No. 780,351. PATENTED JAN. 17, 1905.

W. J. JOHNSTON.

CAMERA REVOLVING APPARATUS.

APPLICATION FILED MAR. 26, 1904.

Fig. 1

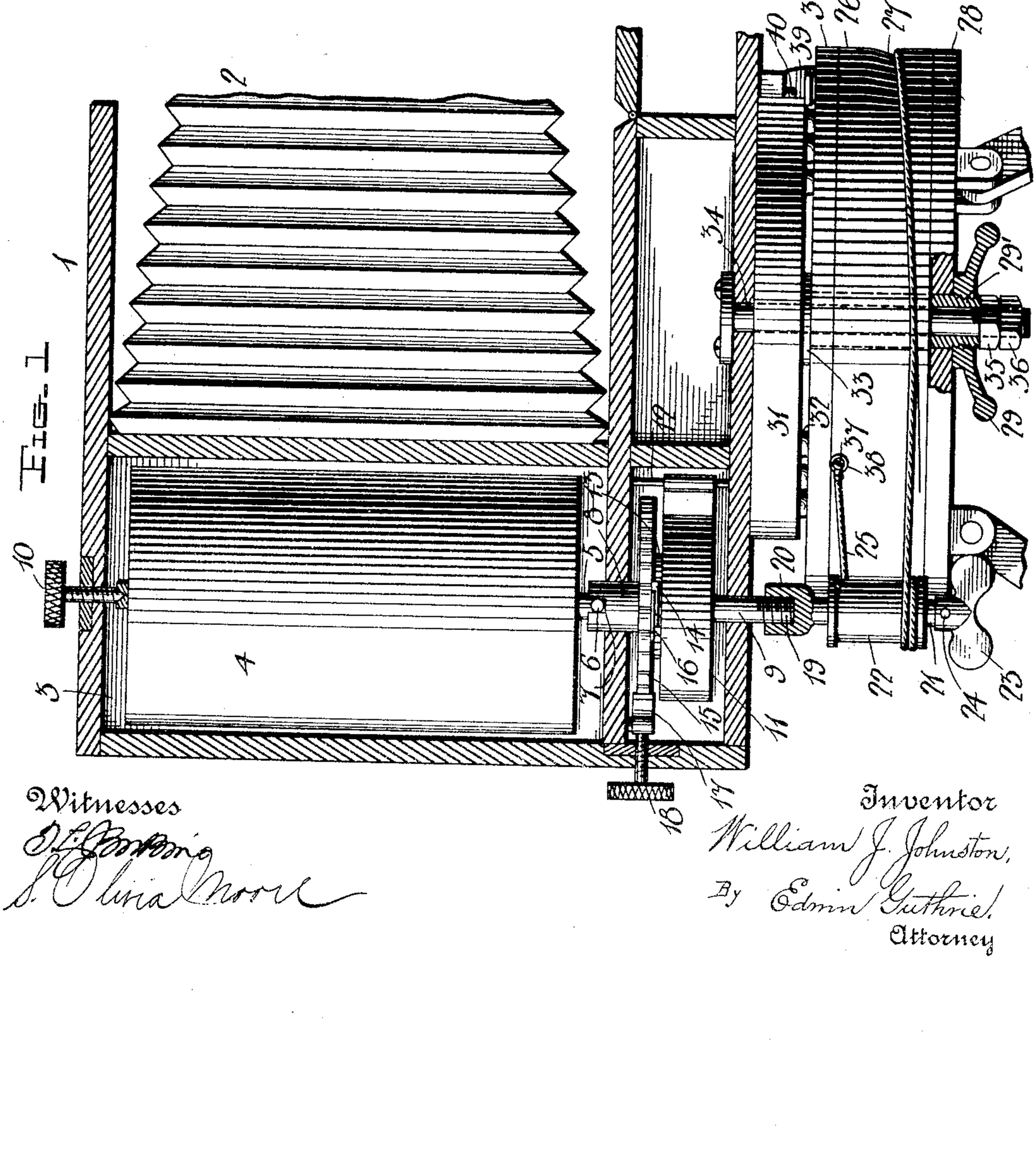


Fig. 2

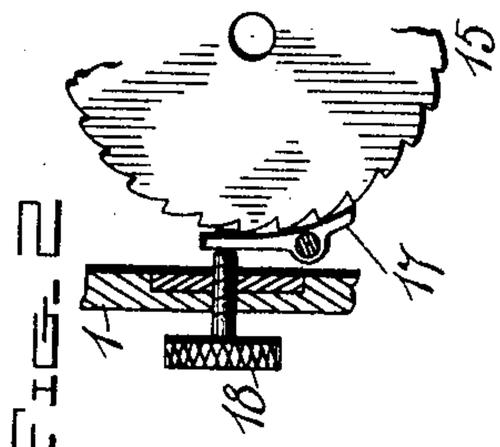


Fig. 3

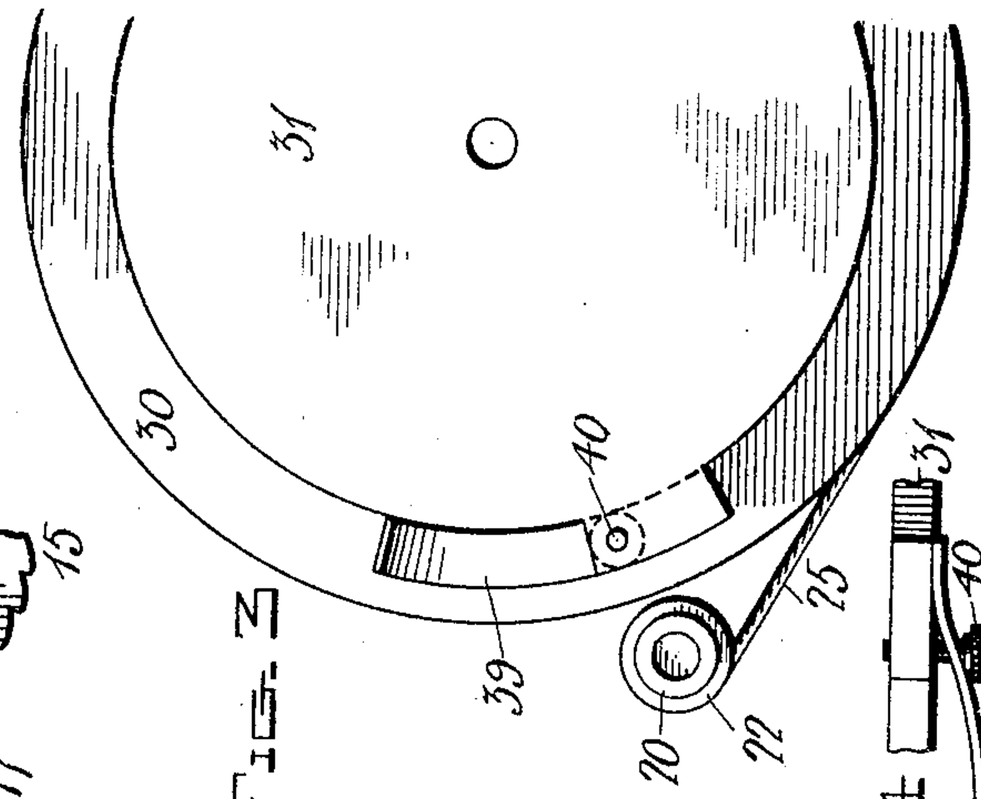
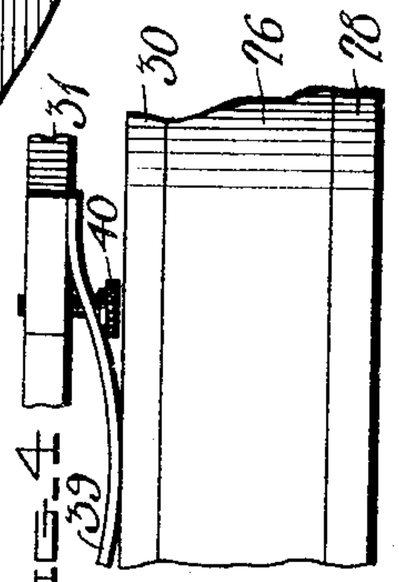


Fig. 4



Witnesses

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No. 780,351. Patented January 17, 1905.

UNITED STATES PATENT OFFICE.

WILLIAM J. JOHNSTON, OF ROCK SPRINGS, WYOMING.

CAMERA-REVOLVING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 780,351, dated January 17, 1905.

Application filed March 26, 1904. Serial No. 200,101.

To all whom it may concern:

Be it known that I, WILLIAM J. JOHNSTON, a citizen of the United States, residing at Rock Springs, in the county of Sweetwater and State of Wyoming, have invented certain new and useful Improvements in Camera-Revolving Apparatus, of which the following is a specification.

My invention relates to camera-revolving apparatus.

The object of my invention is to provide improved and simplified mechanism for the purpose of imparting movement in a circular direction to the particular type of contrivances for taking photographs known as "panoramic" cameras. In nearly all such cameras with which I am acquainted the machinery for turning the box circularly includes a greater or less number of toothed gear-wheels. Motion is lost unavoidably in all train-gearing, however accurately cut and even when new and unworn. After considerable use the continuous wearing away seriously interferes with steadiness of movement and constant speed absolutely demanded to insure the best results in the picture. Again, the interacting gear-wheels often set up a vibratory jarring effect, which is communicated to the whole apparatus and which no amount of weight or rigidity possessed by the tripod will wholly eliminate.

It is also an object of my invention to produce camera-revolving means free in operation from vibrations and consisting of the minimum number of parts.

I accomplish the objects stated by constructing and associating the devices as illustrated in the accompanying drawings, of which—

Figure 1 represents a side view partly in vertical section. Fig. 2 is a fragmentary plan view of a ratchet-wheel and adjustable pawl for restraining the feed-roll from rotating under influence of the motor-spring. Fig. 3 is a top plan view, with the camera-box removed, of the disk or drum, the winding-spool for the draft-cord, and one of the adjustable spring-brakes; and Fig. 4 is a side view of one of the spring-brakes.

Like numbers refer to like parts throughout.

Each constituent element is described in detail and its individual office, together with the mode of operation of the whole, fully explained hereinbelow.

Numeral 1 marks a camera-box of any customary or chosen construction possessing the bellows 2, the exposure or film chamber 3, and a removable feed-roll 4, upon or about which sensitive film may be wound. Near the lower end of the axis 5 of feed-roll 4 are shown the projecting extremities of a diametrical pin 6, passing through the axis and secured therein. The ends of pin 6 engage recesses 7, of which one is shown, in a head 8 of a vertical spindle 9. It is thought to be clear from an inspection of the drawing Fig. 1 that when the pivot thumb-screw 10 at the top of axis 5 is unscrewed from the box the feed-roll may be raised out of connection with the head 8 and restored to its original position by again setting up the thumb-screw. Spindle 9 is directly turned by a motor-spring 11, which has its outermost coil attached to the relatively stationary post 12 and its innermost coil secured to the spindle. A ratchet-wheel 13 is fixed upon spindle 9 in the position illustrated and engages a pawl 14, which is pivotally connected with the under surface of the ratchet-wheel 15, that is loose upon spindle 9. A spring 16 holds the pawl 14 in yielding engagement with ratchet-wheel 13 in the ordinary way. As the motor-spring unwinds it turns first ratchet-wheel 13, and by means of pawl 14 this motion is impressed upon the loose second ratchet-wheel 15, which would revolve with the other parts were it not restrained by means of pivoted pawl 17, (see also Fig. 2,) adapted to be brought into and out of engagement with wheel 15 by the adjusting thumb-screw 18. Further considering Fig. 1, it will be noted that the lower end 19 of spindle 9 is threaded and in that manner is coupled with the threaded head 20 of a stem 21, which passes axially through the winding-spool 22, to be again mentioned, and terminates in a thumb-piece 23, removably secured to the lower end of stem 21 by a pin 24. From the foregoing explanation it is

believed to be now apparent that the motor-spring may be wound up by means of thumb-piece 23 and that its unwinding operation will be restained by the engagement of pivoted and adjustable pawl 17, as illustrated. Obviously if it is desired to wind the spring 11 without turning the feed-roll 4 the diametrical pin 6 must have been raised out of recesses 7.

One end of the draft-cord 25 is suitably connected with the winding-spool 22 near its lower portion, and the cord passes thence around the drum or disk 26, usually provided with a helical groove 27 in which the cord lies before it is wound upon the spool. Normally disk 26 is stationary, being so held upon the table 27 of the tripod by means of hand-wheel 28, threaded upon the lower end of sleeve 29, as drawn. Upper the upper surface of the disk and of the same form and extent is fixed a plate 30, and above plate 30 is a second plate 31 of less diameter, upon which the bottom of the camera-box is placed. Plates 30 and 31 ordinarily are provided with circumferential grooves, which constitute raceways for balls 32, introduced to relieve friction in the operation of the apparatus. The balls are omitted at the middle to clear the view of the head 33 of sleeve 29. This head rests upon the upper surface of plate 30 and the table 27 of the tripod. Disk 26 and plate 30 are thus clamped together by the hand-wheel 28. The camera-box turns with pin 34 as a center. The pin accurately fits the bore of sleeve 29 and is suitably limited as to its vertical displacement by nut 35 and jam-nut 36 upon its threaded lower end, and the camera-box is therefore removable from the tripod at pleasure. To secure the remaining end of cord 25 to disk 26, I usually employ a screw 37 and eye 38, although any similar devices could be used. It is desirable frequently to detach one end of the cord, particularly when winding the motor-spring 11, and the screw and eye enable this to be conveniently effected.

It has been already explained that disk 26 is not permanently attached upon the tripod-table, but may be moved around thereon when the hand-wheel 28 is unscrewed. The purpose of this construction is to enable the camera to be directed toward any point of the compass after the tripod has been set up. For example, assume that the tripod has been placed in a favorable spot and the instrument adjusted with cord 25 all out—that is to say, entirely held in the helical groove of the disk. Under such conditions the camera is ready to sweep through a complete circle, if desired, and the optical axis points in a certain direction. It may happen that it becomes necessary to point the camera in quite a different direction while still preserving the unspooled condition of the cord. By unscrewing the hand-wheel 28 the disk 26, together with the whole apparatus above it, may be turned to any selected point and the disk again fixed by setting up the hand-wheel.

Returning to Fig. 2, it will be understood that when the pivoted pawl 17 is in its withdrawn position, as illustrated, the spool is rotated and takes the cord from the disk, thereby swinging the camera-box around in a horizontal plane. If not retarded, the box would acquire momentum and uneven movement result. That condition is prevented by the spring-brakes 39, of which there are one or more at diametrical points of plate 31, as shown in Figs. 1 and 3. The spring 39 is arranged to press strongly upon the portion of plate 30 which projects beyond plate 31, and the amount of spring-pressure may be regulated by the upward effect of the adjusting thumb-screws 40. The springs may be entirely lifted from contact with plate 30, whereupon no braking action takes place, or the maximum spring-pressure may be exerted by lowering the screw. As the power of motor-spring 11 is constant, different speeds between wide limits may be given the circularly-moving camera-box, and the retarding influence is at all times exactly the same and continuous, even, and non-vibratory movement attained.

In common with other panoramic-camera mechanisms I preserve in my invention the proportional relations of spool, disk, and feed-roll, which require that the length of film exposed during one complete revolution of the camera shall equal the circumference of a circle the radius of which is the focal distance of the lens used.

I do not limit myself to the precise forms, sizes, or arrangement of any of the details shown and explained.

Having thus described my invention and the manner of its operation, what I claim is—

1. In camera-revolving apparatus, the combination with a revoluble camera-box, of a winding-spool borne by the said box, a stationary disk, a flexible connection attached to the said spool and disk and adapted to be wound alternately upon them, and means carried by the said box and arranged to rotate the spool whereby the camera-box is caused to revolve.

2. In camera-revolving apparatus, the combination with a revoluble camera-box, of a winding-spool borne by said box, a stationary disk, a flexible connection attaching said spool and disk and adapted to be wound upon them, means for rotating said spool whereby the camera-box is caused to revolve, and devices constructed and arranged to retard the movement of said box.

3. In camera-revolving apparatus, the combination with a revoluble camera-box, of a winding-spool borne by said box, a stationary disk, a flexible connection attaching said spool and disk and adapted to be wound upon them, means for rotating said spool whereby the

camera-box is caused to revolve, and adjustable devices constructed and arranged to retard the movement of said box.

4. In camera-revolving apparatus, the combination with a revoluble camera-box, of a winding-spool borne by said box and provided with an axial stem, a spindle borne by said box, means whereby the rotation of the spindle is communicated to said stem, a stationary disk, a flexible connection attaching said spool and disk and adapted to be wound upon them, and motor mechanism for rotating said spindle whereby the said camera-box is caused to revolve.

5. In camera-revolving apparatus, the combination with a revoluble camera-box, of a winding-spool borne by said box and provided with an axial stem, a spindle borne by said box, means whereby the rotation of the spindle is communicated to said stem, a stationary disk, a flexible connection attaching said spool and disk and adapted to be wound upon them, motor mechanism for rotating said spindle whereby said camera-box is caused to revolve, and retarding devices constructed and arranged to retard the movement of said camera-box.

6. In camera-revolving apparatus, the combination with a revoluble camera-box, of a winding-spool borne by said box and provided with an axial stem, a spindle borne by said box, means whereby the rotation of the spindle is communicated to said stem, a stationary disk, a flexible connection attaching said spool and disk and adapted to be wound upon them, and a motor-spring encircling said spindle and acting directly to rotate it whereby said camera-box is caused to revolve.

7. In camera-revolving apparatus, the combination with a revoluble camera-box, of a winding-spool borne by said box and provided with an axial stem, a spindle borne by said box, means whereby the rotation of the spindle is communicated to said stem, a stationary disk, a flexible connection attaching said spool and disk and adapted to be wound upon them, a motor-spring encircling said spindle and acting directly to rotate it whereby said camera-box is caused to revolve, and devices for restraining the unwinding of the spring.

8. In camera-revolving apparatus, the combination with a revoluble camera-box, of a winding-spool borne by said box and provided with an axial stem, a spindle borne by said box, means whereby the rotation of the spindle is communicated to said stem, a stationary disk, a flexible connection attaching said spool and disk and adapted to be wound upon them, a motor-spring encircling said spindle and acting directly to rotate it whereby said camera-box is caused to revolve, means for restraining the unwinding of the spring, and retarding devices constructed and arranged to retard the movement of said camera-box.

9. In camera-revolving apparatus, the combination with a tripod-table, of a normally stationary disk and attachments for removably securing the disk upon said table enabling said disk to be rotatively adjusted, a revoluble camera-box, a winding-spool borne by said box, a flexible connection attaching said disk and spool and adapted to be wound alternately upon them, and mechanism for rotating said spool whereby said camera-box is caused to revolve.

10. In camera-revolving apparatus, the combination with a revoluble camera-box, of a winding-spool borne by said box, a stationary disk provided with a helical groove, a draft-cord secured to said spool and disk and adapted to be wound alternately upon them, and mechanism for rotating said spool whereby said camera-box is caused to revolve.

11. In camera-revolving apparatus, the combination with a revoluble camera-box, of a winding-spool borne by said box, a stationary disk, a flexible connection attaching said spool and disk and adapted to be wound alternately upon them, mechanism for rotating said spool whereby said camera-box is caused to revolve, and an adjustable spring-brake arranged to bear upon said disk and retard the movement of said camera-box.

12. In camera-revolving apparatus, the combination with a revoluble camera-box, of a winding-spool borne by said box and having an axial stem, a spindle borne by the said box, means whereby the rotation of the spindle is communicated to the said stem, a stationary disk, a flexible and detachable connection attaching said spool and said disk and adapted to be wound alternately upon them, a spring-motor arranged to rotate the spindle whereby said camera-box is caused to rotate, mechanism for restraining the unwinding of said spring-motor, and a thumb-piece secured to the stem of said spool for winding the said spring.

13. In camera-revolving apparatus, the combination with a revoluble camera-box, of a winding-spool borne by the said box and having an axial stem, a spindle borne by the said box and in line with said stem, detachable coupling devices joining said spindle and stem, a stationary disk, a flexible and detachable connection attaching said spool and said disk and adapted to be wound alternately upon them, a motor-spring encircling said spindle and acting directly to rotate it whereby said camera-box is caused to revolve, means for restraining the unwinding of said spring, and a thumb-piece secured to the stem of said spool for winding the said spring.

14. In camera-revolving apparatus, the combination with a revoluble camera-box, of a removable feed-roll rotatively supported within said box, a winding-spool borne by said box, means whereby the rotation of said spool is communicated to said feed-roll, a stationary disk, a flexible connection attaching said spool

and disk and adapted to be wound alternately upon them, and mechanism for rotating the spool whereby said camera-box is caused to revolve and said feed-roll rotated.

15. In camera-revolving apparatus, the combination with a revoluble camera-box, of a winding-spool borne by said box and having an axial stem, a spindle borne by the said box and in line with said stem, a removable feed-roll rotatively supported within said box and having an axis in line with said spindle, detachable coupling devices joining said spindle and stem, detachable coupling devices joining said spindle and the axis of said feed-roll, a stationary disk, a flexible connection attaching said spool and disk and adapted to be wound alternately upon them, a motor-spring encircling the spindle and acting directly to rotate it whereby said box is caused to revolve and said feed-roll directly rotated, adjustable retarding devices for limiting the speed of the box, and adjustable contrivances for restraining the unwinding of the motor-spring.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM J. JOHNSTON.

Witnesses:
S. OLIVIA MOORE,
FRANK B. MARLOW.