

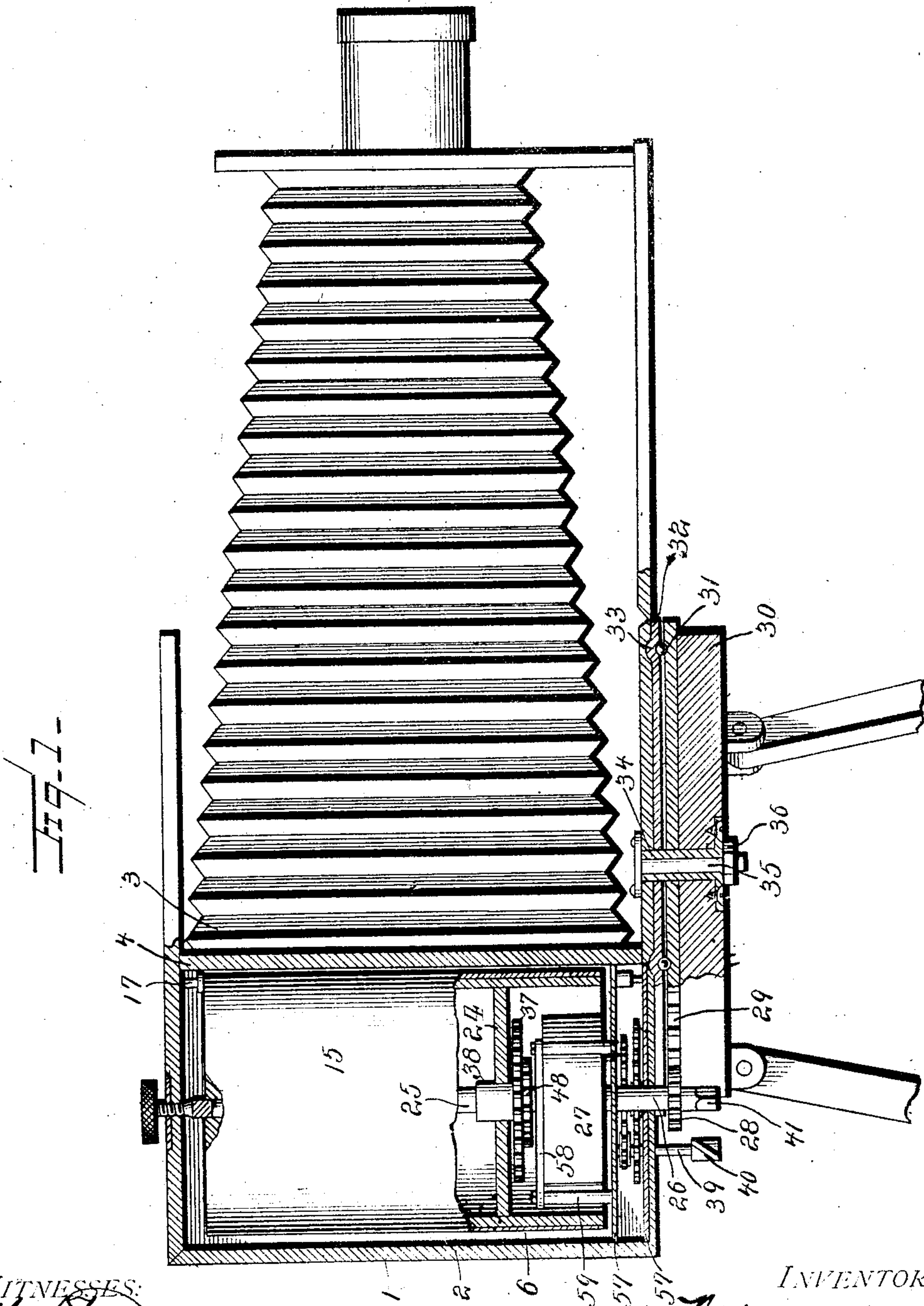
No. 776,403.

PATENTED NOV. 29, 1904.

W. J. JOHNSTON.  
PANORAMIC CAMERA.  
APPLICATION FILED JAN. 7, 1904.

NO MODEL.

3 SHEETS—SHEET 1.



WITNESSES:

*W. F. Doyle*  
*George Hilroy*

INVENTOR

*William J. Johnston*  
BY *Patron Coleman*  
Attorney

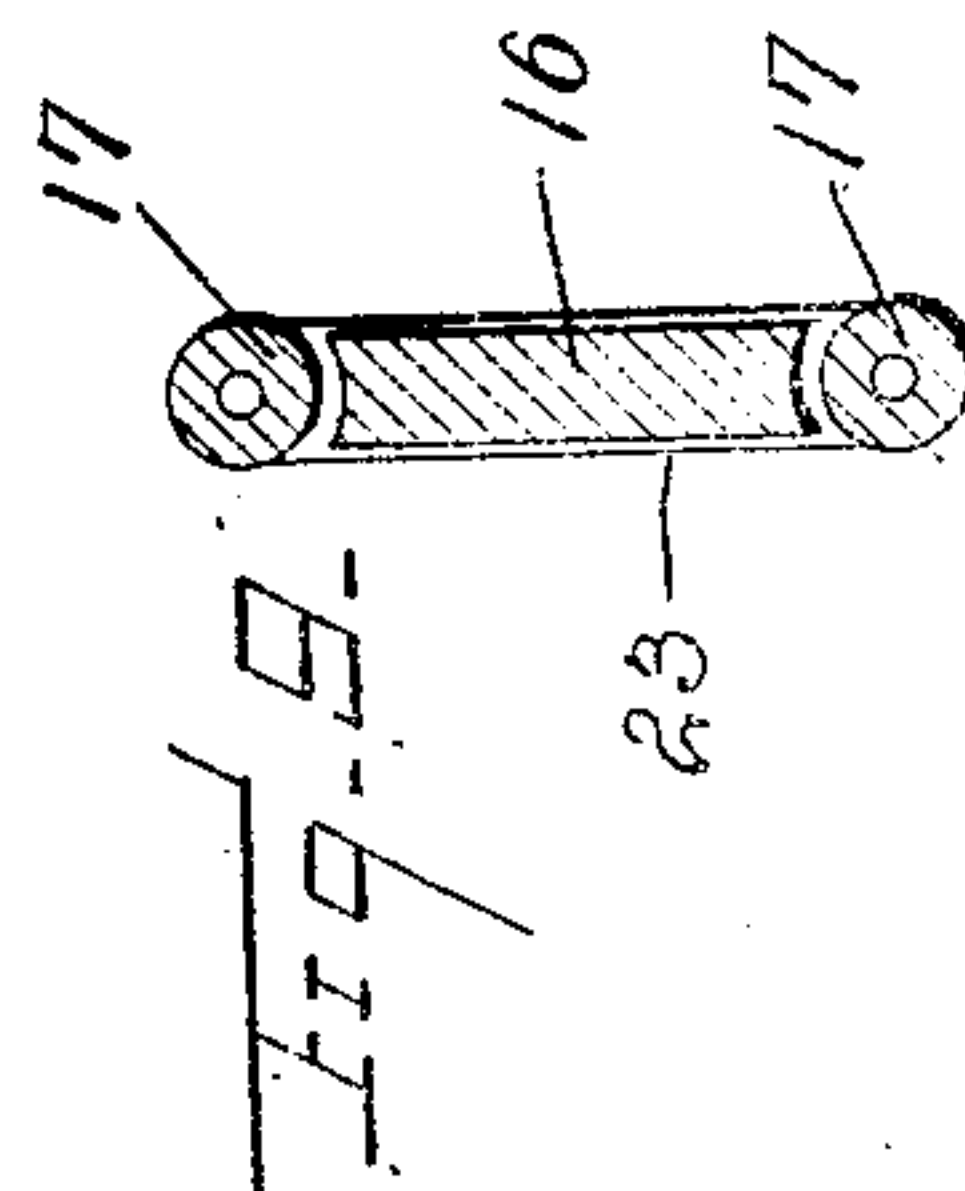
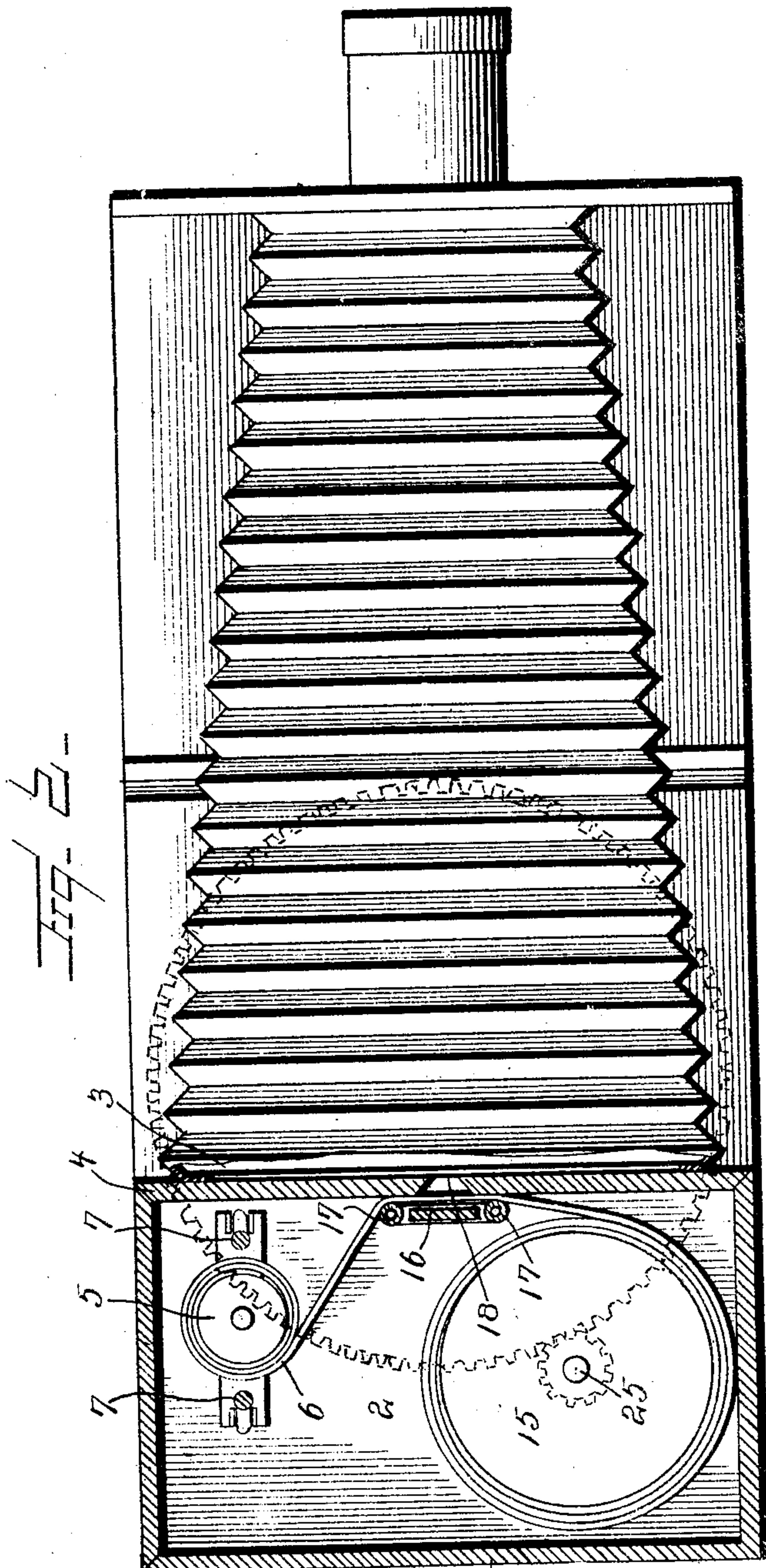
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3 SHEETS—SHEET 2.



WITNESSES:

*W. F. Day & Co.*  
*George Hilton*

INVENTOR

*William J. Johnston*  
BY *Nathan E. Coleman*  
Attorney



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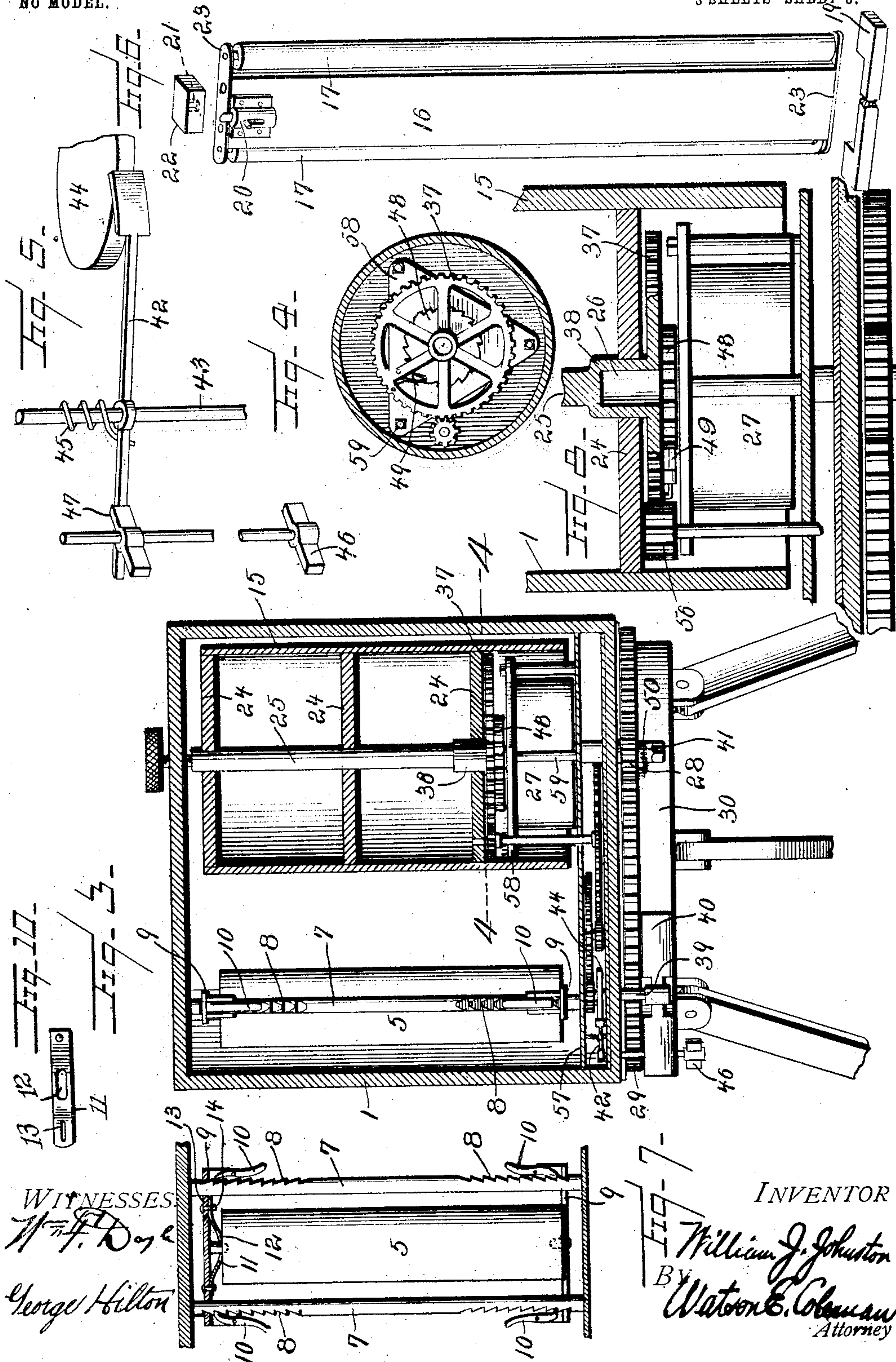
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3 SHEETS-SHEET 3.



WITNESSES

*W. F. Dyer*

*George Hilton*

INVENTOR

*William J. Johnston*

By *Watson E. Coleman*  
Attorney



# UNITED STATES PATENT OFFICE.

WILLIAM J. JOHNSTON, OF ROCK SPRINGS, WYOMING.

## PANORAMIC CAMERA.

**SPECIFICATION** forming part of Letters Patent No. 776,403, dated November 29, 1904.

Application filed January 7, 1904. Serial No. 188,046. (No model.)

*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 Panoramic Cameras, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to photographic cameras, and more particularly to that class of instruments known as "panoramic" cameras, wherein the camera is made to revolve during exposure and the film is adapted to move in the same direction as the lens, the object being to provide a photographic instrument of the class described whereby a continuous panoramic view of any scene within a circle or any portion of a circle may be produced.

A further object of the invention is to produce an instrument of the class described wherein utility is combined with compactness, the purpose being to provide a panoramic camera that shall be simple in construction, practical, and easy of adjustment.

In the accompanying drawings, forming a part of the specification, I have illustrated a preferred embodiment of my invention, and although it will be obvious that certain modifications of form and arrangement will suggest themselves to the skilled operator and mechanic such modifications come well within the spirit of my invention as disclosed and claimed, and I do not, therefore, desire to be limited to the precise construction and arrangement shown.

In the drawings, Figure 1 is a vertical longitudinal section of the preferred form of my device with parts shown in elevation. Fig. 2 is a horizontal section of the form shown in Fig. 1. Fig. 3 is a vertical transverse section of the preferred form. Fig. 4 is a horizontal section on line 4 4 of Fig. 3. Fig. 5 is a detailed perspective view of the stop mechanism. Fig. 6 is a detailed perspective view of the plate and guide-rolls and its retaining-blocks. Fig. 7 is a detailed elevation of the adjustable film-roll-clamp mechanism. Fig. 8 is an enlarged section through the preferred form of

motor. Fig. 9 is a detailed horizontal section taken through the plate and guide-rolls. Fig. 10 is a plan view of the friction-spring which acts on the top of the supply-roll.

Like figures refer to like parts in the several views.

1 designates the framework, comprising a suitable case. This framework is preferably divided into two compartments, which are designated as 2 and 3. These compartments are separated by a vertical partition 4. In the rear of the exposing-compartment 2 is a vertically-disposed film-supply roll 5, of any desired dimensions, on which is wound a flexible sensitized photographic film 6. This supply-roll is pivoted between two standards 7, which are provided at both ends with notches 8. Two plates 9 are adjustably mounted on the standards, and suitably pivoted on each plate are two pawls 10, which are adapted to engage with the notches in the standards. Secured to the top plate in any suitable manner is a spring 11, which is provided with an elongated slot 12 in the center thereof and also with an elongated slot 13 at one end thereof, which is slidably mounted on a stud or lug 14. (See Fig. 10.) These slots permit the spring to give when necessary. One object of this arrangement for the film-roll 5 is to provide a means whereby any desired length of film or supply roll can be used in the camera and also that it may be suitably adjusted in any desired position, particularly when a narrow film is used, so that the film will travel uniformly across the point of exposure without regard to its width. Another object of the arrangement just referred to is to provide a friction tension for the supply-roll 5, by means of the spring 11, in order to prevent the film from unrolling faster than necessary. In the same compartment is another and larger roll 15, to which one end of the film is attached and on which it is wound after having been exposed, and a vertically-disposed removable plate 16, on each side of which is suitably mounted a roll 17.

The compartment 3 contains the bellows and lens. The plate 16, which is easily removed and replaced in order to permit of the ad-



justment of the film in the camera, extends to the full height of the compartment 2, and is placed in close proximity to and in the rear of the partition 4. This plate may be of any desired width, but is preferably slightly wider than the exposing-slot and is disposed so that it completely covers the slot and prevents light from entering the exposing-compartment through the film.

For the purpose of holding the plate 16 in position in the camera and in order to provide means by which it may be easily removed and replaced, as hereinbefore stated, a block 19 is secured to the bottom of compartment 2. Between this block and the slot 18 the lower end of the plate is placed so that the rolls 17 rest against the film. The plate is provided at the top with a snap-lock 20, which engages with a slot 21, which may be placed either in the top of the camera or in a block 22, secured to the side thereof above the slot 18, as shown. The slot 18, which is preferably narrow, extends vertically parallel to and equals in length the feed-roll 15. The slot diverges toward the film 6, as shown in the drawings, in order to admit of the vignetting or blending of the figure on the film, thereby avoiding the lines of demarcation between the multiplicity of images produced and which are blended together continuously in a panoramic view. This slot may be placed in any desired portion of the partition 4, which may be convenient for the carrying of the film from the supply to the feed-roll. The rolls 17 are preferably journaled in bearings 23, secured to the plate 16, and are removable with the plate, although if found desirable they may be pivoted in the framework, and thus made separable from the plate. These rolls are also preferably slightly greater in diameter than the thickness of the plate 16 in order that they may hold the film gently but firmly in place before the slot 18. On each side of the slot 18 and opposite the guide-rolls 17 is fastened a strip of some soft dark material, preferably black velvet, so that the movement of the film may be smooth and uninterrupted and which will at the same time aid in preventing light from penetrating the compartment 2. The feed-roll 15 is hollow and has within it a plurality of disks 24 for the purpose of lending strength and firmness thereto. This roll is mounted on a shaft 25, cooperating with the stub-shaft 26, to which stub-shaft 26 one end of the motor-spring 27 is secured. A pinion 28 is movably mounted on said stub-shaft and is adapted to engage with the stationary toothed wheel or rack 29. This wheel or rack is rigidly mounted on the top of a camera-stand or tripod 30. The shaft 25 and stub-shaft 26 are arranged as shown in the preferred embodiment of my invention in order to admit of the winding of the motor-spring 27 without moving the feed-roll or causing the camera to rotate on its axis.

Near the outer edge of the upper surface of the stationary toothed wheel or rack 29 is an annular groove 31.

32 designates a flat ring which is rigidly secured to the bottom of the framework of the camera. This ring is provided underneath with an annular groove 33, which is disposed near its outer edge, the ring and wheel or rack 29 being preferably of the same circumference, and the two grooves are adapted to fit over each other. In the groove 31 is placed a plurality of antifriction-balls 31<sup>a</sup>, and upon these the ring 32 revolves. If preferred, this revolution can be accomplished by means of antifriction-rollers without the use of the antifriction-balls and the annular grooves, said rollers being suitably disposed between the ring 32 and the toothed wheel or rack 29.

34 designates a sleeve secured to the top of the tripod, as shown, and which passes up through the toothed wheel 29 and the ring 32. Journaled within the sleeve is a rod or bolt 35, which is rigidly secured to the framework of the camera. This rod or bolt has a nut 36 on its lower end which is threaded for the purpose, the object being to hold the camera firmly in position when revolving and also to furnish a pivotal axis upon which the camera can revolve smoothly and equally. A gear-wheel 37 is rigidly secured to the hood or socket 38, which forms the lower end of the shaft 25. This wheel by means of a train of gearing 38<sup>a</sup> operates a shaft 39, on the lower end of which a fan 40 is mounted in any suitable manner. This fan regulates the action of the motor-spring 27, and consequently causes uniform revolutions of the shaft 25 and the revolution of the camera smoothly and equally on its axis. The degree of speed required in the successful operation of the camera for the purposes for which it is intended is attained by changing the size of the wings of the fan or by disposing them at different angles with the shaft 39. The lower end of the stub-shaft 26 is squared, as shown at 41, for the purpose of holding a key.

As a means of stopping the operation of the camera at any desired point a locking mechanism is provided. This consists of the locking-lever 42, which is pivoted on a rod 43 and one end of which frictionally engages with the wheel 44, which is mounted on the shaft 39. A spiral spring 45 is secured at one end to the framework of the camera and the other end bears against the locking-lever, holding it firmly against the wheel 44 when it is desired to lock the camera against further motion. This locking mechanism is controlled by means of the key 46, as shown, and when it is desired to start the camera in motion the turning of the key throws the lug 47 against one end of the locking-lever, and thus removes the other end of the lever from the wheel 44.

The object of having the shaft of the feed-



roll formed in two parts 25 and 26, as heretofore mentioned, is to provide means whereby the motor-spring 27 may be wound without moving the feed-roll or causing the rotation of the camera on its pivotal axis. The upper end of the lower portion 26 of said feed-roll shaft rests in the hood or socket 38. Rigidly mounted on said stub-shaft 26 is a ratchet-wheel 48. Secured to the gear-wheel 37 is a pawl 49, which engages with the ratchet-wheel and prevents reverse movement of the stub-shaft 26. The pinion 28 has secured to it a pawl 50, which engages with notches 51 in the lower end of the stub-shaft and locks this wheel to the shaft after the winding operation is performed.

In the preferred embodiment of my invention it will be observed that the motor-spring 27 is disposed within the hollow feed-roll 15. 57 designates two plates between which is mounted the train of gearing to regulate the speed by operating the fan 40. 58 is a plate disposed above the motor-spring 27 and secured to the upper plate 57 by means of the standards or bolts 59, one end of the motor-spring being fastened to one of these standards or bolts.

It will be observed that in the construction of my invention the feed-roll shaft, the motor-spring, and the pinion 28, which engages with the stationary toothed wheel or rack 29, are all mounted on the same shaft, thus reducing lost motion to a minimum.

In operation the film 6 is placed on the roll 5. One end thereof is then carried past the slot 18 and secured to the feed-roll 15, which must be placed in relation to the exposing-slot so that the film will be drawn in the same direction as the lens travels in covering the view desired to be taken.

The primary object of the feed-roll is to furnish a means of drawing the film past the exposing-slot at a uniform rate of speed and proportionate to the focal distance of the lens, and the secondary object of the roll is to provide a means of disposing of the exposed portion of the film. By releasing the lock and starting the fan 40 the entire mechanism herein described and illustrated is placed in motion, and by exposing the film the scene desired to be taken is impressed thereon.

I have discovered that by changing the diameter of the stationary toothed wheel or rack 29 or the pinion 28 or the feed-roll 15 in mathematical ratio the speed of the revolution of the camera on its pivotal axis and the speed of the film past the exposing-slot can be regulated to meet any and all exigencies.

The principle upon which this camera is constructed in order to accomplish the desired results is deduced from the fact that as the diameter of the pinion 28 is to the diameter of the stationary toothed wheel 29 so is the diameter of the feed-roll 15 to twice the focal

distance of lens desired to be used. Thus to illustrate assume that the diameter of the pinion 28 is three-quarters of an inch, the diameter of the stationary toothed wheel 29 is ten inches, and the diameter of the feed-roll 15 is six inches. It will be at once seen that the focal distance of the lens must be precisely forty inches, or one-half of eighty. In other words, the diameter of the stationary toothed wheel 29 divided by twice the focal distance of the lens to be used must equal the diameter of the pinion 28 divided by the diameter of the feed-roll 15. Constructing the camera on these principles the necessity of the pivotal axis being at any given point with regard to the transverse axis of the lens or relative to the point where the film is exposed is obviated. It may be at any desired position relative to the optical center of the lens, either at, in front, in the rear, or at either side thereof, either in front or in the rear. This principle also allows the exposing-slot 18 to be placed at any convenient point in the partition 4. However, it is desirable that the pivotal axis should be placed as nearly as possible at a point so that when the camera is in operation it shall be evenly balanced, having due regard to compactness of form and other requirements, because the placing of the pivotal axis of the camera in front of the lens or in the rear of the point of exposure will be at a loss of compactness.

Inasmuch as the feed-roll 15 necessarily has its diameter increased slightly by the winding of the film thereon after exposure, it is desirable that the roll be made as large as practicable in order that the increase in the speed of the film caused by such enlargement may be neutralized by moving the lens slightly in advance of its former position when a new view is taken. The latitude of the lens will permit of this and to such an extent that the increased speed of film, which is very slight on account of the extreme thinness of such film, may be counterbalanced. It is obvious that when the camera is in operation the lens and place of exposure will always be equally distant from each other and in the same relative positions.

By recurring to the ratio in the size of the feed-roll, the stationary toothed wheel or rack, and the pinion engaging therewith it can be easily ascertained how much the focal length of the lens must be increased in order to counteract the increased diameter of the feed-roll caused by the winding of the film thereon after exposure.

Having thus described my said invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a camera, the combination of vertical standards having notches near their extremities, horizontal plates movable up and down said standards, a film-roll pivotally connected with said plates, and pawls pivotally attached



to said plates and arranged to engage the notches in the standards whereby a higher or lower position may be given said film-roll.

2. In a camera, a plurality of notched standards, oppositely-disposed plates carrying pawls adapted to engage the notches and to hold the plates in position upon the standards, said plates being provided with pivots secured to their opposing faces for the reception of the film-roll, and a spring mounted upon one of the opposing faces of the plates and provided with an elongated aperture.

3. In a camera, a plurality of notched standards, oppositely-disposed plates carrying pawls adapted to engage the notches and to hold the plates in position upon the standards, said plates being provided with pivots adapted to receive the film-roll, and a bow-spring mounted upon one of the opposing faces of the plates and having an elongated slot therein.

4. In a panoramic camera, the combination with an exposure-compartment, of a lens-compartment, a partition separating said compartments and provided with an exposure-slot, the sides of said slot diverging toward said exposure-compartment from said lens-compartment.

5. In a panoramic camera, the combination with a supply-roll, of a feed-roll, an exposure-compartment containing said rolls and having one side provided with an exposure-slot, a plate in said compartment in rear of said slot, guide-rolls mounted at the sides of said plate and arranged to guide a film between said plate and slot, and means for removably securing said plate and guide-rolls in place.

6. In a panoramic camera, the combination with a fixed rack, of a supply-roll, a feed-roll, a pinion mounted upon the axis of said feed-roll and adapted to engage and travel said rack, an exposure-compartment having one side provided with an exposure-slot, film-guiding means arranged to guide a film to said slot, and a motor having a spring acting directly upon said feed-roll and pinion.

7. In a panoramic camera, the combination with a rack mounted upon a suitable support, of a feed-roll, a pinion mounted upon the axis of the feed-roll and adapted to travel upon said rack, a lens, an exposure-chamber having one side provided with an exposing-slot converging toward the lens, and a motor acting upon the feed-roll and pinion.

8. In a panoramic camera, the combination with a rack mounted upon a suitable support, of a feed-roll, a pinion mounted upon the axis of the feed-roll and traveling upon said rack, a motor, and a ratchet-and-pawl connection between the motor and the axis of the feed-roll and pinion.

9. In a panoramic camera the combination with a rack mounted upon a suitable support, a feed-roll, a pinion mounted upon the axis of the feed-roll and traveling upon said rack, a motor disposed within the feed-roll, and a

ratchet-and-pawl connection between the motor and the axis of the feed-roll and pinion.

10. In a panoramic camera the combination with a circular rack mounted upon a suitable support, of a feed-roll, a pinion mounted upon the axis of the feed-roll and adapted to travel upon the rack, a motor disposed within the feed-roll, a gear-wheel carried by the motor, a second gear-wheel carried by the feed-roll, and a pawl serving to operatively connect the two gear-wheels.

11. In a panoramic camera, the combination with a circular rack mounted upon a suitable support, of a feed-roll, a pinion mounted upon the axis of the feed-roll and adapted to travel upon said rack, a motor acting directly upon the axis of the feed-roll, a pinion, a speed-governor, a train of gearing connecting the speed-governor and the motor, and a fast and loose connection between the motor and the axis of the feed-roll and pinion.

12. In a panoramic camera, the combination with a circular rack mounted upon a suitable support, of a feed-roll, a pinion mounted upon the axis of the feed-roll and adapted to travel upon said rack, a motor disposed within the feed-roll, a gear-wheel carried by the motor, a second gear-wheel carried by the feed-roll, a pawl serving to operatively connect the two gear-wheels, a speed-governor, and a train of gearing connecting the speed-governor and the axis of the feed-roll and pinion.

13. In a panoramic camera, the combination with a circular rack mounted upon a suitable support, of a feed-roll, a pinion carried by the axis of the feed-roll and operatively connected therewith by a pawl, a motor disposed within the feed-roll, a gear-wheel carried by the motor, a second gear-wheel carried by the feed-roll, a pawl serving to operatively connect the two gear-wheels, a speed-governor, a train of gearing connecting the speed-governor and the axis of the feed-roll and pinion, a friction-lock acting upon the gearing, and means for bringing said lock into and out of operation.

14. In a panoramic camera, a feed-roll, a motor disposed within the same, lugs carried by the shaft of the feed-roll, a sleeve provided with slots adapted to be engaged by the lugs, a motor mounted upon a stub-shaft working loosely within said sleeve, a gear-wheel carried by the stub-shaft, a pawl operatively connecting the stub-shaft and sleeve, a speed-governor, and a train of gearing connecting the speed-governor and sleeve.

15. In a panoramic camera, the combination of a feed-roll, a motor disposed within the feed-roll, a lens, and an exposure-compartment having one side provided with an exposing-slot converging toward the lens.

16. In a panoramic camera, adapted to contain a sensitive surface, the combination of a feed-roll, a motor disposed within the feed-roll, a lens, and an exposure-compartment having one side provided with an exposing-slot



arranged between the lens and the sensitive surface, and converging toward the lens.

17. In a panoramic camera, the combination of a feed-roll, a motor disposed within the  
5 feed-roll, a lens, an exposure-compartment having one side provided with an exposing-slot converging toward the lens, and a fast and loose connection between the motor and the axis of the feed-roll.

10 18. In a panoramic camera, adapted to contain a sensitive surface, the combination of a feed-roll, a lens, a motor disposed within the feed-roll, and an exposure-compartment having one side provided with an exposing-slot  
15 disposed between the lens and the sensitive surface and converging toward the lens, and a ratchet-and-pawl connection between the motor and the feed-roll.

19. In a panoramic camera, the combination  
20 with a circular rack mounted upon a suitable support, of a feed-roll, a pinion mounted upon the axis of the feed-roll and adapted to travel upon said rack, a motor disposed within the feed-roll, a gear-wheel carried by the motor,  
25 a second gear-wheel carried by the feed-roll, a pawl serving to operatively connect the two gear-wheels, a sensitized surface, a lens, an exposing-slot disposed between the lens and the sensitized surface, and converging toward  
30 the lens, a speed-governor, and a train of gearing connecting the speed-governor and the axis of the feed-roll and pinion.

20. In a panoramic camera, the combination with a circular rack mounted upon a suitable  
35 support, of a feed-roll, a pinion carried by the axis of the feed-roll and operatively connected therewith by a pawl, a motor disposed within the feed-roll, a gear-wheel carried by the motor, a second gear-wheel carried by the  
40 feed-roll, a pawl serving to operatively connect the two gear-wheels, a sensitized surface, a lens, an exposing-slot disposed between the lens and the sensitized surface and converging toward the lens, a speed-governor, a train  
45 of gearing connecting the speed-governor and the axis of the feed-roll and pinion, a friction-lock acting upon the gearing, and means for bringing the lock into and out of action.

21. In a panoramic camera, the combination  
50 with a circular rack mounted upon a suitable support, of a camera mounted upon said support, rolling members interposed between the camera and support, a feed-roll, a motor disposed within the feed-roll, a fast and loose connection between the motor and the axis of the  
55 feed-roll, a pinion mounted upon the axis of the feed-roll and adapted to travel upon the rack, a speed-governor, a train of gearing connecting the feed-roll and governor, and a friction-lock acting upon the train of gearing.

22. In a panoramic camera, the combination

with a circular rack mounted upon a suitable support, of a camera mounted upon said support, antifriction-balls disposed in annular grooves between the camera and support, a  
65 feed-roll, a pinion carried by the axis of the feed-roll and adapted to travel upon the rack, a motor disposed within the feed-roll and acting directly upon the same, a speed-governor, a train of gearing connecting the feed-roll and  
70 governor, and a friction-lock acting upon the train of gearing.

23. In a panoramic camera, having a train of gearing connecting a feed-roll and a governor, the combination of a lock comprising a  
75 spring-pressed lever having one arm adapted to be brought into frictional contact with the gearing.

24. In a camera, a feed-roll, a motor disposed within the feed-roll and acting directly  
80 thereon, a speed-governor, a train of gearing connecting the feed-roll and governor, and a lock comprising a spring-pressed lever having one arm adapted to be brought into frictional contact with said gearing, and the other arm  
85 so arranged as to be operable from the exterior of the camera.

25. In a panoramic camera adapted to contain a sensitive surface, a supply-roll, a feed-roll, an exposure-compartment having one side  
90 provided with an exposing-slot disposed between the lens and the sensitive surface and converging toward the lens; a plate in said compartment in the rear of the slot, and removable guides arranged between the supply  
95 and the feed roll, and adapted to guide the sensitive surface between said plate and slot.

26. In a camera adapted to contain a sensitive surface, the combination of a lens, a supply-roll, a feed-roll, a compartment having an  
100 exposing-slot arranged between the sensitive surface and the lens, blocks arranged in said compartment, a plate longitudinally arranged within said compartment, guide-rolls mounted on each side of said plate, and a snap-lock  
105 removably securing the plate and guide-rolls in position within the block.

27. In a panoramic camera, the combination with a rack, of a pinion engaging the rack, a film-supply roll, a feed-roll whereby the film is  
110 drawn from the said film-supply roll, and a motor having a spring connected with the aforesaid feed-roll and adapted to rotate it, the said pinion being operated by the said motor and arranged to rotate in the same time with said  
115 feed-roll.

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

WILLIAM J. JOHNSTON.

Witnesses:

DAVID A. REAVILL,  
FLOYD J. WOX.