

Dec. 1, 1931.

J. M. WALL

1,834,908

MOTION PICTURE MACHINE

Filed Feb. 20, 1929

6 Sheets-Sheet 1

FIG. 1.

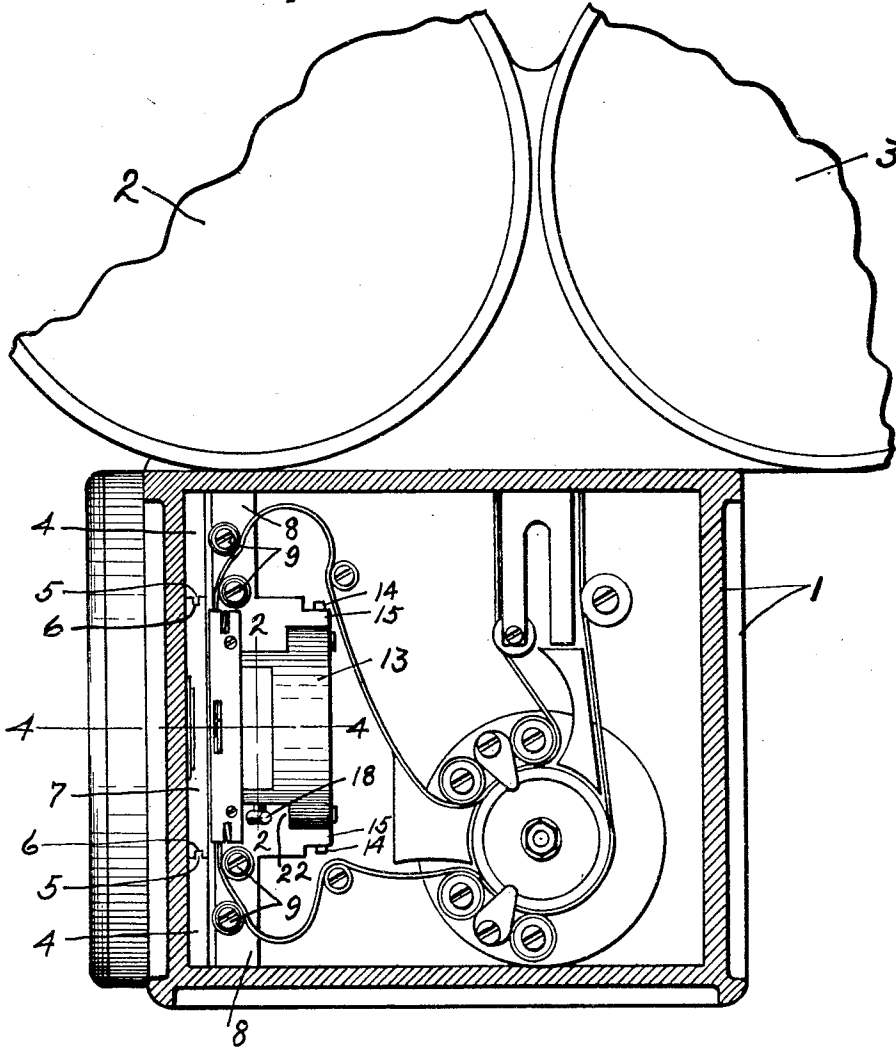


FIG. 2.

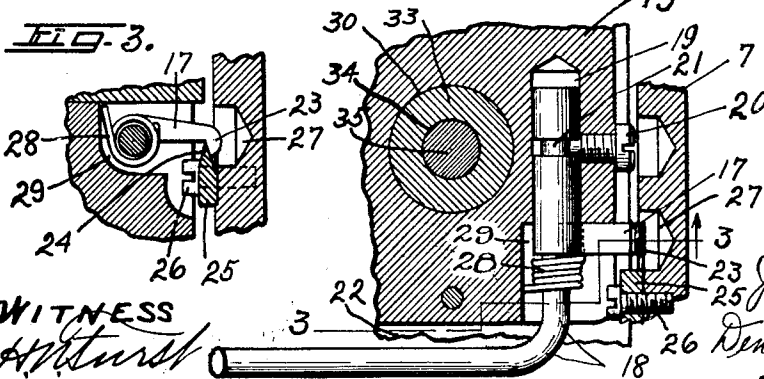
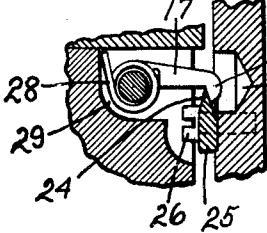


FIG. 3.



WITNESS

W. H. H. H.

INVENTOR

John M. Wall

Dennis & Thompson

ATTORNEYS

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J. M. WALL

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6 Sheets-Sheet 4

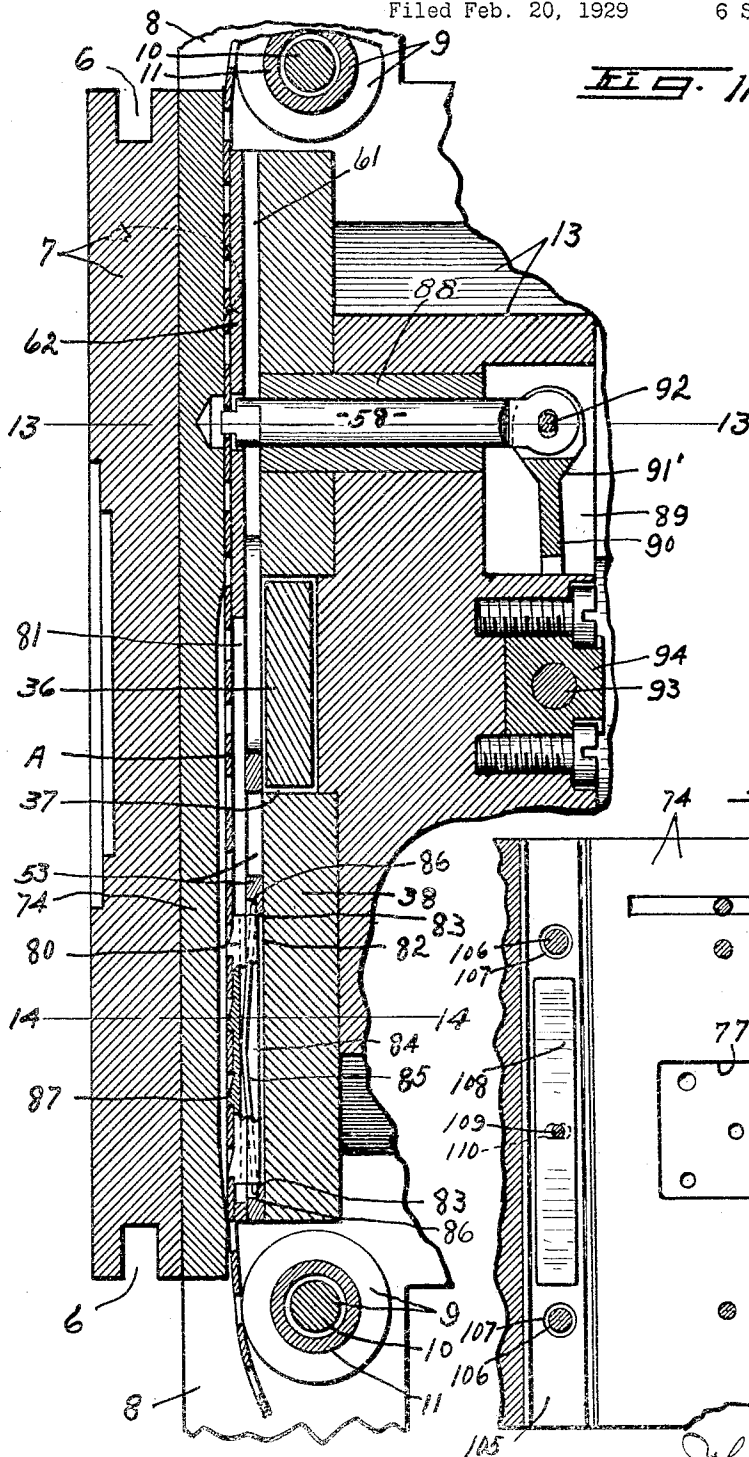


FIG. 11.

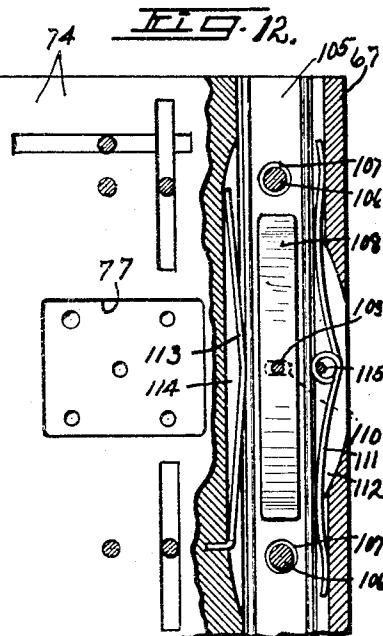


FIG. 12.

WITNESS
H. H. H. H.

BY

INVENTOR
John M. Wall
Dyson & Harper
ATTORNEYS.

Dec. 1, 1931.

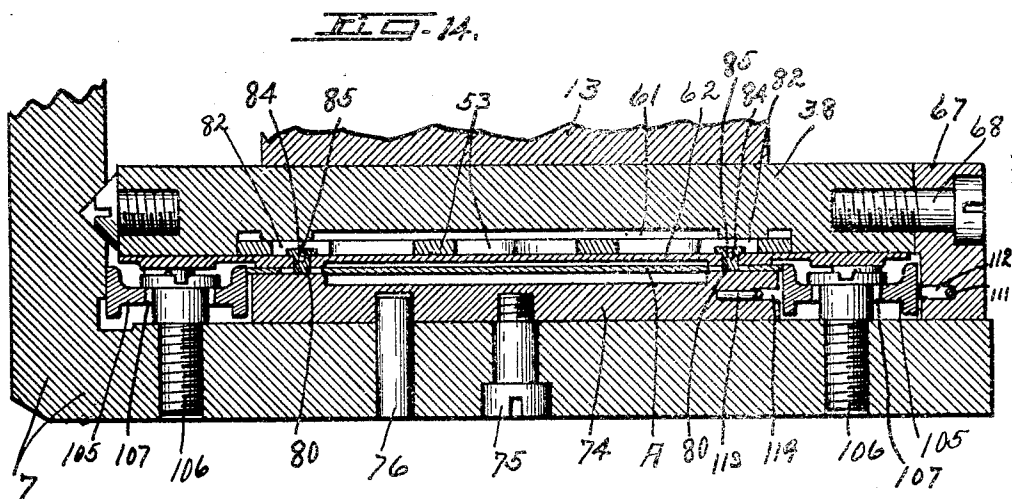
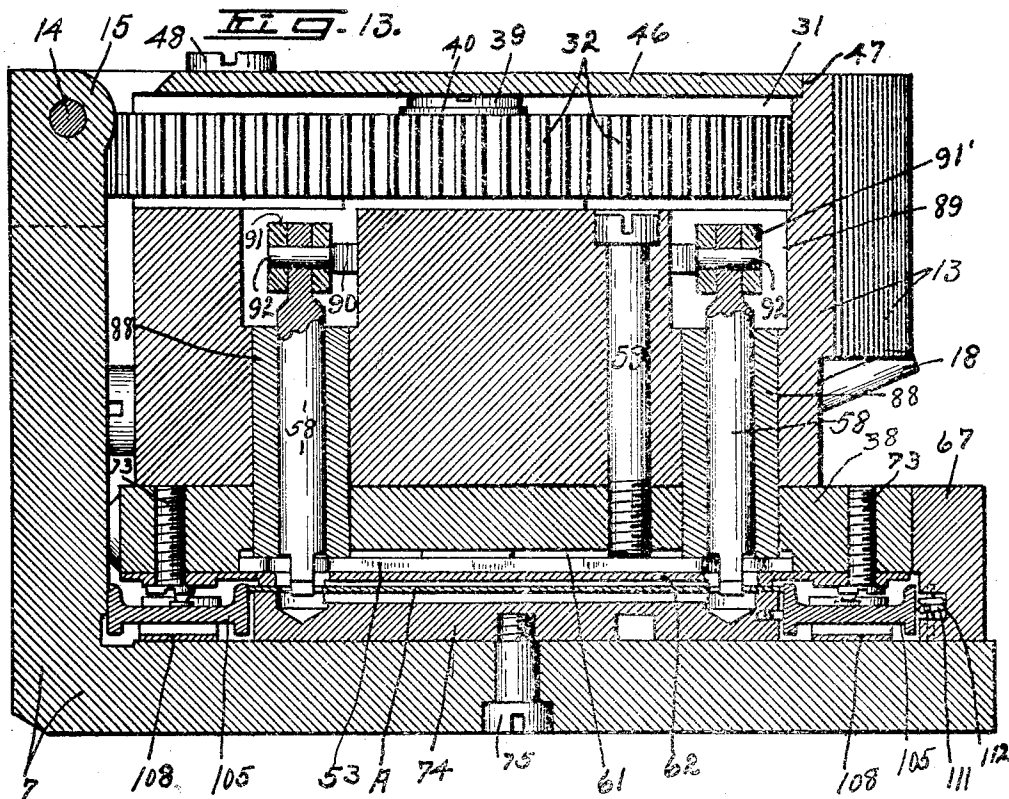
J. M. WALL

1,834,908

MOTION PICTURE MACHINE

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6 Sheets-Sheet 5



WITNESS
H. H. H.

INVENTOR
John M. Wall
BY *Denison & Thompson*
ATTORNEYS

Dec. 1, 1931.

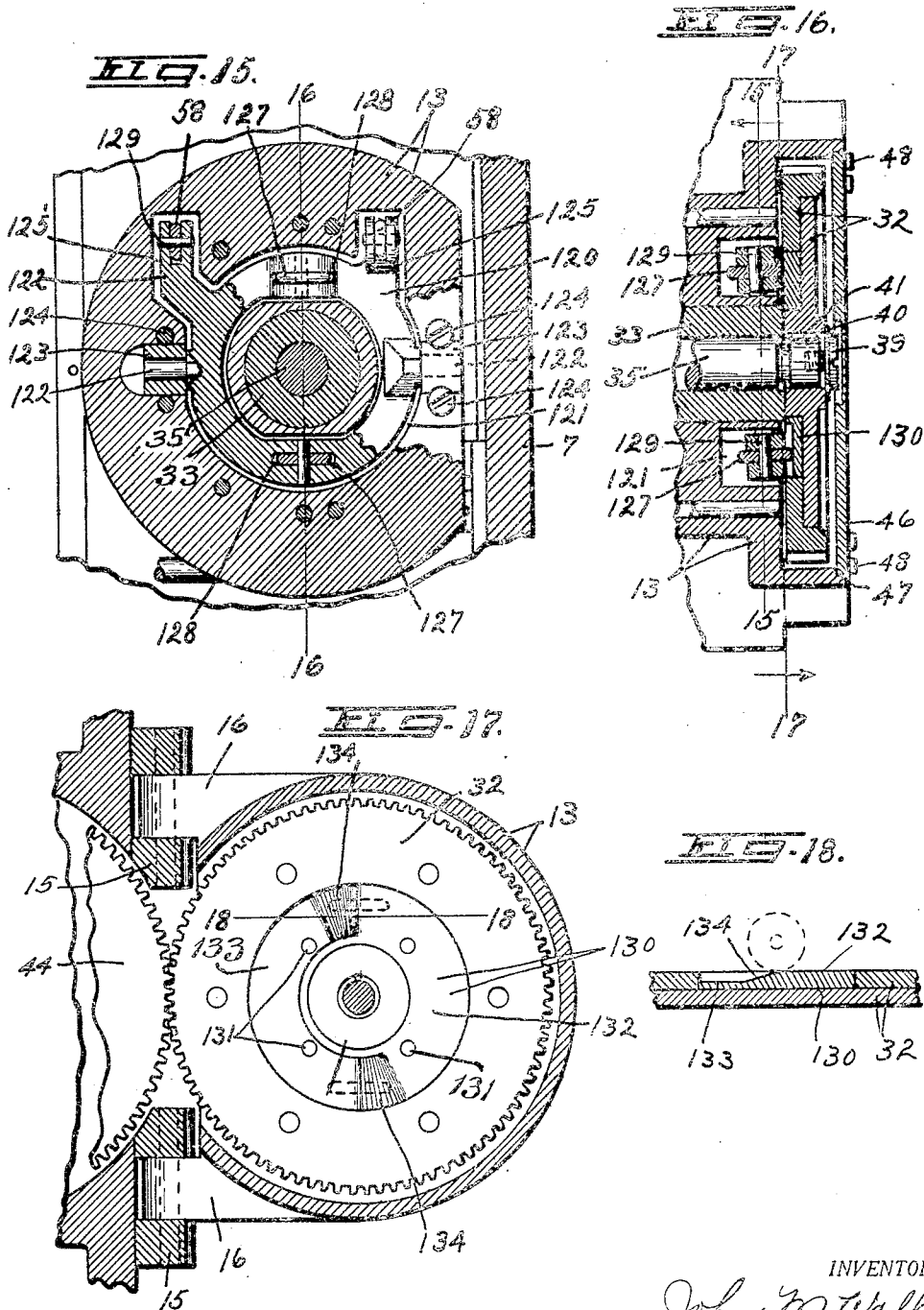
J. M. WALL

1,834,908

MOTION PICTURE MACHINE

Filed Feb. 20, 1929

6 Sheets-Sheet 6



WITNESS,
H. H. Hurst

INVENTOR.
John M. Wall
BY *Denison & Thompson*
ATTORNEYS.

UNITED STATES PATENT OFFICE

JOHN M. WALL, OF SYRACUSE, NEW YORK, ASSIGNOR TO FOX CASE CORPORATION, OF
NEW YORK, N. Y., A CORPORATION OF NEW YORK

MOTION PICTURE MACHINE

Application filed February 20, 1929. Serial No. 341,396.

This invention relates to certain new and useful improvements in motion picture machines and more particularly to the intermittent feed mechanism.

5 The main object of the invention is to provide an intermittent feed mechanism which is adapted to operate at very high speed which is necessary in the feeding of the film in a motion picture camera during the taking of "ultra speed" pictures.

10 Another object is to provide a locking mechanism whereby the film will be held in a perfectly straight or perpendicular plane within the intermittent feed mechanism at all times during the idle operation of the ratchet feed bars and the exposure of said film.

15 Other objects and advantages relating to the details of the structure and the form and relation of the parts thereof will more fully appear from the following description, taken in connection with the accompanying drawings, in which:

25 Figure 1 is a side elevation of a moving picture camera with the casing in section to show the mechanism enclosed therein.

Figure 2 is an enlarged detail vertical section taken in the plane of the line 2—2 Figure 1, showing the construction of the latch locking device.

30 Figure 3 is a detail horizontal section taken in the plane of the line 3—3, Figure 2.

Figure 4 is an enlarged horizontal section of the intermittent feed mechanism taken in the plane of the line 4—4, Fig. 1.

35 Figure 5 is a vertical section taken on the line 5—5, Fig. 4.

Figure 6 is a vertical section taken on the line 6—6, Figure 4.

40 Figure 7 is a detail horizontal section taken in the plane of the line 7—7, Figure 6, illustrating one of the cam faces.

Figure 8 is a vertical section taken on the line 8—8, Figure 5, illustrating the automatic lock operating cams.

Figure 9 is a vertical face view of the ratchet feed bars guide plate taken on the line 9—9, Figure 8.

50 Figure 10 is a vertical face view of the

ratchet feed bars operating plate taken on the line 10—10, Figure 8.

Figure 11 is an enlarged detail vertical section taken on the line 11—11, Figure 5, through one of the locking pins.

Figure 12 is a detail vertical section taken on the line 12—12, Figure 8.

Figure 13 is a detail horizontal section through the locking pins taken on the line 13—13, Figure 11.

Figure 14 is a detail horizontal section through the ratchet feed taken on the line 14—14, Figure 11.

Figure 15 is a detail vertical section similar to Figure 5, illustrating a modified construction of an operating yoke for the locking pins taken in the plane of the line 15—15, Figure 16.

Figure 16 is a detail vertical section of the inner end of the intermittent feed mechanism embodying a modified form of cam for operating the locking pin yoke taken in the plane of line 16—16, Figure 15.

Figure 17 is a detail vertical section taken in the plane of the line 17—17, Figure 16, showing a face view of the operating cam.

Figure 18 is a detail horizontal section taken in the plane of the line 18—18, Figure 17, illustrating one of the cam faces.

The apparatus consists of a rectangular box like case 1 of usual construction having an open side which is closed by a door, not shown, hinged to the case 1 during the taking of pictures. The case 1 is also provided with two film magazines 2 and 3 mounted on top of said case and each magazine is adapted to support the usual film reel, not shown.

Two vertically spaced plates 4 are secured to the inner surface of the front end wall of the case 1 and have their opposed edges disposed in parallel and provided with a longitudinally extending parallel tongue or rib 5 formed thereon and adapted to engage respective longitudinally extending grooves 6 provided in the top and bottom parallel edges of one of the legs of a frame piece 7 which is L shaped in horizontal cross section. This leg of the frame piece 7 extends transversely in parallelism with the front wall of the

case 1 when said frame piece is mounted in the case 1 between the plates 4. The other leg of the frame piece extends rearwardly therefrom along side the rear side wall of said case and is provided with upwardly and downwardly projecting extensions 8 adjacent the forward leg thereof.

These extension members 8 are each provided with, in this instance, two forwardly extending film guide members 9 which are arranged in staggered relation vertically and in co-operative alignment with the film passage through the intermittent feed mechanism. The guide members 9 are composed of a supporting horizontal pin or shaft 10 secured to the respective extension member 8 and extends forward therefrom. A guide roller 11 is rotatably mounted upon the outer end of each of the pins 10 and may be held in operative position thereon by screws 12 secured to the outer ends of each of the pins 10.

A body member 13 substantially circular in vertical cross section, is pivotally mounted on the rearwardly extending leg of the frame piece 7, by means of vertically spaced pivot pins 14, which are positioned in registering vertical holes formed in slotted rearwardly extending ears or lugs 15 spaced some distance apart, and extending laterally from said leg, and also in corresponding holes formed in two vertically spaced ears 16 extending inward laterally from the rear portion of the body member 13 and adapted to be positioned in the slots formed in the respective ears 15 thereby permitting a swinging movement of the body member 13 with respect to the frame piece 7.

The body member 13 may be locked in the operative position by means of a latch member 17 which is integral with or secured to one leg of an L shaped operating lever 18 which is pivotally mounted in a vertical bore 19, formed in the body member 13 forwardly of the ears 16. The latch operating lever 18 may be rotatably held in operative position within the bore 19 by a screw 20, screw-threaded into the adjacent portion of the body member 13. Said screw being provided with a reduced inner end which is adapted to be positioned within a groove 21 located near the upper end of the upright leg of the operating lever 18, which is located within the vertical bore 19. The other leg of the latch operating lever 18 extends outward horizontally from the vertical leg thereof and lies within a flattened or recessed portion 22 of the lower surface of the body member 13 so that the operating lever may be conveniently manipulated.

The latch member 17 extends inwardly from the vertical leg of the operating lever 18 towards the rearwardly extending leg of the frame piece 7 and is provided with a hook formation 23 at its outer end which is adapted to lie back of a lock surface 24 of a block 25, secured to the rearwardly extending leg

of said frame piece 7 by the screw 26. The adjacent portion of the rearwardly extending leg of the frame piece 7 is recessed at 27 to permit the free movement of the latch member 17 as it is moved into and out of locking engagement with the block 25. The latch member 17 is normally held in locking engagement with the locking surface 24 of the block 25 when the body member is in the operative position, as shown in Figures 1, 2 and 3, by a spring 28 which is coiled about the operating lever 18, just below the latch member 17, and has one end thereof turned upwardly and extends into a vertical hole provided in the hub of the latch 17, while the other end of the spring 28 extends tangentially and engages the adjacent wall of a recess 29 provided in the adjacent lower portion of the body member 13.

The body member 13 is provided with a bore 30 concentric with the longitudinal axis of said body member and extends from the front face thereof rearwardly and terminates in an enlarged portion forming a recess 31 in the rear surface of the body member of slightly less diameter than that of said body member and of a suitable depth to permit the positioning and free operation of a drive gear 32 therein. A bearing member 33 of substantially the same length as the bore 30 is positioned within said bore in which it has a press fit to prevent the rotation thereof.

The bearing member 33 is provided with a longitudinal bore 34 co-axial therewith, in which a horizontal shaft 35 is rotatably mounted. A crank disk 36 is secured to or integral with the forward end of the shaft 35, and is positioned in a bore 37 provided in the plate 38 with the rear face thereof normally held against the forward end of the bearing member 33 by the gear 32, which has the forward face of the hub thereof normally held against the rear face of said bearing member by a screw 39 screw-threaded into the rear end of the shaft 35 thereby holding said shaft in its normal position and preventing any longitudinal movement thereof in respect to the bearing member 33. The drive gear 32 is mounted upon the rear end of the shaft 35 in any suitable manner and may be prevented from moving axially by the washer 40, which is positioned between the head of the screw 39 and the hub of the gear 32, and may be splined to said shaft by a key 41 so that the gear and shaft will rotate together.

The periphery of the gear 32 extends through a suitable opening 42 provided in the wall of the recess 31 at the inner portion thereof by cutting away a portion of that part of the surface of the body member 13, which is normally positioned adjacent the rearwardly extending leg of the frame piece 7 thereby forming a flat perpendicular surface on the inner periphery of said body mem-

ber as more clearly seen in Figures 4, 5 and 6.

A portion of the rearwardly extending leg of the frame piece 7 adjacent the gear 32 is also cut away to provide an opening 43 through which a gear 44 similar to the drive gear 32 may extend to mesh with said gear 32 to drive same. The gear 44 may be driven in any suitable manner, as by the usual shutter shaft 45, which is rotatably mounted in the inner wall of the camera case 1. The gear 44 being securely mounted upon the shaft 45 so as to rotate therewith. The gears 32 and 44 are so disposed with relation to the axis of movement of the body member 13, that they remain in mesh during a portion of the swinging movement of said body member about its pivotal pins 14 to and from the operative position. This swing movement being sufficient to permit the film guide to be opened for the insertion of film without disturbing the driving relation of the gears.

The pivotal point of the body member 13 is substantially in the vertical plane of the rear sides of the gears 32 and 44 adjacent the meshing point thereof as more clearly shown in Figures 4 and 13.

The rear end of the recess 31 may, as shown, be closed by a circular plate 46 secured in an annular groove 47 provided in the rear face of the wall surrounding said recess by headed screw 48, screw-threaded adjacent the plate 46 into the ears 16 and having a portion of their heads projecting over said plate. A portion of this plate 46 may be cut away adjacent the meshing point of the gears 32 and 44 so as to permit the free swinging or pivotal movement of the body member 13.

The crank disk 36 has a crank pin 50 secured therein which projects forwardly therefrom and has a drive member 51 rotatably mounted on said crank pin, see Figures 8 and 10. The drive member 51 may be substantially square in vertical cross section and adapted to engage a horizontal slot 52 provided in the rectangular ratchet feed bar operating plate 53, to produce a reciprocating movement to said operating plate when the shaft 35 is rotated.

The operating plate 53 is positioned in a vertical plane just ahead of the crank disk, 36, and is provided with openings therein, which form a substantially rectangular marginal frame 54, a horizontal central cross portion 55 which extends between the vertical sides, and angle truss portions 56 extending from points adjacent respective ends of the cross portion 55 to the centers of respective horizontal end portions of the marginal frame 54. See Figure 10. The slot 52 is located in the cross portion 55 and extends horizontally from one vertical side of the marginal frame 54 to the other side.

The openings in the plate 53 are to substantially reduce the weight thereof and at the same time provide a member which will

be sufficient to withstand the stresses to which said plate is subjected during the extremely high velocity of the reciprocating movement thereof. The upper portion of each vertical side of the marginal frame 54 is relatively wider than that of the lower portion thereof so that a vertical slot 57 may be provided in each of said sides. Said slots extend downwardly through the upper horizontal cross portion of the operating plate 53 and terminates near the center cross portion 55 of said plate, one to be located in each of the vertical sides and in co-operative alignment with respective film locking pins 58, which will be more fully described hereinafter.

The slots 57, are of sufficient width and length to permit the operating plate 53 to be moved to its supermost position without coming into contact with the locking pins 58. The hereinbefore mentioned vertically disposed plate 38 is rectangular in form and is secured against the vertical front face of the body member 13 by means of screws 59 and dowel pins 60, Figures 5, 8 and 13.

The front face of the plate 38 is provided with a relatively shallow vertically disposed channel 61 formed therein of substantially the same width as that of the operating plate 53, and which co-operates with the rear face of a plate 62 to guide the ratchet operating plate 53 as it is being reciprocated by the rotation of the shaft 35. The plate 53 may be assisted in its reversed movement at the end of each stroke by means of two springs 63 formed in a coil near one end thereof with the remaining end portion of this end of said springs extending tangentially to the coil, and terminating with the extreme ends bent at right angles to the remaining portion and extending in a direction parallel with the main portion of the spring, as indicated at 64, Figure 10.

The springs normally lie in respective suitable grooves 65 provided at the upper and lower edges of the plate 38 with the coiled end portions thereof positioned in grooves 66, which are in registration with said grooves 65 and provided in either end of the vertically disposed rail 67, secured to the outer edge of the plate 38 by screws 68. See Figure 14.

The portion 64 of these springs are disposed in respective holes 69 provided in either end of the rail 67 a short distance inwardly from the grooves 66, while that portion of the springs which is between the portions 64 and the coiled portion are positioned in suitable vertical grooves provided in the inner surface of the rail 67 between the holes 69 and the respective grooves 66, thereby securely clamping the outer end of the springs 63 between the rail 67 and the adjacent portion of the outer edge of the plate 38.

The inner portion of the springs 63 extend to a position substantially in a vertical plane

with the vertical center of the plate 53 where they are bent at right angles to the main portion of the springs to extend forwardly over the plate 53, so as to lie in the path of movement of the respective end of said plate as it is moved towards its extreme upper or lower position, and thereafter, continue to the end of the stroke against the action of the respective springs as indicated at the lower portion of Figure 10. As the movement of the stroke of the plate is reversed the spring follows the same until it again engages the bottom of the groove 65, thereby functioning to cushion and aid in the reversal of the plate 38.

The plate 62 is a relatively thin, rectangular, vertically disposed one of substantially the same width as the plate 38, and is secured to the front face thereof by means of screws 73.

Another relatively narrow, rectangular, vertically disposed plate 74 is positioned centrally of the plate 62, when said plate and the supporting body member 13 are in the normal operating position. The plate 74 is secured to the rear face of the front or transverse leg of the frame piece 7 by means of the screws 75, and dowel-pins 76, and spaced sufficiently from the plate member 62, when that plate is in the operative position to form a guide for a motion picture film —A— therebetween. See Figures 8, 11, 13 and 14. The guide plate 74 is provided with, in this instance, a rectangular opening 77 there-through, said opening being in co-axial alignment with the axis of the body member 13 and drive shaft 35, and in co-operative alignment with a similar opening 78 provided in the front transverse leg of the frame piece 7.

These two openings 76 and 77 are also in registration or co-operative alignment with the shutter and lens opening —B— of the camera case 1, as indicated in Figure 4, thereby permitting the object or objects to be photographed to be focused upon the film —A— when said film is held in the proper position between the guide plates 62 and 74.

The film —A— is moved intermittently between the respective film guide plates 62 and 74 by means of two vertical ratchet feed bars 80 positioned at the rear of the film —A— and in co-operative alignment with respective rows of perforations provided in the usual moving picture film near the outer longitudinal edges thereof.

The ratchet feed bars 80 may, as shown, be T shaped in horizontal cross section with the head or flanged portion positioned at the rear of the plate 62, while a narrow or tongue portion thereof extends forwardly through suitable vertically extending guide slots 81 provided in said plate disposed in parallelism at the lower portion of this plate. See Figures 9, 10, 11 and 14.

The slots 81 are disposed to align with the

respective rows of perforations of the film —A— as it is moved between the respective film guide plates 62 and 74, and of sufficient length to permit the free vertical reciprocating movement of the respective feed bar 80. These bars have the rear or flanged portion thereof positioned in respective openings 82, provided in the lower adjacent portion of the operating plate 53 between the central cross portion 55 and the lower marginal end portion thereof, while the upper and lower ends of the ratchet bars engage opposed spaced surfaces or abutment portions 83 formed at the upper and lower ends of the openings 82 to reciprocate the feed bars in the slots 81 with the plate 53 and adapted to permit movement of the ratchet bars independently of the plate 53 normal to their plane of movement to and from the plate 74.

Longitudinal grooves 84 are provided in the rear face of the ratchet bars 80 adapted to receive respective bow springs 85, which have their ends engage the plate 53 to yieldably urge said ratchet bars forward or toward the plate 74. The plate 53 has recess formations 86 at the ends of the bars, which receive the ends of the bow springs 85 for longitudinally retaining the same.

The front vertical edge of the ratchet feed bars are serrated to form teeth 87 with the abutment surface thereof face downwardly so that when the plate 53 is moved downwardly the teeth 86 project through the afore mentioned perforations in the film —A— with the abutment surfaces of the teeth engaging the upwardly facing edges of the perforations of the film and move the film downwardly. When the plate 53 is moved upwardly, the cam surfaces of the teeth 87 cause the feed bars 80 to move rearwardly against the action of the spring 85 and to ratchet over the film perforations so that the film remains stationary during this upward movement of the bars 80.

The forward movement of the drive bars 80 caused by the action of the bow springs 85 is limited by the flanges at the rear vertical edge of said bars engaging the rear or adjacent surface of the guide plate 62 as more clearly illustrated in Figure 14.

The film —A— may, as shown, be securely held against vertical movement during the upward or idle movement of the ratchet feed bars 80 by means of two spaced horizontally disposed locking pins 58, before mentioned. See Figures 11 and 13.

The locking pins 58 are located some distance above the horizontal plane which passes through the axes of the drive shaft 35, and each is in alignment with a respective row of the usual perforations in the film —A—. The pins are slidably mounted within respective guide members 88, which have their rear portion mounted within the body member 13 and extend forwardly from a recess 89 pro-

vided in the rear surface of the body member 13 just ahead of the recess 31, while their forward ends extend through and are secured to the plate 38, with their forward ends terminating at the rear of the operating plate 53. The forward ends of the locking pins 58 are reduced in size and adapted to project through the perforations of the film when said pins are in their forward or locking position. The locking pins are moved into and out of the locking position by means of an annular rocking yoke 90, which is positioned in the recess 89 and is provided with two upwardly extending lugs or arms 91 and 91', which are rotatably connected to the locking pins 58 by means of bearing pins 92, which pass through corresponding holes provided in the rear ends of the locking pins 58 and the arms 91.

The yoke 90 is rotatably supported by means of two lateral horizontally disposed cylindrical arms 93, positioned in the plane which passes through the axis of the drive shaft 35, one on either side of the yoke 90, and having their outer ends rotatably mounted in suitable bearing pieces 94 secured in the adjacent rear face of the body member 13 by the screws 95. Figures 5 and 11.

The yoke 90 is rocked upon its axis by means of two circular discs or wheels 96 and 97 of unequal diameter, which are rotatably mounted at diametrically opposite sides of the drive shaft 35 on vertically disposed bearing pins 98, secured to opposite sides of the yoke 90 in the vertical plane which passes through the axis of the drive shaft 35 or in other words at right angle to the axis of said rock yoke.

The discs or wheels 96 and 97 are preferably positioned at unequal distances from the axis of the drive shaft 35 with the larger wheel 96 located at the opposite side of the axis of the yoke 90 to that at which the arms 91 are located and at a greater distance from said axis than that of the smaller wheel 97. This arrangement of the wheels permits each one to be actuated by a separate means such as the cam members 99 and 100 respectively. See Figures 6, 7 and 8.

The cam members 99 and 100 are positioned concentrically upon the forward face of the drive gear 32 and secured thereto by the screws 101. Each of said cam members are provided with a concentric raised or forwardly projecting track portions 102 and 103 respectively, which are adapted to be in constant contact with their respective yoke actuating wheels 90 and 97. Each of said track members are constructed with substantially one half of their front surfaces in a plane in advance of the remaining portion, and the two sections of the same cam thus formed are connected at their adjacent ends of diametrically opposite relatively short inclined portions or tracks 102' and 103'. That is the

forward track surfaces of the inclined portions are at an angle to the remaining track portions of their respective cams. See Figures 6 and 7.

As the adjacent inclined portions or tracks 102' and 103' are described within the same acute angle which has its vertex in the axis of the drive shaft 35, but with different radii, it is evident that the inclined tracks 102' of the outer cam 99 having the longer radius will be of greater length than the inclined tracks 103' of the inner cam 100, which are constructed with the shorter radius, therefore, the movement of the yoke 90 when actuated by the inclined tracks 103' through the medium of the upper wheel 97, to move the locking pins 58 into locking engagement with the film —A—, will be more abrupt than it is when actuated by the inclined track 102' through the medium of the lower wheel 96, which movement returns the locking pins from the locking to the unlocking position.

It has been found through experimentation that this construction provided not only a positive, but a smoother and more quiet operating mechanism than when the cam or inclined track portions are constructed with equal radii.

The film —A— is guided transversely in its movement between the plates 62' and 64 by means of a pair of vertically disposed guide rails 105, mounted on the transverse leg of the frame piece 7, one at each vertical edge of the plate 64, by means of headed and shouldered screws 106 passing through holes 107 in the guide rails 105 and screw-threaded into said transverse leg, said holes being larger than the screws to permit movement of said guide rails to and from each other. See Figures 12, 13 and 14.

The guide rails 105 are adjustably held against the heads of the screws 106 by means of a pair of flat spring members 108 each of which are disposed vertically between the forward surface of said rails and the adjacent inner surface of the transverse leg of the frame piece 7 between the respective co-operating screws 106.

The springs 108, have either end thereof positioned against the adjacent inner surface of the frame piece 7, while the central portion of the springs are bowed inwardly and rest against the central portion of their respective rails 105. Said springs being held in operative position by means of a pin 109 secured to the forward transverse leg of the frame 7, midway between the ends of said springs and extend rearwardly through transverse elongated holes 110, provided in the adjacent central portion of each of the guide rails 105, thereby permitting the horizontal adjustment of the guide rails 105 to or from the transverse leg of the frame 7 so that the inner vertical edges of said guide rails will be in co-operative alignment with

the adjacent vertical edges of the film —A—, as it is being moved between the plates 62 and 64.

The guide rail adjacent the rearwardly extending leg of the frame piece 7 is normally maintained against the surface of this leg, while the other guide rail is caused to yieldably press the film edgewise against the first mentioned guide rail when the body member is in the operating position by means of a bow spring 111 which is positioned within a longitudinal groove 112 provided in the inner vertical face of the rail 67 adjacent the co-operating guide rail 105 when the body member 13 is in the operative position, in which position the rail 67 is constructed to lie on the outside of said guide rail.

The ends of the bow spring 111 engage the bottom of the groove 112, and the center of said spring has a reverse curve hump projecting inwardly and engaging the opposing face of the adjacent guide rail 105 to yieldably move it toward the other guide rail against the action of another bow spring 113, which is positioned in a longitudinal groove 114 provided in the outer vertical edge of the plate 64. The bow spring 113 has its ends engaging the bottom of the groove 114 with one of said ends turned and entered into a corresponding hole provided in the bottom of said groove, while the central portion of said spring is bowed outwardly and engage the adjacent guide rail 105 to maintain the same away from the outer vertical edge of the plate 74.

The spring 111 is held in partially compressed condition in the groove 112 by a pin 115 secured in the rail 67 and extending across said groove and through the hole of the loop forming the hump at the center of the spring 111. Thus it will be noted that when the body member 13, and the plates 38 and 62, and the rail 67 secured thereto are moved outwardly about the pivotal pins 14 to the open or loading position, the rails 105 are separated permitting easy insertion of the film therein, the guide rails being caused automatically to assume guiding relation with the film as the body member and the parts carried thereby are moved to the closed or operative position.

In the Figures 15, 16 and 17 and 18, is shown a modified form of the locking pins operating yoke and actuating cam therefor. The locking pins operating yoke 120 is substantially annular in plane view and is disposed in a substantially annular recess 121 provided in the rear surface of the body member 13 by means of horizontal laterally disposed cylindrical arms 122, one on either side of the yoke in the horizontal plane which passes through the axis of the drive shaft 35. The arms 122 are rotatably mounted in bearing members 123, which are secured to the body member 13 by means of screws 124.

The yoke 120 is also provided with a pair of vertical upwardly extending lateral arms 125 and 125'. Each of the said arms is pivotally connected to the rear end of a pair of horizontally disposed locking pins 126, said pins being in co-operative alignment with respective rows of the usual perforations which are provided in the film —A—.

The yoke 120 is also provided with two diametrically disposed rollers or wheels 127 located in the vertical plane which passes through the axis of the drive shaft 35, one on either side of said drive shaft and at an equal distance therefrom. The rollers 127 are positioned within suitable slots 128 provided in diametrically opposite sides of the yoke at equal distance from the axis thereof, and are rotatably secured to said yoke by means of respective bearing pins 129, which are secured in suitable holes provided in the adjacent portions of the lock yoke 120.

The rollers or wheels 127 are so positioned in relation to the drive gear 32 that their rearwardly projecting peripheral surfaces are in constant contact with the forward cam surface of an actuating member 130 secured to the adjacent inner surface of the drive gear 32 by means of the rivets 131.

The cam 130 is constructed with diametrically opposite raised and lowered portions 132 and 133 with the adjacent ends of said portions connected by a cam track 134 with its forward cam surface arranged in a plane at an angle to the forward surfaces of the portions 132 and 133.

It is therefore now evident that while one of the rollers 127 is approaching or bearing upon the raised portion 132 the other roller will be approaching or bearing upon the lower portion 133 and thereby impart a rocking movement to the locking pin operating yoke 120, as the cam member 130 is revolved by the drive gear 32 and thereby move the lock pins 58 into and out of locking engagement with the film —A—.

This movement of the locking pins is so timed in relation to the operation of the ratchet feed bars 80, which whether actuated by the action of the preferred form of the pair of cam members 99 and 100 or by the modified form of one cam member 120, that at the beginning of the downward or feeding stroke thereof, the locking pins 58 will be withdrawn from the perforations from the film —A— and be held in the unlocking position until the completion of said feeding stroke when the locking pins will be moved forward into locking engagement with the film and remain in this locking position during the upward or idle stroke of the feed bars at the completion of which the locking pins will again be withdrawn from the locking engagement with the film through the action of the cams upon the pin actuating yoke, 130

thereby producing an intermittent movement of the film in its passage between the guide plates 62 and 64 and the guide rails 105 and a locking means, which is durable, quiet and smooth in operation for holding the film in an intermittent stationary position during the idle stroke of the feed mechanism for the photographing of pictures upon said film, by the light passing from the camera lens through the apertures 77 and 78 provided in the plate 74 and the front transverse leg of the frame 7 respectively, said light being periodically permitted to expose progressive section of the film in registration with the said aperture by a shutter operated in timed relation with the intermittent feed device as is usual.

Although I have shown and particularly described the improved embodiment of my invention, I do not wish to be limited to the exact detail of the construction shown, and various changes may readily be made without departing from the spirit of this invention as set forth in the appended claims.

I claim:

1. An intermittent feed mechanism comprising a body member, a shaft rotatably mounted in said body, a film guide, means actuated by said shaft to intermittently move a film along said guide, a pair of locking pins slidably mounted in the body member having one end thereof adapted to engage perforations provided in respective rows in a moving picture film for intermittently locking said film against longitudinal movement, a rock yoke pivotally mounted in the body member and connected to the locking pins for moving said pins into and out of locking engagement with the film, a pair of rollers rotatably mounted on the yoke and disposed at right angles to and at unequal distances either side of the axis of said yoke, a pair of cam members mounted on the shaft to rotate therewith adapted to engage respective rollers to rock the yoke upon its axis, and means for rotating said shaft.

2. An intermittent feed mechanism comprising a body member, a shaft rotatably mounted in said body, a film guide, a reciprocating plate slidably mounted in the body member in co-operative relation with the film guide, means actuated by the shaft to reciprocate said plate, a pair of longitudinally disposed ratchet feed bars arranged in spaced relation upon said plate transverse the reciprocal movement thereof, and adapted to engage successive perforations provided in respective rows in the film to move said film in one direction, a pair of locking pins slidably mounted in the body member and having one end thereof adapted to engage the film to lock it against longitudinal movement, means actuated by the shaft to move the pins into locking engagement with the film during the idle movement of the feed bars, and

separate means actuated by the shaft to move said locking pins to the unlocking position during the working movement of said feed bars, and means for rotating said shaft.

3. An intermittent feed mechanism comprising a body member, a shaft rotatably mounted on said body, a film guide carried by the body, means actuated by the shaft to intermittently move a film along said guide, a pair of locking pins slidably mounted in the body member having one end thereof adapted to engage perforations provided in respective rows in the film for intermittently locking said film against longitudinal movement, a rock yoke pivotally mounted in the body member and connected to the locking pins for moving said pins into and out of locking engagement with the film, a pair of rollers rotatably mounted on the yoke and disposed at right angles to and at equal distances on diametrically opposite sides of the axis of said yoke, a cam member connected with the shaft adapted to engage said roller to rock the yoke upon its axis, and means for rotating said shaft.

4. An intermittent feed mechanism comprising a body member, a shaft rotatably mounted in said body, a film guide, a reciprocating plate slidably mounted in the body member in co-operative relation with the film guide, means actuated by the shaft to reciprocate said plate, a pair of longitudinally disposed ratchet feed bars arranged in spaced relation upon said plate transverse the reciprocal movement thereof and adapted to engage successive perforations provided in respective rows in the film to move said film in one direction, a pair of locking pins slidably mounted in the body member and having one end thereof adapted to engage the film to lock it against longitudinal movement, a cam member mounted on the shaft to rotate therewith, means connected with the pins adapted to be engaged by said cam to move the pins into locking engagement with the film at the commencement of the idle stroke of the feed bars, and to move said locking pins from the locking engagement to the unlocking position at the commencement of the working stroke of the feed bars, and means for rotating said shaft.

5. An intermittent feed mechanism comprising a body member, a shaft rotatably mounted in said body, a film guide, a reciprocating plate slidably mounted in the body member in co-operative relation with the film guide, means actuated by the shaft to reciprocate said plate, a pair of longitudinally disposed ratchet feed bars arranged in spaced relation upon said plate transverse the reciprocal movement thereof and adapted to engage successive perforations provided in respective rows in the film to move said film in one direction, a pair of locking pins slidably mounted in the body member and

having one end thereof adapted to engage the film to lock it against longitudinal movement, a rock yoke pivotally mounted in the body member and connected to the locking pins for moving said pins into and out of locking engagement with the film, a pair of rollers rotatably mounted on the yoke and disposed at unequal distances from and at diametrically opposite sides of the axis thereof, a cam member mounted on the shaft and actuated thereby adapted to engage one of said rollers to rock the yoke in one direction upon its axis to bring the locking pins into locking engagement with the film at the commencement of the idle stroke of the feed bars, and a second cam member mounted on the shaft and actuated thereby adapted to engage the other one of the rollers to rock the yoke in the opposite direction upon its axis, to bring the locking pins into the unlocking position with respect to the film at the commencement of the working stroke of the feed bars, and means for rotating said shaft.

6. An intermittent feed mechanism comprising a body member, a shaft rotatably mounted in said body, a film guide, a reciprocating plate slidably mounted in the body member in co-operative relation with the film guide, means actuated by the shaft to reciprocate said plate, a pair of longitudinally disposed ratchet feed bars arranged in spaced relation upon said plate transverse the reciprocal movement thereof and adapted to engage successive perforations provided in respective rows in the film to move said film in one direction, a pair of locking pins slidably mounted in the body member and having one end thereof adapted to engage the film to lock it against longitudinal movement, a rock yoke pivotally mounted in the body member and connected to the locking pins for moving said pins into and out of locking engagement with the film, a pair of rollers rotatably mounted on the yoke and disposed at equal distances and at diametrically opposite sides of the axis of the yoke, a cam member mounted on the shaft and actuated thereby adapted to engage one of said rollers to rock the yoke in one direction upon its axis to bring the locking pins into locking engagement with the film at the beginning of the idle stroke of the feed bars and to engage the other roller to rock the yoke in the opposite direction to bring the locking pins to the unlocking position in respect to the film at the beginning of the working stroke of the feed bars, and means for rotating said shaft.

In witness whereof I have hereunto set my hand this 14th day of February, 1929.

JOHN M. WALL.