

Feb. 21, 1933.

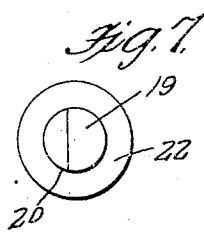
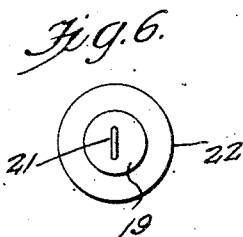
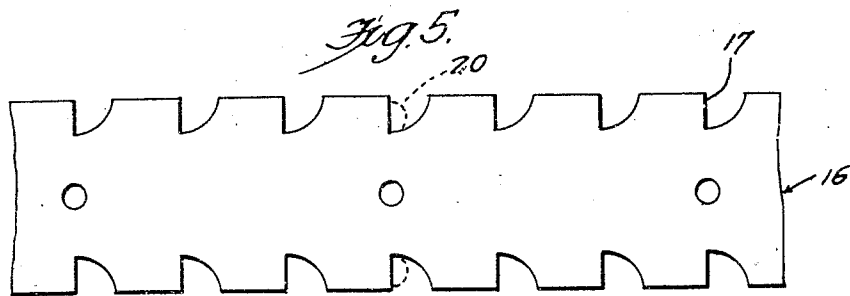
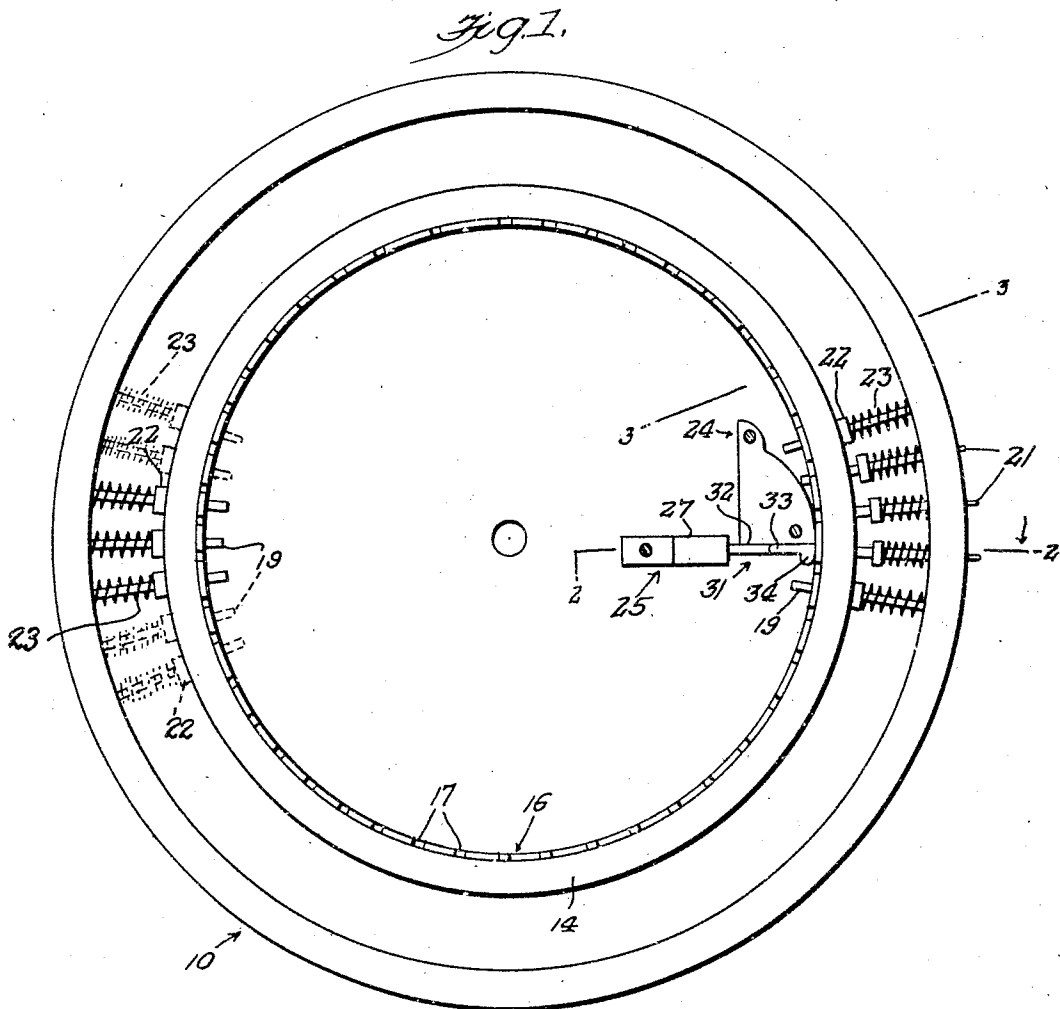
H. E. PIPER

1,898,141

MOTION PICTURE FILM PRINTING DEVICE

Filed Aug. 8, 1930

2 Sheets-Sheet 1



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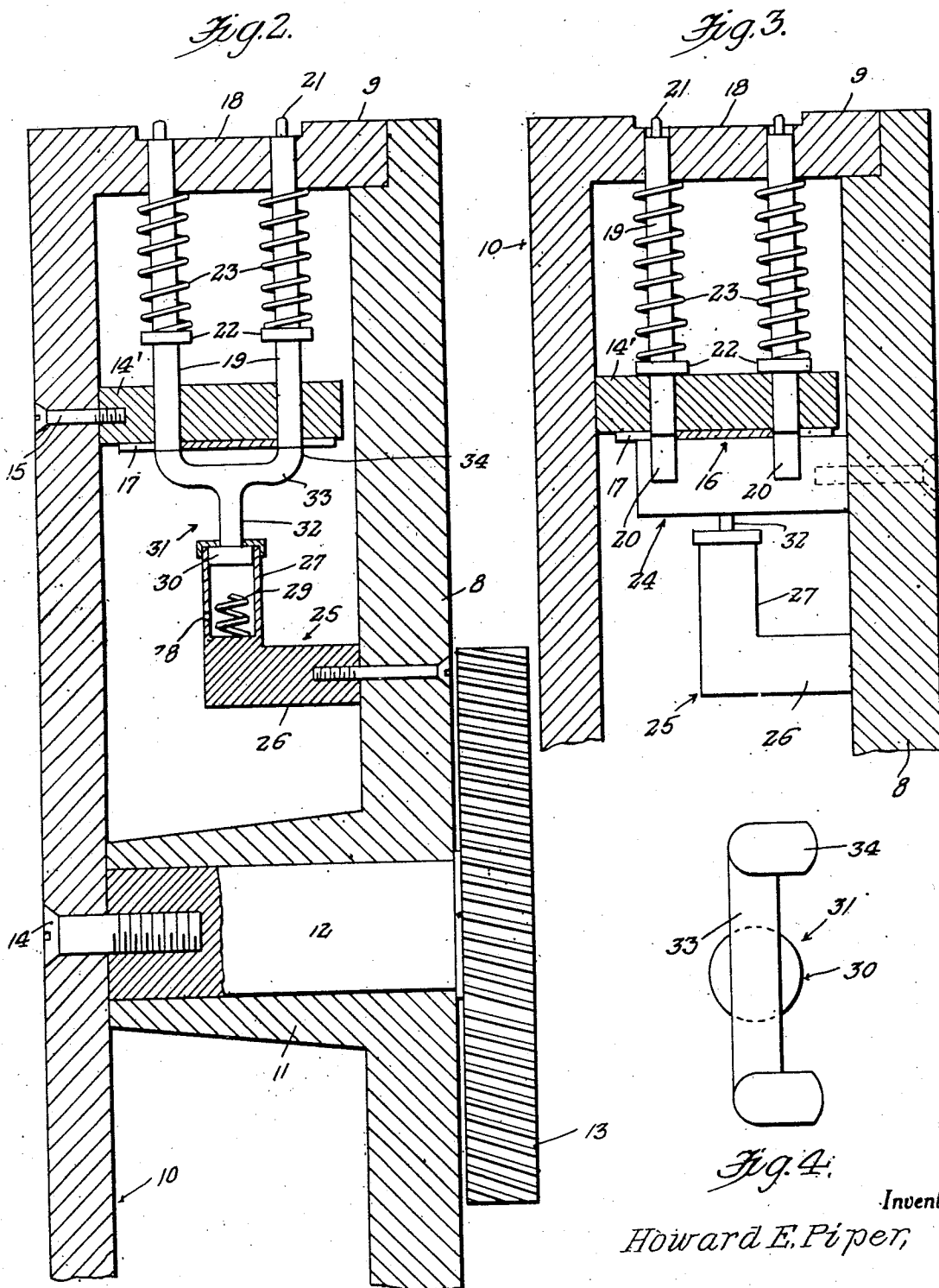
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MOTION PICTURE FILM PRINTING DEVICE

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2 Sheets-Sheet 2



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MOTION PICTURE FILM PRINTING DEVICE

Application filed August 8, 1930. Serial No. 473,937.

This invention relates generally to devices which are known as printers for motion picture films, and particularly to improvements in structure and arrangements of parts whereby a novel and improved high speed step-by-step feeding of the conventional film is achieved for printing purposes.

In carrying the present invention into practice, I have evolved and produced a new organization of details, which are mechanically allied in such a way as to provide for a more positive step-by-step feeding action so as to promote more efficient results in the printing operations.

A feature of the invention is a cam block for projecting the pins in proper order and in appropriately timed relationship.

Another feature is the use of a dash pot serving as a resilient check for reducing and practically eliminating metallic clicking noises as the pins return to their normally retracted or non-feeding positions.

Other features and advantages of my invention will appear in the following description and drawings.

In the drawings:

Figure 1 is a view in elevation showing the drum, inner ring, and some of the associated film feeding pins and pin projecting and check means.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a cross section taken on the line 3—3 of Figure 1.

Figure 4 is an end view of the reciprocatory element of the structure of the spring catch device.

Figure 5 is a plan view of a portion of the keeper band.

Figure 6 is a view of the outer end of one of the spring retracted feed pins.

Figure 7 is an end view of the inner end of the same pin.

In Figure 2 of the drawings, the numeral 8 designates a circular stationary supporting plate having a marginal groove in its periphery for rotatably receiving the rim portion 9 of the rotary feed drum 10. The plate 8 is provided with a hub 11, constituting a bearing for the axle 12. The axle is pro-

vided with a suitable driving gear 13 and is attached by an appropriate fastener 14 to the central portion of the drum 10. An annulus or ring 14' is secured on the inside of the drum as at 15 in concentric spaced relation within the rim 9 of the drum.

Attached to the radially inward side of the annulus 14' is metal band 16, which may be designated as a keeper. This is formed along its opposite longitudinal edges with segmental notches 17. These notches register with circumferentially spaced pairs of transversely spaced radial guide holes in the annulus 14'. The guide holes register also with similar guide holes in the rim 9. The periphery of the rim 9 is provided with a groove 18 for the reception of the apertured motion picture films of conventional type. Movable in the pairs of guide holes in the rim 9 and in the annulus 14' are pairs of radial feed pins 19. The radially inward ends of the pins 19 are cut off as at 20, (see Figure 7) to form a shoulder, which is adapted to engage with the straight side of the notches 17 whereby rotation of the pin is prevented. The radially outward end portions of these pins extend slidably through the guide holes in the rim 9 and into the groove 18 and have reduced terminals 21, for engaging in the marginal apertures of the films. The numeral 22 designates a shoulder near the radially inward end of the pin. An expansion coiled spring 23 is circumposed on each pin and acts between the rim 9 and the shoulder 22 for returning them and maintaining them in the normally retracted position as illustrated at the left in Figure 1.

The numeral 24 designates generally the cam block mounted on the plate 8. This is formed with a cam surface located in proper relation to the pins 19 to successively and intermittently project the pins from the normally retracted position to a fully projected film feeding position for engagement with the apertures of the films.

The operation of this arrangement is illustrated in Figure 1, where, at the right, the top pin is shown in the fully retracted position immediately before coming into engagement with the cam surface, and the next low-

er pin is shown engaging the cam surface and being thereby initially and progressively moved from the fully retracted position. The third pin is shown engaged with the cam and moving into film feeding position. The fourth pin is shown in the fully projected position just as it is being carried into position to return to its fully retracted position in which position the next lower pin is illustrated. With this arrangement, it is advisable to provide means for preventing a too quick return of the pins 19 to fully retracted position as they drop off the end of the cam. For this purpose I have provided a novel dash pot arrangement which is located in close proximity to the heel of the cam block 24 so as to receive the pins as they drop off under the action of their springs 23. This dash pot or spring check is generally designated by the numeral 25 and as seen in Figures 2 and 3, comprises an attaching arm 26 carrying a cylinder 27 having an air release port 28. In this cylinder is a piston 30 or a plunger 31 and a check spring 29 for coating with the piston. The plunger 31 includes a guide stem 32 having a U-shaped or formed end 33, whose arms are provided with laterally directed rounded enlargements 34 located at the heel of the cam 24, so as to receive the inward ends 20 of the pins 19 as they recede and leave the cam to return to normal retracted position. This provides for a noiseless cushioning return of the feed pins.

Particularly do I wish to emphasize the specially timed action of the spring returned cam projected pins, which brings the terminals or teeth 21 into proper feeding position for engaging the apertures in the marginal edges of the films.

By this arrangement, only one set of teeth is in full film-feeding position at a time. Because of this condition, the film on each side of such set of teeth is permitted to equalize its pull and align itself without buckling or stretching, such as obtains in printers in which two or more sets of feeding pins are simultaneously in the full film-feeding position. This arrangement also eliminates the friction and binding which spreads the holes in the films since the films are loaded upon only one set of pins which is ready to receive the films. In other forms of printers, the teeth are shot with some force and at high speed into improperly aligned holes in the films with consequent damage to the holes and to the films. The pins of the invention are eased progressively into full feeding position and the films loaded thereon, and at the end of the printing position the pins are pulled out of the film at high speed, thereby eliminating such pins from further contact with the films so as to enable the film to shift or stop and align itself instead of buckling or stretching between the teeth. Though the

action of my machine is not what is called in the art "intermittent", or "interrupted", the film action achieved is essentially a step-by-step action, due to the equalizing movements of the films in this arrangement.

This arrangement insures perfect contact of the negative with the raw stock, and slip-page or buckling of the negative on the positive stock is prevented immediately before and during printing, that is, before the printing light reaches beyond the first frame line. As the light strip is only 1/64 of an inch wide and is so adjusted as to hit the frame line at the instant the pin drops back and permits self-aligning of the films, sharp prints from either old or new negatives are obtained. The structure is designed to permit adjusting of the negative sidewise, to equalize the differences in width due to negative shrinkage. Also, if the frame line on the negative is a little off, it can be printed nearer the center of the raw stock by so loading the printer as to take account of the shrunken condition of the negative. No other printing device that I know of can do this so easily and in fact no device with which I am familiar can accomplish results of equal precision. The construction is so designed that the light source is adjustable also in loading the printer to fit all frame lines. While the device is a step by step printer in action, it permits only a slipping action of the films equal to the amount of relative shrinkage of the films, and therefore it is easier on the films than any step printer device with which I am acquainted. No evidence of shrinking appears on the film thus printed while this objectionable result obtains in some of the continuous types of printers now employed.

It will be observed that the device requires no shutter mechanism. It is simple to construct and is susceptible of expeditious repair and adjustment of the parts. The longevity of the films employed with the machine of my invention is outstanding because of the fact that each set or pair of teeth acts only once to every two feet of film printed and because the action of the teeth is such as not to unduly strain or stretch the film. These and other features and advantages will be quite apparent to persons skilled in the art to which the invention relates. Therefore a more lengthy description is regarded as unnecessary.

Minor changes in shape, size and rearrangement of details within the spirit of the invention as embodied in the following claims, may be resorted to, in actual practice, if desired.

What is claimed is:

1. In a structure of the class described, a relatively stationary plate provided with a bearing, a shaft journaled in said bearing, a drive for said shaft, a drum attached to said shaft, said drum having a rim portion in ro-

tary contact with a guide groove formed on said plate, the rim portion of the drum being formed with a film receiving groove, and intermittently operable successively acting sets of feed pins carried by said drum and projectible radially outwardly at predetermined intervals into said film groove, said sets of pins being normally spring retracted, and means on said plate for projecting the sets of pins outwardly whereby only one set of pins is in full film-feeding position at a time.

2. In a structure of the class described, a mounting plate provided with a bearing, a shaft journaled for rotation in said bearing, operating means for the shaft, a drum on said shaft, said drum including a rim having rotatable contact with said plate, said rim being formed on its outer periphery with a film groove and pairs of guide holes, a ring attached to said drum in inwardly spaced concentric relation to said rim, said ring also having pairs of guide holes in registry with said first named pairs of guide holes, a plurality of pairs of feed pins mounted for reciprocation in said pairs of guide holes, the outer end portions of the pins being formed with reduced terminals functioning as film hole engaging teeth, spring means for maintaining said pins normally retracted out of the groove, and a cam block on said mounting plate located in the path of movement of the inner end portions of the pairs of pins as the drum is rotated for successively and intermittently gradually projecting the teeth outwardly into film engaging position in the groove, then permitting each tooth to be retracted to a normal retracted position in such manner that only one set of teeth will be in full film engaging position at a time.

3. In a structure of the class described, a mounting plate provided with a bearing, a shaft journaled for rotation in said bearing, operating means for the shaft, a drum on said shaft, said drum including a rim having rotatable contact with said plate, said rim being formed on its outer periphery with a film groove and guide holes, a ring attached to said drum in spaced concentric relation to said rim, said ring also having guide holes in registry with said first named holes, a plurality of film feeding pins mounted for reciprocation in said guide holes, the outer end portions of the pins being formed with reduced terminals functioning as film hole engaging teeth, spring means for maintaining the pins normally retracted and the teeth out of position to engage a film in the groove, and a cam block on said mounting plate located in the path of movement of the inner end portions of the pins for successively and intermittently gradually projecting the pins for positioning the teeth in film engaging position in the groove, then permitting the

teeth to be retracted into said normal position at a predetermined time as they are moved out of contact with said cam block, together with a dash pot on said mounting plate located in close proximity to the heel of the cam block for checking and absorbing the retraction movement of the pins.

4. In a printing machine of the class described, a relatively stationary supporting plate, a bearing on the plate, a shaft in said bearing, a drum attached to said shaft for rotation therewith, said drum having a grooved rim, the groove being adapted for reception of a film, said rim having circumferentially spaced pairs of guide holes, a ring fixedly mounted on the drum inwardly of said rim and having guide holes registerable with said first named guide holes, pairs of film feeding pins having their end portions mounted for sliding movement in the respective guide holes of the rim and ring, the radially outward ends of the pins being reduced and formed with film engaging teeth, the intermediate portion of each pin having a shoulder, a return spring on each pin between the rim and the shoulder for normally maintaining the pins in retracted position and the teeth out of film engaging position in the groove, a cam block on said plate in the path of travel of the inner end portions of said pairs of pins as the drum is rotated, and a dash pot mounted on said plate comprising a cylinder, a spring therein, and a plunger mounted for reciprocation in said cylinder, said plunger having its outer end of U-shaped configuration, the arms thereof having lateral abutments with which the radially inward ends of each pair of said pins is successively engageable for checking the return movement of the pins under the action of said springs.

5. A printing machine of the type described, comprising, a support, a bearing on the support, an axle rotatable in the bearing, drive means on the axle, a drum on the axle having a rim provided with peripheral film receiving means, an inwardly spaced annulus on the drum, said rim and annulus being provided with registered pairs of radial guide openings, pairs of film feeding pins movable in said openings, spring means for maintaining the pins normally radially inwardly retracted out of film feeding position, and cam means engageable with the inward ends of the pins for moving said pairs of pins successively outwardly into film feeding position whereby only one pair of said pins will be in film feeding position at any time, so as to permit the pull of the film on either side of the pairs of pins which may be in the full feeding position to operate to aline the outer and inner films and prevent buckling or stretching of the films between adjacent pins.

6. A printing machine of the type described, comprising, a support, a bearing on

the support, an axle rotatable in the bearing, drive means on the axle, a drum on the axle having a rim provided with peripheral film receiving means, an inwardly spaced annulus on the drum, said rim and annulus being provided with registered pairs of radial guide openings, pairs of film feeding pins movable in said openings, spring means for maintaining the pins normally radially inwardly retracted out of film feeding position, said projecting means for moving said pairs of pins successively outwardly into film feeding position whereby only one pair of said pins will be in film feeding position at any time, so as to permit the pull of the film on either side of the pairs of pins which may be in the full feeding position to operate to align the outer and inner films and prevent buckling or stretching of the films between adjacent pins, and dashpot means for damping the return movement of the pairs of pins as they are released from full film feeding position by the projecting means, whereby to eliminate objectional noise otherwise attending the said return movement and to eliminate excessive wear on the parts.

7. A film feeding mechanism for printing drums, comprising, film feeding means radially movable in the drum, retracting means for maintaining said film feeding means normally retracted radially inwardly out of film feeding position, and projecting means for moving said film feeding means progressively into full film feeding position, said projecting means being adapted to hold the film feeding means in the said film feeding position for a predetermined interval of rotation of the drum then permit the so held film feeding means to be acted upon by the retracting means so as to be instantly retracted out of film feeding position, whereby to permit the pull of the films on either side of the next succeeding film engaging means to operate to prevent buckling or stretching of the films between adjacent film feeding means.

8. A film feeding mechanism for printing drums, comprising, film feeding means radially movable in the drum, retracting means for maintaining said film feeding means normally retracted radially inwardly out of film feeding position, and projecting means for moving said film feeding means progressively into full film feeding position, said projecting means being adapted to hold the film feeding means in the said film feeding position for a predetermined interval of rotation of the drum then permit the so held film feeding means to be acted upon by the retracting means so as to be instantly retracted out of film feeding position, whereby to permit the pull of the films on either side of the next succeeding film engaging means to operate to prevent buckling or stretching of the films between adjacent film feeding

means, said pull operating further to produce a step by step movement of the films relative to the drum and film feeding means as the films are pulled so as to bear first against one side and then the opposite side of the feeding apertures of the films.

In testimony whereof I affix my signature.

HOWARD E. PIPER.

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