash pot 6, of which the action is regulated by the cam 28, and which acts on the drum in accordance with the time of opening of the shutter.

The pneumatic brake, is arranged tangentially to the circumference of the shutter so that it is arranged with its base throughout, or nearly throughout the whole of its length, let into the edge of the casing or into the casing, a lug 6¹ soldered to the brake cylinder being used for securing it to the casing 1 by means of a screw.

The shutter mechanism consists of a ring 7 with slots 8 in which engage pins 9 on the diaphragm sectors 10 pivoted at 12 12¹ and 12² to lugs 11 forming part of the casing.

The ring 7 can have a movement of a limited amplitude about the inner bearing 13 supporting it, the said movement being given either by the drum 2 to which it can be connected by a rod 14, for snapshots, whatever be the time of opening of the shutter, or by means of the disengaging device itself for time exposures.

The spindle of the drum 2 secured to the upper plate and to the operating device 3, is provided with two stops 15 and 16, limiting its movement by their contact with the part 17. When the drum is set by moving the lever 3 in the direction of the arrow 18 the stop 15 passes behind the projecting end 19 of a bent part 20 pivoted at 12¹ and controlled by a spring 22 secured at 21 and bearing with its other end against the casing. The long arm of the part 20 rests against a projection 23 on a part 24 which is pivoted at 25 and connected by pin and slot connection to the disengaging lever 4 which rotates about the point 26.

The part 24 is provided with an arm or projection 27 which rests against the piston of the cylinder 5. This arm plays the same part as the lever 4 when the pneumatic ball is used for effecting the release of the shutter.

The movement which is given to the cam 28 in accordance with the desired period of time of opening of the sectors brings about the rocking of a part 29 pivoted at 30. This part is provided with an arm 31 which engages with the piston 31¹ of the pneumatic brake cylinder 6.

The arm 31 has a curved form or such shape that it always normally engages, whatever be the position of the part 29, in a slot made in the brake piston 31¹, and consequently always attacks the piston at the same point, whatever be the latter's position, without any loose play.

This arm 31 is connected by a rod 32 to a part 33 provided with a finger 34 behind which passes the stop 16 secured to the spindle of the drum 2 when the latter is being set. A spring 35 rests against the part 33 and has the tendency to bring the latter into the position determined by the cam 28.

A second cam 36 arranged under the cam 28 moved at the same time as the latter by means of the milled disc 37 provided with indications of the duration of shutter opening for snapshot and for time exposures, varies the position of a lever 38 pivoted at 39. The lever 38 itself moves a part 40 pivoted at 41 and resting against a pin 42 secured to the rod 14. A spring 43 mounted on the part 40, has the tendency to apply the pin 42 against the lever 40, so that for snapshots a notch 44 in the rod 14 can engage the pin 45 of the ring 7 and drive the latter the moment when the apparatus is disengaged, in order to produce the double movement of opening and closing the sectors.

It should be pointed out here, that, as has just been seen, unlike in ordinary apparatus, it is the spindle of the drum 2 to which the stops 15 and 16 are secured, which moves under the action of the spring, the casing or jacket of the drum being able, owing to this arrangement, to have any shape in accordance with its position in the apparatus.

Before examining how the opening and the closing of the shutter for time

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exposures may be effected by the single operation of the disengaging device, it is advisable to consider the working of the apparatus for snapshots

Let it be first assumed that it is desired to obtain a time of opening of the sectors equal, for instance, to $\frac{1}{300}$ of a second. It is obvious that at that speed the pneumatic brake will not have to act. Therefore by turning the disc 37
5 the cam 28 will be brought into such position, that, by means of the parts 29, 31 and the rod 32, the part 33 will be moved out of the path of the stop 16 on the spindle of the drum 2.

On the other hand, the cam 36 is in a position in which the part 38 acts on the part 40, so as to turn the latter about the pivot 41, in order to force its end at the side of the drum to allow the rod 14 to engage, by means of its recess 44 with the pin 45 of the ring 7. At the same time, the part 38 moves towards the outer edge of the shutter, the time and bulb exposure parts 48 and 50, so that the said parts cannot come into contact with the lug 57 of the ring 7.

The spring is set by acting on the lever 3 in the direction of the arrow 18. The stop 15 thus comes behind the arm 19, the result of which is that the apparatus will be held in the set position. In order to disengage, whether it is done by pressing with the finger on the lever 4 or by using the bulb, the part 24 is caused to oscillate. In oscillating, the part 24 by means of the finger 23,
20 rocks the part 20, the result of which is that the arm 19 is lowered and the stop 15 of the drum disengaged so that the drum turns back, the whole force of the spring which it contains being utilised. By the movement of the rod 14, the ring 7 is moved first in the direction of the arrow 46, then in the direction of the arrow 47, the result being the opening and closing of the sectors of the
25 shutter.

Let it be now assumed that the apparatus is arranged for a longer time of exposure, for instance, for one second.

As in this case the pneumatic brake has to act, the movement given to the cam 28 after the time of exposure has been regulated by means of the indicator 37, results in the movement of the part 29 31 and the part 33, by means of
30 the rod 32, so that the projection 34 comes into the path of the stop 16.

Consequently when the drum is set, the stop 16, owing to the obliquity of the projection 34, will force the latter to move without any action on the lever controlling the piston. The drum being set, the projection 34 resumes its position
35 in the path which will be now taken by the stop 16. On the drum being disengaged, the stop 16 will, instead of rotating without a stop as before, first meet the projection 34 and will thus be stopped in its movement until the force of the spring of the drum has overcome the resistance of the brake. The time during which the drum will remain stationary will depend on the position
40 occupied by the projection 34 in the path of the stop 16, and, as has been already shown, this position of the projection 34 is regulated by the cam 28 at the moment when the indicator 37 is set. This regulation of the position of the projection 34 is combined at the same time with the movement given to the piston in the brake cylinder, the piston being also moved when the cam 28 acts
45 on the part 29, 31, at the moment when the indicator 37 is being set.

The indicator, as designed for application with the cam 28, can be set for $\frac{1}{300}$, $\frac{1}{100}$, $\frac{1}{4}$, $\frac{1}{2}$, one second, two seconds, and the time exposures. These divisions are not absolute, and could be quite different, but it is needless to say that it is only for the maximum speed which depends on the strength of the spring of the
50 drum, that the brake will remain inoperative. For any other speed, the projection 34 will come more or less into the path of the stop 16, and at the same time the piston will be more or less moved in the cylinder, and thus the time of opening of the shutter will be varied.

The same shutter device enables the exposure to be made by using the disengaging device. It must be pointed out again that the apparatus is arranged
55 in such manner that the time-exposure parts work independently of the spring of the drum, even if the drum has been set by mistake.

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To the disengaging lever 4 is pivoted a part 48 provided with a notch 49 at its end. Under the part 48 which is provided with a kind of pawl 52, is arranged another part 50 pivoted at 51 to the bottom of the casing 1. Springs 53, 54 and 55 act respectively on the parts 48 and 50 and the pawl 52.

When the cam 28 and the cam 36 are moved for the purpose of effecting a time-exposure, the part 38 which at other times forces, by means of the projection 56, the parts just described towards the outer wall of the casing, allows the said parts to return under the action of their spring so that the notch 49 meets the lug 57 of the ring 7. At the same time, the arm 38¹ of the part 38 allows the part 40 to turn about its pivot pin 41, until it comes to rest with its projecting part 40¹ against the inner edge of the shutter. This movement of the part 40 has for its object to force the rod 14 to move away from the lug 45 which is thus released.

In order to open the shutter it is then sufficient to act on the lever 4 or on the arm 27 by means of the bulb, whereupon the part 48 advances and causes the ring 7 to turn, the sectors of the shutter open out, and, owing to the lug 57 having come behind the end of the part 50, the said sectors remain open although the finger has been removed from the lever 4.

The shutter thus remains open during the time required for the exposure. By pressing again with the finger on the lever 4, the part 48 is moved as before, and consequently the end of the pawl 52 which comes into contact with the lug 57, slides on the latter and strikes laterally against a tappet 58 of the part 50. The part 50 is pushed back, and its end releases the lug 57 of the ring 7 which then moves back and closes the sectors of the shutter.

This is the movement of the double or time exposure proper, in which the opening of the shutter is produced by pressing on the arm 4 which is then released, the closing being obtained by again pressing on the arm 4. It is, therefore, necessary here to make two operations on the arm 4 in order to bring about complete working of the shutter. The opening and the closing can be effected by acting only once on the arm 4, as in the so-called "bulb" exposure, the shutter then remaining open during the time that the finger presses on the arm 4.

To that end, the cam 36 is placed in such position that the part 48 always meets the lug 57 in its movement, but the part 50 is sufficiently far moved towards the outer wall of the casing to prevent its end exercising any stopping action on the lug 57. Therefore, only the part 48 will act. This part will push the ring 7 in the direction of the arrow 46 and, when the finger of the operator releases the arm 4, the ring will return to its original position under the action of its spring, at the same time as the lever 48, the shutter thus being closed.

The part 40 is provided as already stated with a stop 40¹ so that the travel of the said part when the indicator is arranged for a time-exposure, is limited by the said stop coming into contact with the inner wall of the casing. Owing to the said stop, the part 40 is stopped in front of the parts 48, 50 and 52 which continue to move in order to arrive into a suitable position.

The ring serving for moving the blades of the iris-diaphragm is shown at 60 (Figures 2 and 3) on the inner face of the cover 61 of the casing of the shutter and is closed by an annular thin plate stamped out in a manner well known in shutter construction so as to provide a recess enabling the blades 62 of the iris to be arranged in it. This stamped out shape is made use of owing to the great rigidity given to the ring.

The ring 60 is connected to the ring 63 arranged on the outer face of the cover 61, by screws or rivets 64 passing through grooves 65 made in an arc of a circle in the metal body of the cover. A hand 66 secured to the ring 63 enables the iris blades to be operated from the outside. The movement of the part 63 is then transmitted to the driving ring 60 by screws or rivets 64.

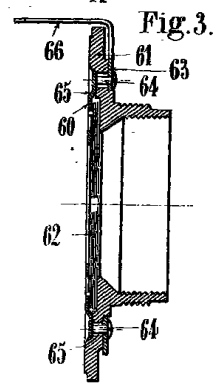
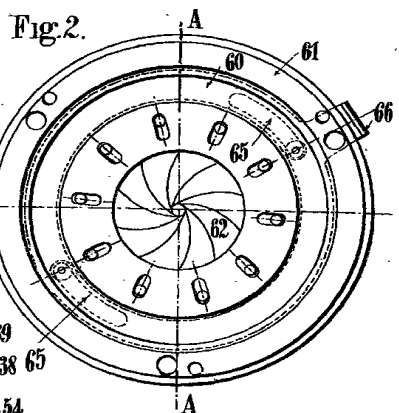
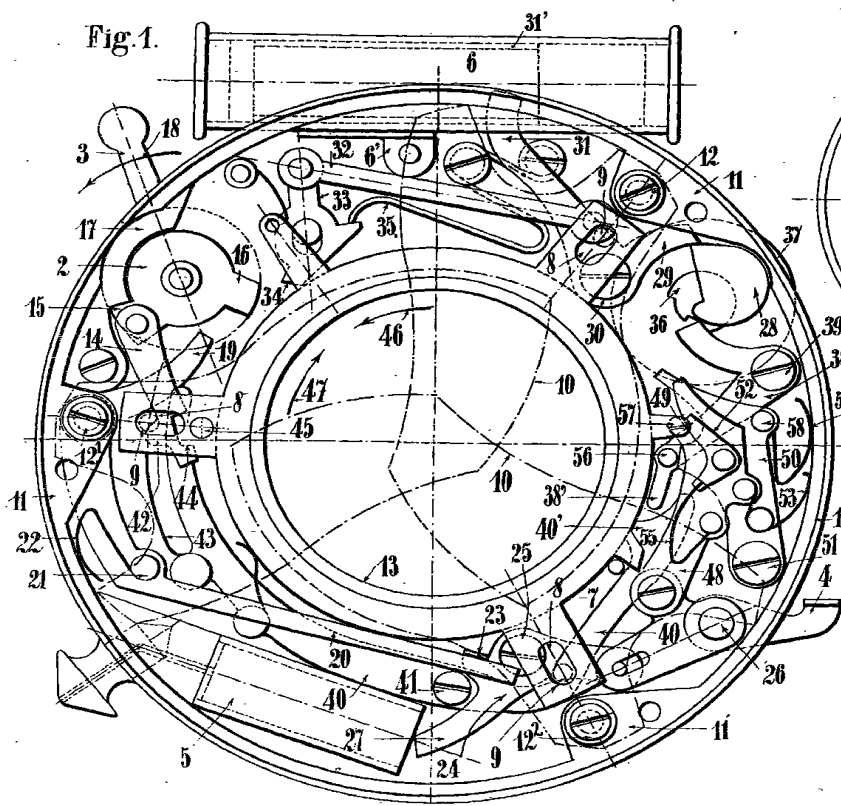
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Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A photographic shutter comprising time or bulb exposure parts and instantaneous exposure parts independent of one another having an operating lever for setting the instantaneous exposure parts which, together with the spring actuating the latter, is unemployed during the manipulation of the time or bulb exposure parts, the entire operation of these parts being ensured by the disengaging lever or by bulb pressure, substantially as described.
2. In a photographic shutter of the kind described a pneumatic brake device in which the piston does not move when the shutter is set said device having a rod which transmits to the piston the movement produced by the spring of the drum, by means of levers and cams substantially as described.
3. In a pneumatic brake device of the kind described in Claim 2 a device for connecting the brake piston with its mechanism intended to move it laterally, by means of a lever the end of which is suitably bent or shaped and enters a slot in the piston, substantially as and for the purpose described.
4. In a photographic shutter of the kind described a pneumatic brake device, the pump of which is arranged tangentially to the circumference of the shutter casing, so that its base throughout the whole or nearly the whole of its length is let into the casing substantially as described.
5. In a photographic shutter of the kind described, a pneumatic release-cylinder to enable the exposure to be effected by means of a pneumatic ball, arranged in the interior of the shutter and secured only to the outer wall of the shutter, substantially as described.
6. In combination with the pneumatic brake device as claimed in Claim 2 a cam device enabling the travel of the piston of the pneumatic brake to be regulated as desired substantially as described.
7. In a photographic shutter of the kind described a pneumatic brake device the cylinder of which is let in and arranged tangentially to the circumference of the shutter, the means for fixing it the said cylinder being arranged in the interior of the shutter.
8. In combination with a photographic shutter of the kind described an iris diaphragm provided with a driving ring stamped out in such manner as to produce a cavity for receiving the iris blades substantially as described.
9. In a photographic shutter of the kind described a fixed drum device the movable spindle of which transmits the movement of the spring to the shutter, in combination with a shutter, the time exposure mechanism of which is always set substantially as described.
10. The complete photographic shutter mechanism substantially as described or illustrated in the accompanying drawings.

Dated this 18th day of February 1907.

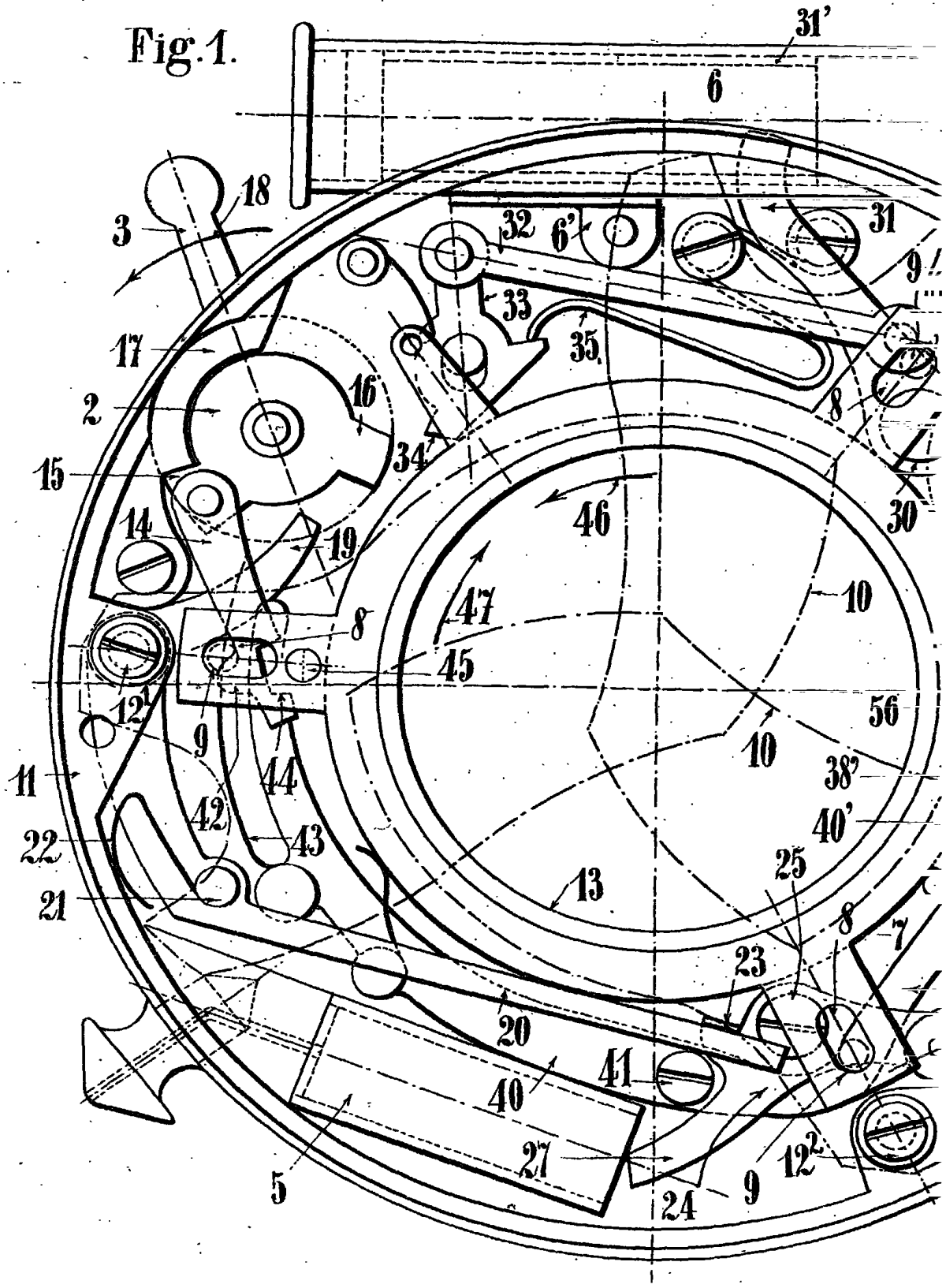
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Fig. 1.



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Fig. 2.

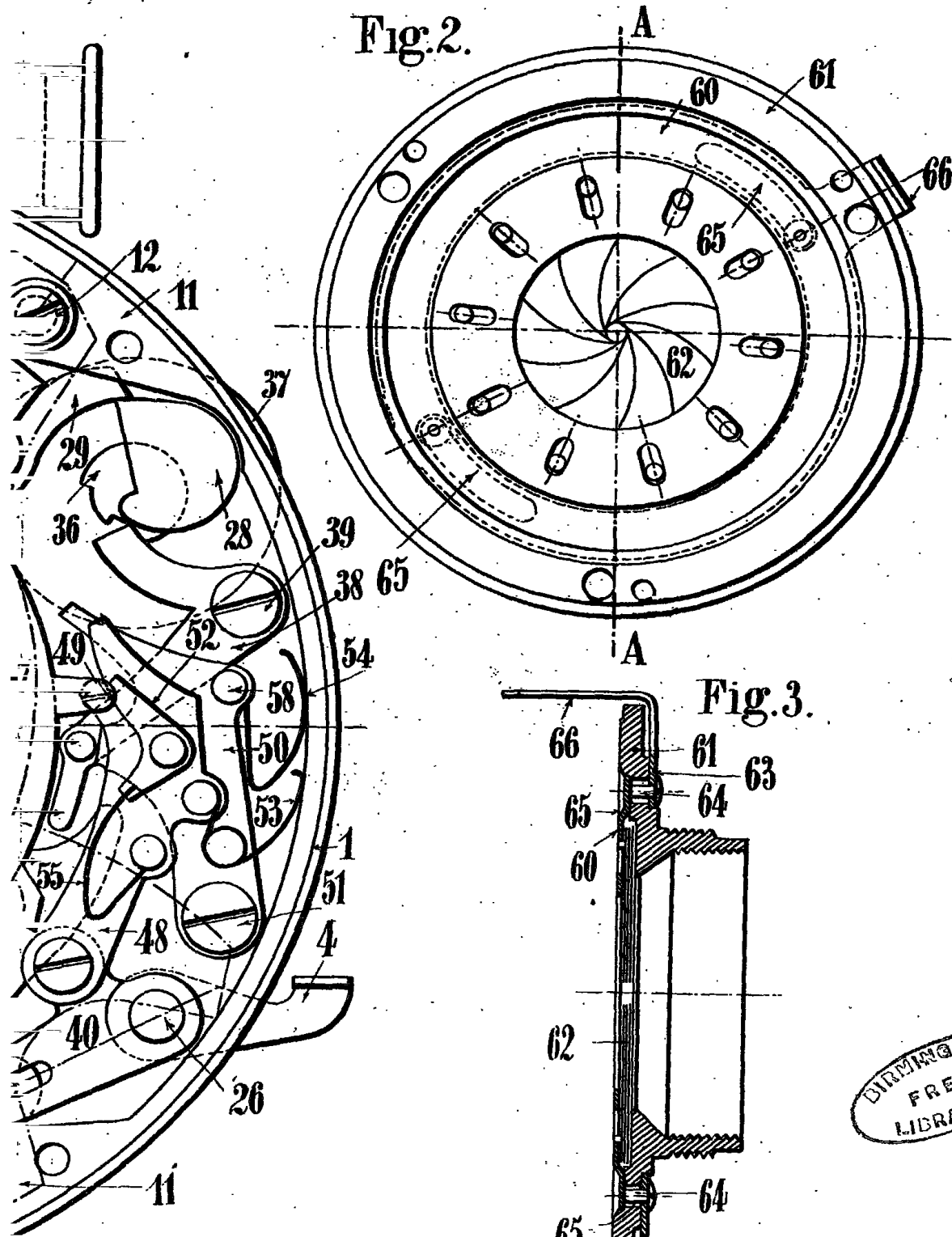
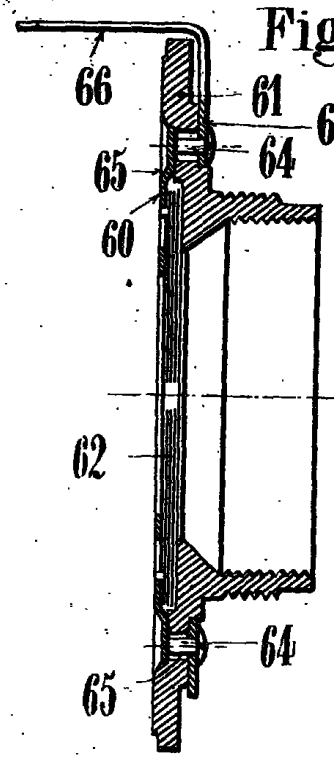


Fig. 3.



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