

E. W. KELLY.
 AUTOMATIC PLATE CHANGING DEVICE.
 APPLICATION FILED APR. 10, 1911.

1,015,027.

Patented Jan. 16, 1912.

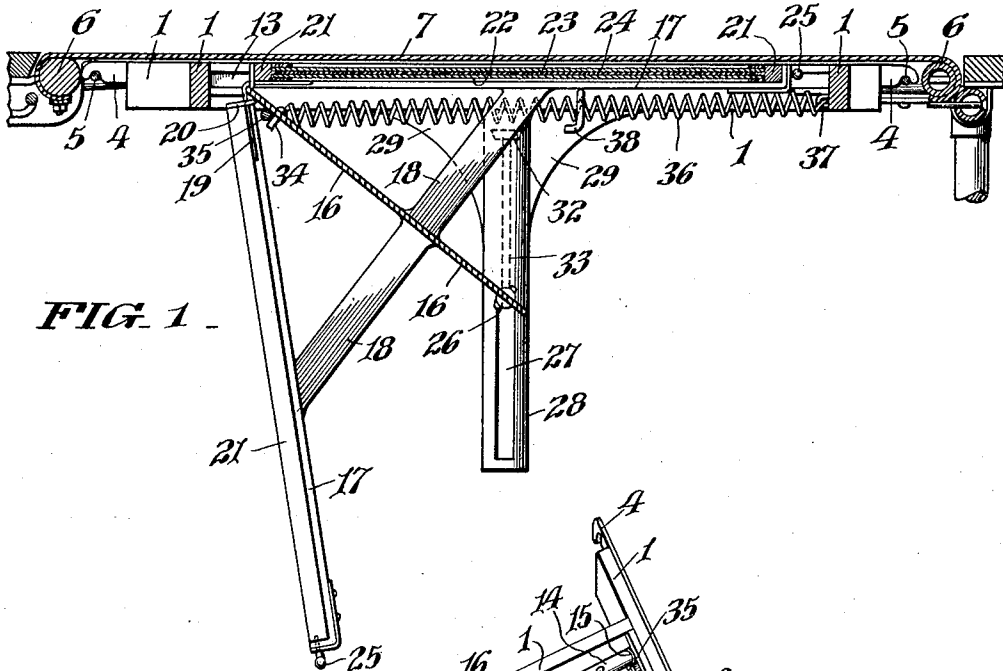


FIG. 1.

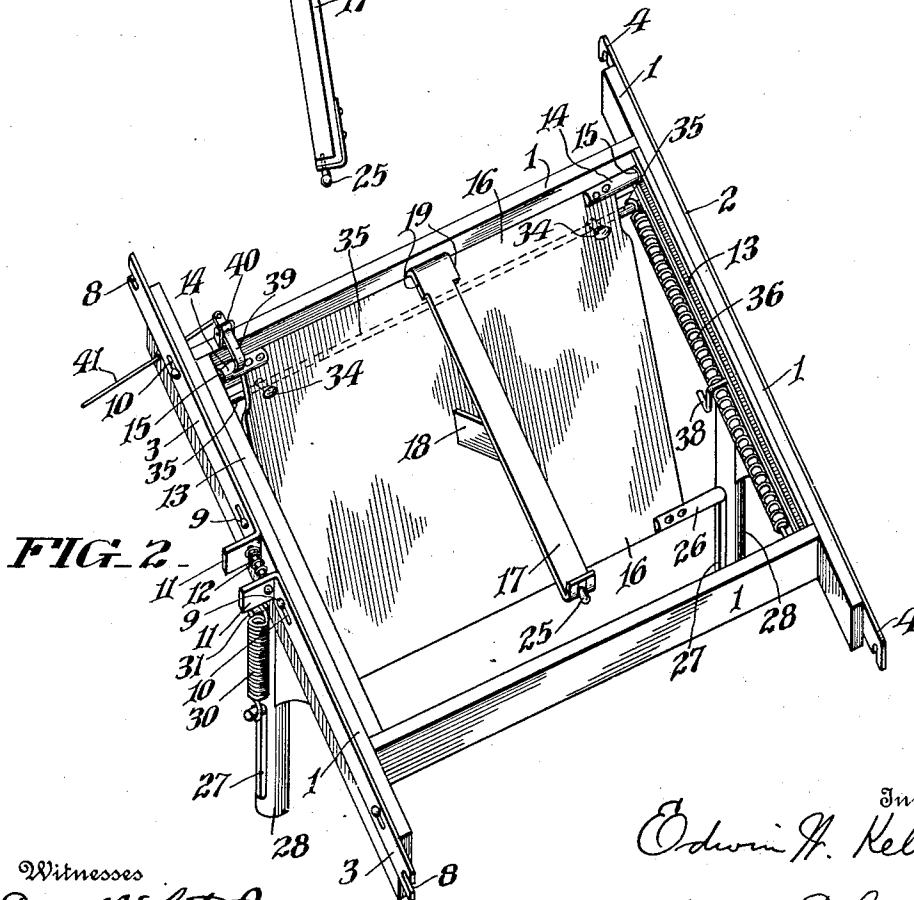


FIG. 2.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC PLATE-CHANGING DEVICE.

1,015,027.

Specification of Letters Patent.

Patented Jan. 16, 1912.

Original application filed July 27, 1910, Serial No. 574,045. Divided and this application filed April 10, 1911. Serial No. 619,923.

To all whom it may concern:

Be it known that I, EDWIN W. KELLY, a citizen of the United States, residing in the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Plate-Changing Devices, of which the following is a specification.

My invention relates to apparatus for shifting a plurality of sensitive plates or other sensitive media in succession to position for operation or exposure.

More particularly my invention relates to apparatus of the character described for use in the production of radiographic or X-ray images for stereoscopic work.

My invention resides in a plurality of plate holders, preferably held by a unitary support, with means for shifting these plate holders to successively occupy operative exposure positions. The means for moving the plate holders may be an automatic motive device, which may be tripped or released at the will of the operator.

My invention resides in the features hereinafter described and claimed.

For illustration of one of the forms my invention may take, reference is to be had to the accompanying drawing, in which:

Figure 1 is a side elevational view, some parts in section, of plate shifting means, together with parts of a support. Fig. 2 is a perspective view of the same plate shifting mechanism.

The plate shifting apparatus comprises the main frame 1 having secured upon two of its sides the strips 2 and 3, the former terminating in the hooks 4 adapted to engage the rods or pins 5 supported by the frame 6, upon which may be supported the plate 7 of aluminum or other material translucent or transparent to X-rays, said frame 6 and plate 7 constituting a part of an operating table. The strips 3 have their ends slotted as at 8, 8, which are also adapted to embrace the rods or pins 5 and prevent the frame 1 from separating therefrom. The strips 3 are slidable upon the side of the frame 1, the engagement being by screws 9 passing freely through the slots 10 in the members

3. Approximate the center of the frame 1 the two parts 3, 3 have outwardly turned ears 11, 11, which may be gripped and forced toward each other in opposition to the spring 12, to withdraw the slotted ends of the members 3, 3 to such position that upon release of the ears 11 the spring 12 will force the members 3, 3 apart and cause the slots 8, 8 to embrace the rods 5. On the inner sides of two of the sides of the frame 1 are provided two parallel guides 13, here shown in the form of channels, in which engage the pins 14 carrying rollers 15 which roll in the channels 13. The pins 14 are secured in alinement with each other at one edge of the plate or member 16, of steel or other material opaque to the X-rays or other radiations employed. This plate 16 is secured substantially mid-way between the plate holder supports 17 to which it is braced by the struts 18, the plate holder supports 17 and the plate 16 being in fixed relation with respect to each other and moving as a unit. Where the supports 17 converge at one edge of the plate 16, they are provided with lateral extensions 19 over each of which slides a slotted member 20 carried by each of the plate holders 21, the plate holders being omitted in Fig. 2 for the sake of clearness. As appears in section in Fig. 1, 22 is one cover of the plate holder opaque to ordinary light, against which is shown the radiographic or photographic plate 23 covered by a second cover 24 of aluminum or other material opaque to ordinary light but transparent to X-rays or other radiations employed. At the outer ends of the plate holder supporters 17 are provided pins 25 which engage in the plate holders 21 to hold them in fixed relation to the supporters 17. At the outer edge of the plate or member 16 are provided the alined pins 26, which extend through slots 27 in the tubular posts 28 secured upon the main frame 1 and extending at right angles thereto and supported or strengthened by the webs 29. To each pin 26 is secured one end of a spiral tension spring 30 secured at its other end to a post 31 upon the main frame 1. Within each tube 28 is a plunger or piston 32 fitting snugly within said tube and

secured upon a rod 33 pivoted at its outer end upon the pin 26. The movement of the pin 26 upwardly in the slot 27 is, therefore, retarded and the plate 16 and the plate holders cushioned in their movement.

Near one edge of the plate 16 are supported pins 34 against which engages a transversely extending rod 35, lying against said pins and said plate 16 but not secured thereto. At each end the rod 35 engages a spiral tension spring 36 secured at its other end at 37 to the main frame 1. In the path of travel of the rod 35 are disposed hooks 38 secured in two opposite sides of the frame 1. In the position shown in Figs. 1 and 2, the springs 36 are under tension and the plate 16 and the attached plate holder supporters 17 are held in that position by the latch 39 pivoted at 40 and engaging one of the pins 14, a wire or rod 41 being attached to the latch 39 to lift the same to free the pin 14.

With loaded plate holders held on the members 17, the parts are moved to the positions shown in Figs. 1 and 2, where the springs 36 are under tension and the parts held by the latch 39. In this position one of the plates is in position immediately back of the aluminum plate 7 ready to receive the exposure. After the exposure is made, and the X-ray tube shifted, as is understood in stereoscopic X-ray work, the operator pulls the wire or rod 41 lifting the latch 39 from the pin 14, whereupon the springs 36 contract and pull the rod 35 toward the right, as viewed in Fig. 1, thereby causing the pins 26 to descend in the slots 27 of tubular posts 28 in opposition to springs 30, the plate 16 and the holders 17 in the meantime rotating about said pins 26, and the pins 14 moving along in the channels 13. When the pins 26 have reached the lower limit of their travel, the springs 30 have been put under their maximum tension, by energy derived from springs 36, and the pins 14 are directly in a vertical line with the pins 26, as viewed in Fig. 1. The further movement due to springs 36, and to the inertia or momentum of the moving parts, carries the moving parts past this dead-center position, whereupon the springs 30 contract, assisting the springs 36, and cause the plungers 32 to again rise in the tubes 28 retarding the further or continued motion of the moving parts. The pins 14 continue to move toward the right hand end of the channels 13 and the pins 26 continue to move toward the tops of their slots 27, as viewed in Fig. 1.

In the travel of the rod 35 toward the right, as viewed in Fig. 1, that rod encounters the hooks 38 and remains in engagement with them and prevents further action by the springs 36. And the springs 30, due to the fact that the parts have now passed slightly beyond the aforementioned dead-

center position, carry the moving parts to their final position, the rod 35 being held by the hooks 38, while the plate 16 and attached parts and plate holders leave the rod 35 stationary on the hooks 38, and complete their movement. When the moving parts have reached their new and final position, the other plate holder 21 shown extending downwardly at the left of Fig. 1, has been brought into position immediately behind the aluminum plate 7 and the plate holder 21 shown in section in Fig. 1 has been moved down to a similar position, but at the right. In other words, one plate holder has been moved away from operative or exposure position. Then the second exposure under the X-rays or other radiations may be made. It will be noted, as viewed in Fig. 1, that the X-ray tube or other source of radiations should be directly above the plate 7, and that with the parts in these positions, the opaque plate 16 shields the downwardly extending plate member at the left of Fig. 1 from the radiations, thus preventing the reserve plate and holder from being subjected to the X-rays and improperly exposed. Similarly, when this reserve plate and holder have been shifted to operative or exposure position and the first plate holder has been removed away from operative or exposure position by the automatic action of the motive device hereinbefore described, the plate 16 is in position to similarly shield the plate which has been first exposed.

By my construction above described, the plate holders are not merely rotated, but are both rotated and translated.

By the construction herein described, the shifting of the holders and their plates is accomplished smoothly, without sudden jars during the movement, and without jars or shocks at the limits or end of the movement.

While I have herein shown springs as the means for exerting force to move the plate holders, it is to be understood that any other suitable force exerting means may be employed.

This application is a division from my prior application Serial No. 574,045, filed July 27, 1910.

What I claim is:

1. Plate shifting apparatus comprising a plurality of plate holders movable together in fixed relation with respect to each other, and means for rotating and translating said plate holders, whereby one plate holder is removed from and another plate holder is brought to exposure position.

2. Plate shifting apparatus comprising a plurality of plate holders movable together in fixed relation with respect to each other, and an automatic motive device for rotating and translating said plate holders, whereby one plate holder is removed from

and another plate holder is brought to exposure position.

3. Plate shifting apparatus comprising a plurality of plate holders movable together, an automatic motive device for rotating and translating said plate holders, whereby one plate holder is removed from and another plate holder is brought to exposure position, and means for locking said motive device.

4. Plate shifting apparatus comprising a plurality of plate holders movable together, and means for moving one of said plate holders from and another to exposure position comprising cooperating springs, one of said springs exerting tension during movement of said plate holders, and another spring put under tension by said first mentioned spring and thereafter exerting force on said plate holders.

5. Plate shifting apparatus comprising a plurality of plate holders movable together, and means for moving one of said plate holders from and another to exposure position comprising cooperating springs, one of said springs exerting tension during movement of said plate holders, another spring put under tension by said first mentioned spring during movement of said plate holders, and during the latter part of the movement of said plate holders exerting a force on them.

6. Plate shifting apparatus comprising a plurality of plate holders movable together, means for moving one of said plate holders from and another to exposure position comprising cooperating springs, one of said springs exerting tension during movement of said plate holders, another spring put under tension by said first mentioned spring during movement of said plate holders, and a latch for restraining said springs.

7. Plate shifting apparatus comprising a plurality of plate holders movable together, means for moving one of said plate holders from and another to exposure position comprising cooperating springs, one of said springs exerting tension during movement of said plate holders, another spring put under tension by said first mentioned spring during movement of said plate holders, and during the latter part of the movement of said plate holders exerting a force on them, and a latch for restraining said springs.

8. Plate shifting apparatus comprising a plurality of plate holders movable together, and means for rotating and translating said plate holders one from and another to exposure position comprising cooperating springs, one of said springs exerting tension during movement of said plate holders, and another spring put under tension by said first mentioned spring during movement of said plate holders.

9. Plate shifting apparatus comprising a plurality of plate holders movable together,

and means for rotating and translating said plate holders one from another to exposure position comprising cooperating springs, one of said springs exerting tension during movement of said plate holders, another spring put under tension by said first mentioned spring during movement of said plate holders, and during the latter part of the movement of said plate holders exerting a force on them.

10. Plate shifting apparatus comprising a plurality of plate holders movable together, a pivotal support for said plate holders, and means for rotating said plate holders about said pivotal support and for translating said pivotal support, whereby one plate holder is removed from and another plate holder is brought to exposure position.

11. Plate shifting apparatus comprising a plurality of plate holders in fixed relation at an angle to each other, a pivotal support for said plate holders, and means for rotating said plate holders upon said pivotal support and for translating said pivotal support, whereby one plate holder is removed from and another plate holder is brought to exposure position.

12. Plate shifting apparatus comprising a plurality of plate holders in fixed relation at an angle to each other, a plate shielding member between said plate holders, a pivotal support for said plate holders, and means for rotating said plate holders upon said pivotal support and for translating said pivotal support, whereby one plate holder is removed from and another plate holder is brought to exposure position.

13. Plate shifting apparatus comprising a plurality of plate holders movable together, a pivotal support for said plate holders, a guide for said plate holders, means movable with said plate holders engaging said guide, and means for rotating said plate holders about said pivotal support while guided by said guide, whereby one plate holder is removed from and another plate holder is brought to exposure position.

14. Plate shifting apparatus comprising a plurality of plate holders movable together, a pivot, means connecting said plate holders with said pivot, a straight guide for said plate holders, a member movable with said plate holders and movable in said straight guide, and a guide for said pivot, said pivot being movable in its guide.

15. Plate shifting apparatus comprising plate holders in fixed relation at an angle to each other, a pivot between said plate holders, means connecting said plate holders with said pivot, a guide, a member movable with said plate holders movable in said guide, and a pivot guide, said pivot movable in said pivot guide.

16. Plate shifting apparatus comprising plate holders in fixed relation at an angle

to each other, a member disposed between said plate holders, a pivot for said plate holders on said member, and a guide in which said pivot is movable.

17. Plate shifting apparatus comprising plate holders in fixed relation at an angle to each other, a member disposed between said plate holders, a pivot for said plate holders on said member, a guide in which said pivot is movable, a second guide, and a member in fixed relation with said plate holders movable in said second guide.

18. Plate shifting apparatus comprising plate holders in fixed relation at an angle to each other, a member disposed between said plate holders, a pivot for said plate holders on said member, a guide in which said pivot is movable, a second guide, and a member in fixed relation with said plate holders movable in said second guide, said guides being disposed at right angles to each other.

19. Plate shifting apparatus comprising plate holders movable together, a pivot, means connecting said plate holders with said pivot, a guide for said pivot, a second guide for said plate holders, means movable with said plate holders engaging said second guide, a member exerting force on said plate holders to move them with respect to said second guide, a second member exerting force upon said pivot, said first mentioned member moving said plate holders and storing energy in said second member, said second member thereafter moving said plate holders.

20. Plate shifting apparatus comprising plate holders in fixed relation at an angle with each other, a pivot, means connecting said plate holders with said pivot, a guide for said pivot, a second guide for said plate holders, means movable with said plate holders engaging said second guide, a member exerting force on said plate holders to move them with respect to said second guide, a second member exerting force upon said pivot, said first mentioned member moving said plate holders and storing energy in said second member, said second member thereafter moving said plate holders.

21. Plate shifting apparatus comprising plate holders movable together, a pivot, means connecting said plate holders with said pivot, a guide therefor, a second guide at right angles to said first mentioned guide, means movable with said plate holders engaging said second guide, a member exerting force upon said plate holders, a second member exerting force upon said pivot, said first mentioned member first moving said plate holders with respect to said second guide and storing energy in said second member, said second member thereafter completing the movement of said plate holders.

22. Plate shifting apparatus comprising

plate holders movable together, a pivot, means connecting said plate holders with said pivot, a guide therefor, a second guide at right angles to said first mentioned guide, means movable with said plate holders engaging said second guide, a spring exerting force upon said plate holders to move them with respect to said second guide, a second spring connected to said pivot, said first spring moving said plate holders to dead-center position with respect to said pivot for storing energy in said second spring, said second spring moving said plate holders when they have passed said dead-center position.

23. Plate shifting apparatus comprising plate holders movable together, a pivot, means connecting said plate holders with said pivot, a guide therefor, a second guide at right angles to said first mentioned guide, means movable with said plate holders engaging said second guide, a spring exerting force upon said plate holders to move them with respect to said second guide, a second spring connected to said pivot, said first spring moving said plate holders to dead-center position with respect to said pivot for storing energy in said second spring, said second spring moving said plate holders when they have passed said dead-center position, and a stop for said first spring after said plate holders have passed said dead-center position.

24. Plate shifting apparatus comprising plate holders movable together, a pivot, means connecting said plate holders with said pivot, a guide therefor, a second guide at right angles to said first mentioned guide, means movable with said plate holders engaging said second guide, a spring exerting force upon said plate holders to move them with respect to said second guide, a second spring connected to said pivot, said first spring moving said plate holders to dead-center position with respect to said pivot for storing energy in said second spring, said second spring moving said plate holders when they have passed said dead-center position, and means for freeing said plate holders from said first spring after they have passed said dead-center position.

25. Plate shifting apparatus comprising plate holders in fixed relation at an angle to each other, a plate shielding member movable with and disposed between said plate holders, and means for rotating and translating said plate holders one from and another to exposure position.

26. Plate shifting apparatus comprising plate holders movable together, a pivot, means connecting said plate holders with said pivot, a guide therefor, a second guide at right angles to said first mentioned guide, means movable with said plate holders engaging said second guide, a spring exerting

force upon said plate holders to move them
with respect to said second guide, a second
spring connected to said pivot, said first
spring moving said plate holders to dead-
5 center position with respect to said pivot
and storing energy in said second spring,
said second spring moving said plate holders
when they have passed said dead-center po-
sition, a stop for said first spring after said
10 plate holders have passed said dead-center

position, and a latch for restraining said
first spring.

In testimony whereof I have hereunto
affixed my signature in the presence of the
two subscribing witnesses.

EDWIN W. KELLY.

Witnesses:

ELEANOR T. McCALL,
ANNA E. STEINBOCK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."
