P. KAEMMERER.

DEVICE FOR EXPOSING SENSITIVE LAYER CARRIERS.

APPLICATION FILED NOV. 13, 1906.

**984,007.** Patented Feb. 14, 1911.

Fig. 1.

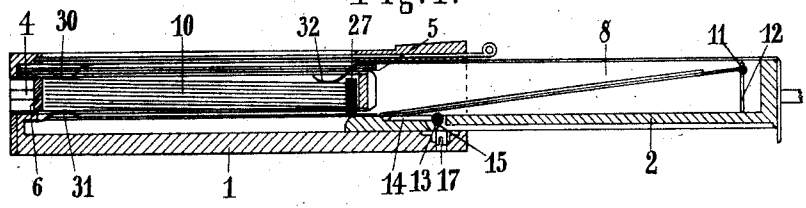



Fig. 2.

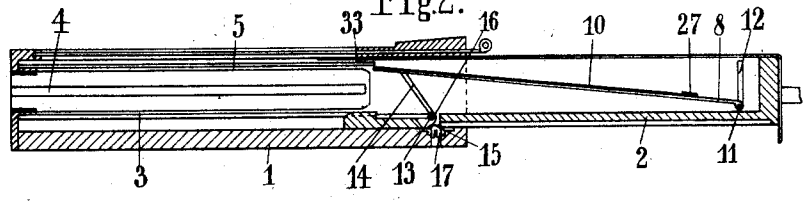



Fig. 4.

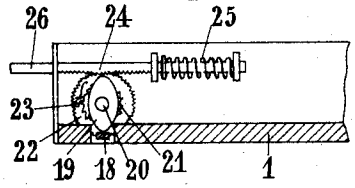



Fig. 3.

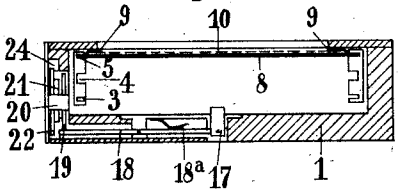



Fig. 5.

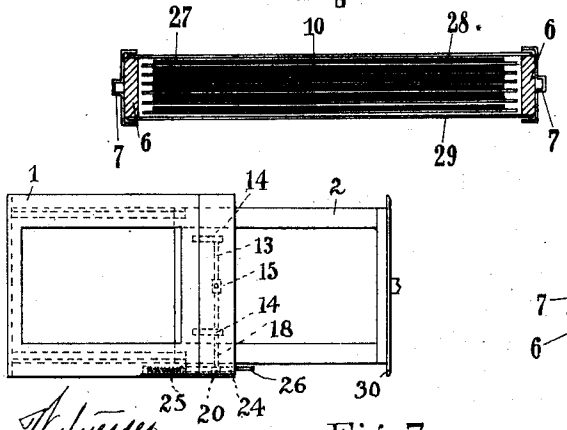
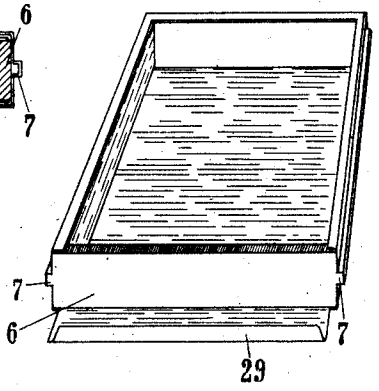



Fig. 7.

Fig. 6.

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# UNITED STATES PATENT OFFICE.

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## DEVICE FOR EXPOSING SENSITIVE LAYER-CARRIERS.

984,007. Specification of Letters Patent. **Patented Feb. 14, 1911.**

Application filed November 13, 1906. Serial No. 343,212.

*To all whom it may concern:*

Be it known that I, PAUL KAEMMERER, a subject of the German Emperor, and a resident at 5 Holsteinischestrasse, Steglitz, near Berlin, Germany, have invented an Improved Device for Exposing Sensitive Layer-Carriers, of which the following is a full, clear, and complete specification.

The present invention relates to a device suitable to expose sensitive layer-carriers which form a pile one after another in an exposing chamber.

An important object of the invention is to bring about the change of the layer-carriers with the aid of a carrier-slide carried by a dark-slide, and consists in the lowest sensitive layer-carrier of the pile in each case being seized with the help of such a carrier-slide when the dark-slide which carries the same is inserted, and in said layer-carrier being carried with it when the dark-slide is drawn out, whereupon the slide which carries the layer-carrier is raised with regard to the bottom of the box, so that it arrives above the pile of layer-carriers when the dark-slide is slid into the exposing chamber, the slide serving as a light-tight interposition between the sensitive layer-carrier which is to be exposed and the pile of layer-carriers.

For the purpose of carrying this method into practice a device is employed in accordance with the present invention which consists of a receptacle or exposing chamber with a chamber or dark-slide, the dark-slide being provided with a slide capable of being displaced in its upper position with respect to the base of said box, said slide being provided with means for engaging a sensitive layer-carrier.

The shape of the package for the layer-carriers is also important which shape must be such that the package is held at a definite height between the base and the plane of exposure when it is inserted into the exposing chamber, so that the carrier-slide is able to engage under the pile of sensitive layer-carriers, as well as be led over the same.

A particularly simple construction results if the slide is provided with lateral folds or grooves into which the side edges of the sensitive layer-carriers are able to enter. In order that this may take place care must be taken that each of the sensitive layer-carriers is provided with strengthening pieces at that edge which is to enter first into the fold of the slide, which strengthening pieces leave the corners of the concerned edge free so that there is a certain amount of space between the edges which are to be seized by the folds of the slide at their outermost corners, which space enables the front edge of the slide to pass.

One form of the invention is represented by way of example in the accompanying drawings.

Figure 1 shows in longitudinal section a sensitive layer-carrier changing device with withdrawn dark-slide and with carrier-slide constructed in accordance with the invention, in which the carrier-slide is situated in that position which it takes up when it is to receive the lowest sensitive layer-carrier of the pile by the insertion of the dark-slide. Fig. 2 likewise shows a longitudinal section of the device represented in Fig. 1, with the difference, however, that the carrier-slide is here represented in the position after the removal of a layer-carrier immediately before this layer-carrier arrives into the plane of exposure in the exposure chamber by inserting the dark-slide again. Fig. 3 is a cross-section through the sensitive layer-carrier changing device and shows the driving mechanism of the lifting piece by which the controlling device for the carrier-slide is set in action. Fig. 4 shows in side elevation the device for actuating the lifting piece represented in Fig. 3. Fig. 5 is a cross-section through a package for the sensitive layer-carriers arranged in accordance with the invention. Fig. 6 is a package for the sensitive layer-carriers shown in perspective after the removal of one of the two shutters. Fig. 7 shows a plan of the exposing chamber with the dark-slide withdrawn.

In the drawings the exposing chamber is denoted by 1. The dark-slide has the denomination 2. The sides of the exposing chamber are provided with grooves 3, 4, 5, of which the grooves 4 serve for guiding the package-frame which is provided on the outside of its two sides with projecting springs 7. The grooves 3, 5 serve for guiding the slide 8 which is mounted on the dark slide 2. The carrier-slide 8 is provided at both sides with bent rims 9 which form folds into

which the sensitive layer-carriers 10 are able to slide, as is indicated in Fig. 3. The slide 8 is provided at its one end with an axle 11 which is mounted with its two ends in grooves 12 in the sides of the dark-slide 2 so that the axle can be displaced in the grooves 12, whereby the end of the slide which carries the axle 11 is approached more or less to the bottom of the dark-slide. An axle 13 is mounted revolubly in the base of the dark-slide, said axle being provided with lifting arms or tappets 14 and with a nose 15. The detent or nose 15 is not firmly connected with the axle 13, but is able to rotate within certain limits on the same, but is however brought back each time by a spring into its position of rest as soon as no outside influence acts upon it.

17 is a movable detent or stop which is situated on an arm 18 (Fig. 3) which is mounted revolubly on the exposing chamber 1 and which is under the influence of a spring $18^a$ tending to keep the arm 18 in a position corresponding to the lowermost or inoperative position of the detent 17.

19 is a cam which is revoluble on an axle 20, the latter being fastened in the side of the exposing chamber. Besides the cam 19 a ratchet-wheel 21 and a spur-wheel 22 with pawl 23 are on the axle 20, said ratchet-wheel being firmly connected and said spur-wheel being loosely connected with said cam, said pawl engaging in the toothing of the ratchet-wheel 21.

24 is a rack which is displaceable in the side of the exposing chamber and which is under the action of a spiral spring 25, the latter endeavoring to push the end 26 of the rack out of the end of the exposure chamber.

The sensitive layer-carriers 10 are provided at their one end with strengthening borders 27 which however do not extend over the entire breadth of the sensitive layer-carriers, but leave a rim free at both sides so that the rims of the sensitive layer-carriers lying one over another are separated from one another by a space into which the bent rims 9 of the slide 8 are able to be pushed. The package-frame for the sensitive layer-carriers is closed or is able to be closed on its two broad sides by slides 28, 29. Springs 30, 31 which are arranged in the exposing chamber serve for holding the pile of sensitive layer-carriers so that it is not able to fall out of the package-frame 6 after the latter has been inserted into the exposing chamber and after the withdrawal of the slides 28, 29. Springs 32 press the layer-carriers with their strengthened ends on to the base of the dark-slide.

33 is a stop at the top side of the exposing chamber preventing layer-carriers resting on the slide 8 from leaving the chamber 1 on withdrawing the slide.

The employment of the described device takes place as follows: It is taken that the parts are situated in the position represented in Fig. 1, and that the lowest layer-carrier of the pile is to be removed from the exposure chamber and placed on the pile or be brought into the position for exposure. For this purpose the dark-slide 2 is pushed into the exposing chamber 1. The slide 8 enters into the grooves 3 of the exposing chamber and slides at the same time with its rims 9 into the narrow intermediate spaces between the side edge of the lowest layer-carrier 10 and that lying next over it. According as the dark-slide is pushed into the exposure chamber, the slide 8 with its end carrying the axle 11 is depressed in the grooves 3 against the bottom of the dark-slide, in consequence of the guiding of the edges of the slide, whereby the ends of the axle 11 are displaced in the grooves 12. When the dark-slide approaches its end position inside the exposing chamber, the end of the dark-slide strikes the end 26 of the rack 24 and pushes this end into the side of the exposing chamber. The consequence of this is a rotation of the wheel 22, of the wheel 21 and of the cam 19 by means of the pawl 23. The cam is so arranged that at the end of the insertion movement the lever 18 is situated in such a position that the stop 17 lies within the path of the nose 15 of the shaft 13 of the dark-slide. If, therefore, after the dark slide has been pushed in, said box is withdrawn from the exposing chamber again carrying with it the lowest layer-carrier 10 which is placed with its edges in the grooves of the slide 8 formed by the rims 9, the nose 15 strikes the detent or stop 17 and a rotation of the shaft 13 is effected and the end of the slide 8 which is remote from the shaft 11 is raised by the arms or tappets 14, as may be seen in Fig. 2. The resilient arrangement of the nose 15 on the axle 13 causes the nose 15 to remain in contact with the stop 17 even when the dark-slide is begun to be pushed forward again, so that a release of the slide 8 from the tappets 14 only occurs as soon as the front end of the slide has already entered into the grooves 5 of the exposing chamber. With the continued advance of the dark-slide, the slide 8 with its ends provided with the axle 11 is gradually raised in the grooves 5 in consequence of the guiding, so that the axle 11 is situated again in its commencing position represented in Fig. 1 when the advance is finished, whereas the layer-carrier resting on the slide simultaneously arrives in the position for exposure. Exposure may take place in this position, the slide serving as a light-tight intermediary between the layer-carrier situated on the slide and the pile of layer-carriers. When the dark-slide is moved forward, the end 26 of the rack 24 is also this time pushed into the side of the

exposing chamber at the end of the advance movement, after the rack was pushed out again when withdrawing the dark-slide by the action of the spring 25 without a displacement of the cam 19 having occurred. When the rack is pushed in again the cam 19 is rotated a certain amount again, namely is rotated so far that the lever 18 is released from the cam 19 and the detent 17 passes out from the path of the nose 15. If, therefore, after the dark-slide has been pushed into the exposing chamber bringing the layer-carrier into the position for exposure, the dark-slide is again withdrawn, the axle 13 is not rotated; the tappets 14 remain therefore in the position represented in Fig. 1, and the slide 8 sinks down with its front end on the bottom of the dark-slide, whereas the axle 11 remains in its upper position represented in Fig. 1. Thus the changing process can commence again, because the exposed layer-carrier has been retained by a detent or the like in the exposing chamber when withdrawing the dark-slide from the exposing chamber, so that the slide is free for the reception of a new layer-carrier. The closure of the dark-slide upon its upper side in its withdrawn position may be effected in an optional manner.

The device for executing the new changing method represented in the drawings may be varied in manifold ways; particularly the required changeover of the slide from the position shown in Fig. 1 into the position shown in Fig. 2 could be effected in any other manner, preferably not automatically, but by hand. The controlling device effecting the change of position of the slide may also be varied in manifold ways. Also it is not necessary that the slide be provided with the described device of particular kind for seizing the sensitive layer-carrier; on the contrary any other gripping device could also be employed for the purpose in question, in so far as the same allows the lowest layer-carrier at any time to be separated from the pile and secured to the slide on the one hand, so that the same can be removed from the exposure chamber, and on the other hand to secure the concerned layer-carrier in the exposing chamber after its insertion into the exposing chamber again above the pile when withdrawing the dark-slide and to release said layer-carrier from the carrier-slide.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A device for exposing photographic layer-carriers, comprising in combination a receptacle for the reception of a pile of layer-carriers which is provided with an opening for exposure, a light-tight closed chamber into which the layer-carriers of the pile can be passed connected with the same, a slide of light-tight material capable of acting as support for the layer-carriers and provided with engaging means for seizing a layer-carrier, guides in said receptacle which receives said pile above and below the pile for the insertion of said slide and means for securing a layer-carrier resting on the slide in said receptacle which receives the pile on the side of the pile having the exposure opening.

2. A device for exposing photographic layer-carriers comprising in combination a receptacle for the reception of a pile of layer-carriers which is provided with an opening for exposure, a light-tight closed chamber into which the layer-carriers of the pile can be passed connected with the same, a slide of light-tight material capable of acting as support for the layer-carriers and provided with a rim whereby a groove is formed for seizing a layer-carrier, guides in said receptacle which receives said pile above and below the pile for the insertion of said slide and means for securing a layer-carrier resting on the slide in said receptacle which receives the pile on the side of the pile having the exposure opening.

3. A device for exposing photographic layer-carriers, comprising in combination a receptacle for the reception of a pile of layer-carriers which is provided with an opening for exposure, a light-tight closed chamber into which the layer-carriers of the pile can be passed connected with the same, a revoluble axle in said chamber, a slide of light-tight material engaging said axle capable of acting as support for the layer-carriers and provided with engaging means for seizing a layer-carrier, guides in said receptacle which receives said pile above and below the pile for the insertion of said slide and means for securing a layer-carrier resting on the slide in said receptacle which receives the pile on the side of the pile having the exposure opening.

4. A device for exposing photographic layer-carriers, comprising in combination a receptacle for the reception of a pile of layer-carriers which is provided with an opening for exposure, a light-tight closed chamber into which the layer-carriers of the pile can be passed connected with said receptacle, and having a substantially vertical groove in at least one of its sides, a revoluble axle in said chamber movable in said groove, a slide of light-tight material engaging said axle capable of acting as support for the layer-carriers and provided with a rim whereby a groove is formed for seizing a layer-carrier, horizontal grooves in said receptacle which receives said pile above and below the pile for the insertion of said slide, means adapted to raise said slide together with a layer-carrier and adapted to permit said slide to fall without a layer-carrier and means for securing a layer-

carrier resting on the slide in said receptacle which receives the pile on the side of the pile having the exposure opening.

5. A device for exposing photographic layer-carriers, comprising in combination a receptacle for the reception of a pile of layer-carriers which is provided with an opening for exposure, a light-tight closed chamber into which the layer-carriers of the pile can be passed connected with said receptacle, and having a substantially vertical groove in at least one of its sides, a revoluble axle in said chamber movable in said groove, a slide of light-tight material engaging said axle capable of acting as support for the layer-carriers and provided with a rim whereby a groove is formed for seizing a layer-carrier, horizontal grooves in said receptacle which receives said pile above and below the pile for the insertion of said slide and means for securing a layer-carrier resting on the slide in said receptacle which receives the pile on the side of the pile having the exposure opening.

6. A device for exposing photographic layer-carriers comprising in combination a receptacle for the reception of a pile of layer-carriers which is provided with an opening for exposure, a dark-slide into which the layer-carriers of the pile can be passed connected with the same, a slide of light-tight material mounted movably in said dark-slide capable of acting as support for the layer-carriers and provided with engaging means for seizing a layer-carrier, guides in said receptacle which receives said pile above and below the pile for the insertion of said slide, means adapted to raise said slide together with a layer-carrier and adapted to permit said slide to fall without a layer-carrier, and means for securing a layer-carrier resting on the slide in said receptacle which receives the pile on the side of the pile having the exposure opening.

7. A device for exposing photographic layer-carriers, comprising in combination a receptacle for the reception of a pile of layer-carriers which is provided with an opening for exposure, a light-tight closed chamber into which the layer-carriers of the pile can be passed connected with said receptacle, and having a substantially vertical groove in at least one of its sides, a revoluble axle in said chamber movable in said groove, a slide of light-tight material engaging said axle capable of acting as support for the layer-carriers and provided with a rim whereby a groove is formed for seizing a layer-carrier, horizontal grooves in said receptacle which receives said pile above and below the pile for the insertion of said slide, a second axle (13) mounted revolubly in said chamber, tappets (14) on said latter axle, a nose (15) engaging said axle (13), a detent (17) adapted to engage said nose, an arm (18) carrying said detent (17) revoluble in said receptacle, revoluble means adapted to actuate said arm, means (26) adapted to be engaged by said chamber adapted to actuate said latter revoluble means, whereby said tappets alternately raise said slide and release it for falling, and means for securing a layer-carrier resting on the slide in said receptacle which receives the pile on the side of the pile having the exposure opening.

8. A device for exposing photographic layer-carriers, comprising in combination a receptacle for the reception of a pile of layer-carriers which is provided with an opening for exposure, a dark-slide connected with the same into which the layer carriers of the pile can be passed, and having a substantially vertical groove in at least one of its sides, a revoluble axle (11) in said dark-slide movable vertically in said groove, a slide (8) of light-tight material engaging said axle capable of acting as support for the layer-carriers and provided with a rim (9) whereby a groove is formed for seizing a layer-carrier, horizontal grooves in the sides of said receptacle which receives said pile above and below the pile for the insertion of said slide, a second axle (13) mounted revolubly in said dark-slide, arms (14) on said axle (13), a nose (15) resiliently engaging said axle (13), a detent (17) adapted to engage said nose, a lever (18) carrying said detent (17) pivoted in said receptacle, revoluble means adapted to actuate said lever, means (26) adapted to be engaged by said dark-slide adapted to actuate said latter revoluble means whereby said arms alternately raise said slide and release it for falling, and means for securing a layer-carrier resting on the slide in said receptacle which receives the pile on the side of the pile having the exposure opening.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

PAUL KAEMMERER.

Witnesses:
WOLDEMAR HAUPT,
HENRY HASPER.