

Oct. 26, 1926.

G. A. SALINS

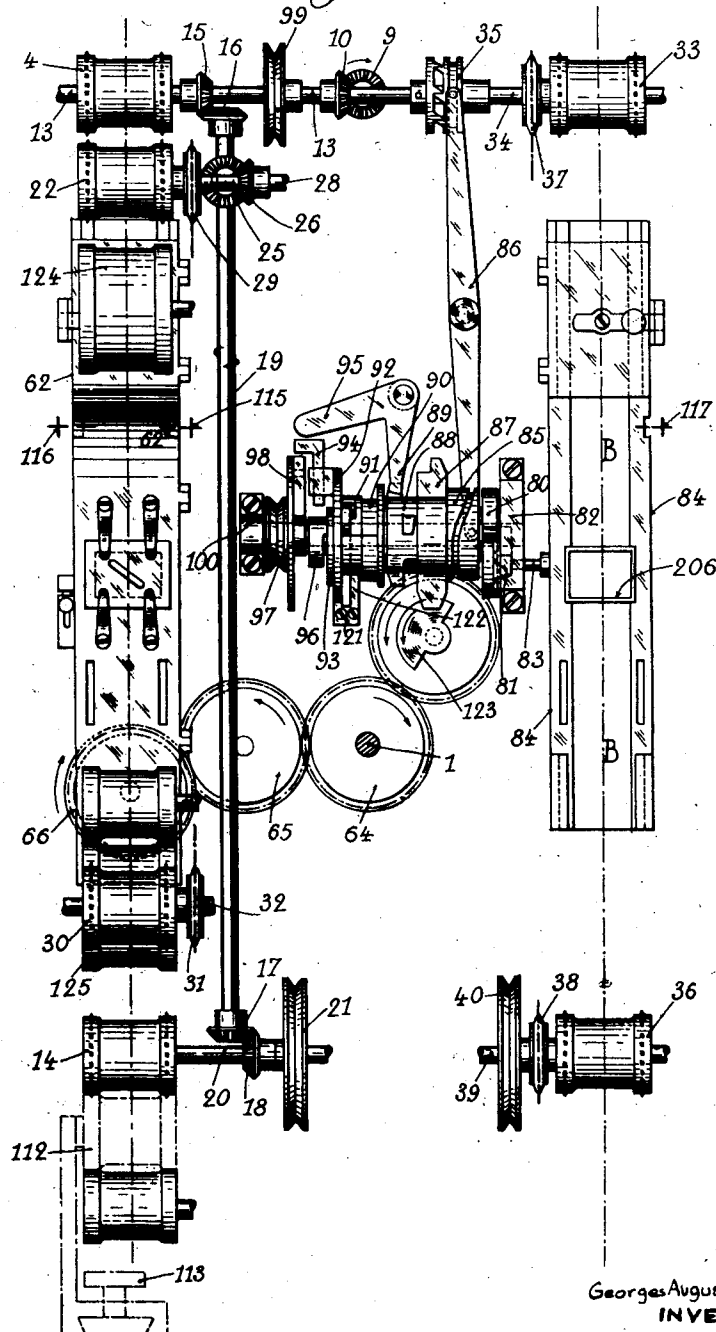
1,604,485

APPARATUS FOR THE PRINTING OF CINEMATOGRAPHIC FILMS

Filed June 21, 1922

7 Sheets-Sheet 1

Fig. 1



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Oct. 26, 1926.

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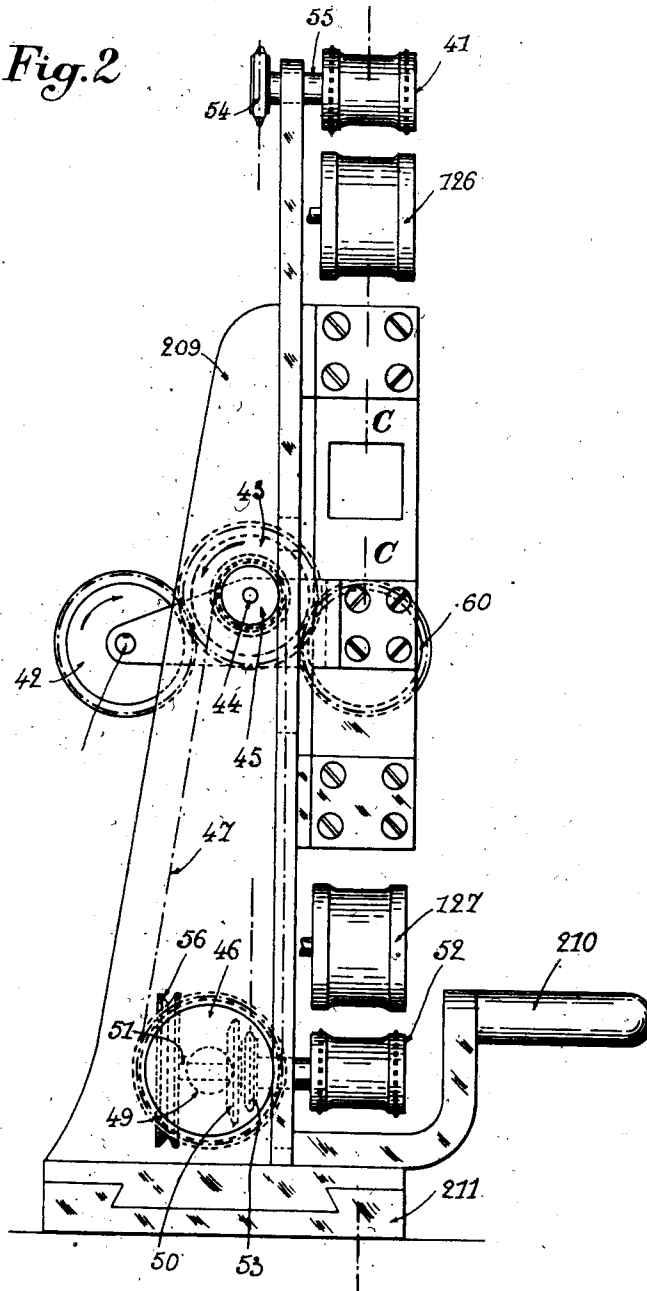
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APPARATUS FOR THE PRINTING OF CINEMATOGRAPHIC FILMS

Filed June 21, 1922

7 Sheets-Sheet 2

Fig. 2



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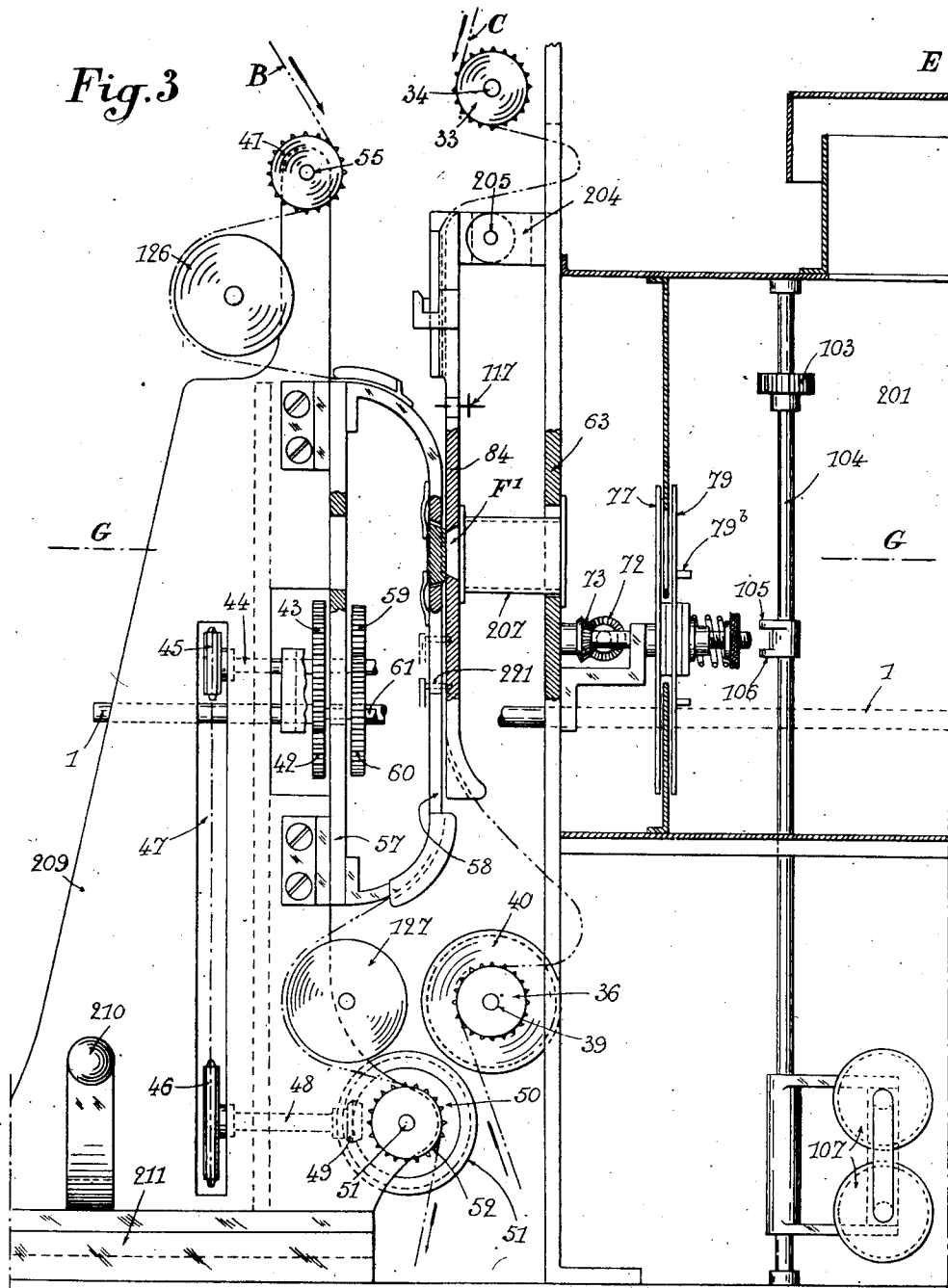
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APPARATUS FOR THE PRINTING OF CINEMATOGRAPHIC FILMS

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7 Sheets-Sheet 3



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Oct. 26, 1926.

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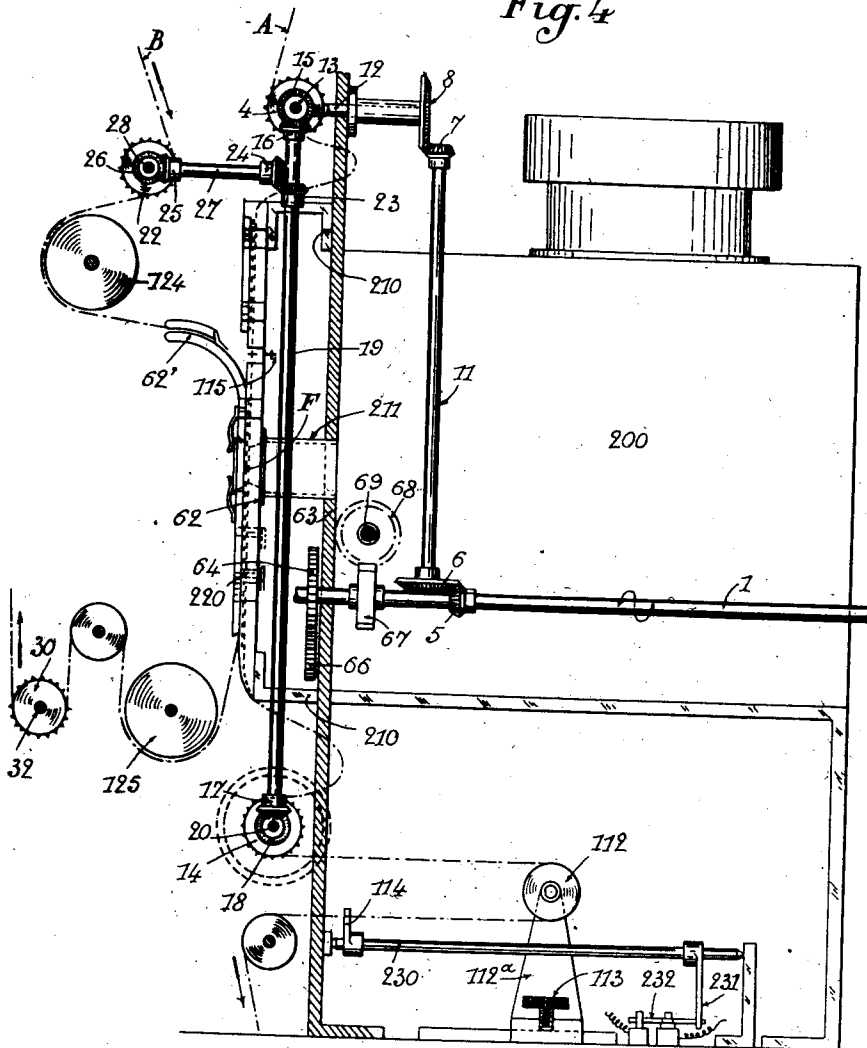
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APPARATUS FOR THE PRINTING OF CINEMATOGRAPHIC FILMS

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7 Sheets-Sheet 4

Fig. 4



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7 Sheets-Sheet 5

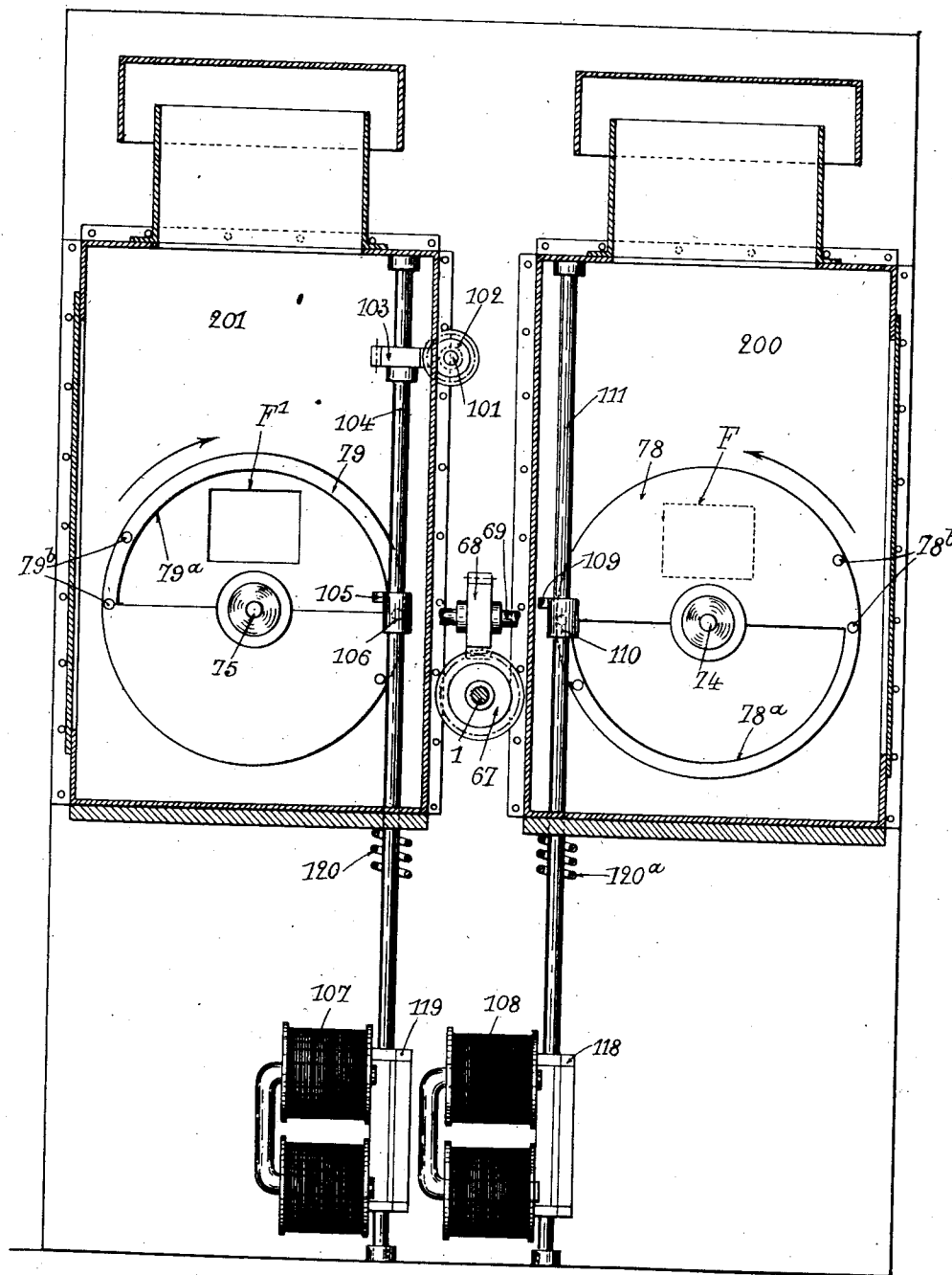


Fig. 5

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7 Sheets-Sheet 6.

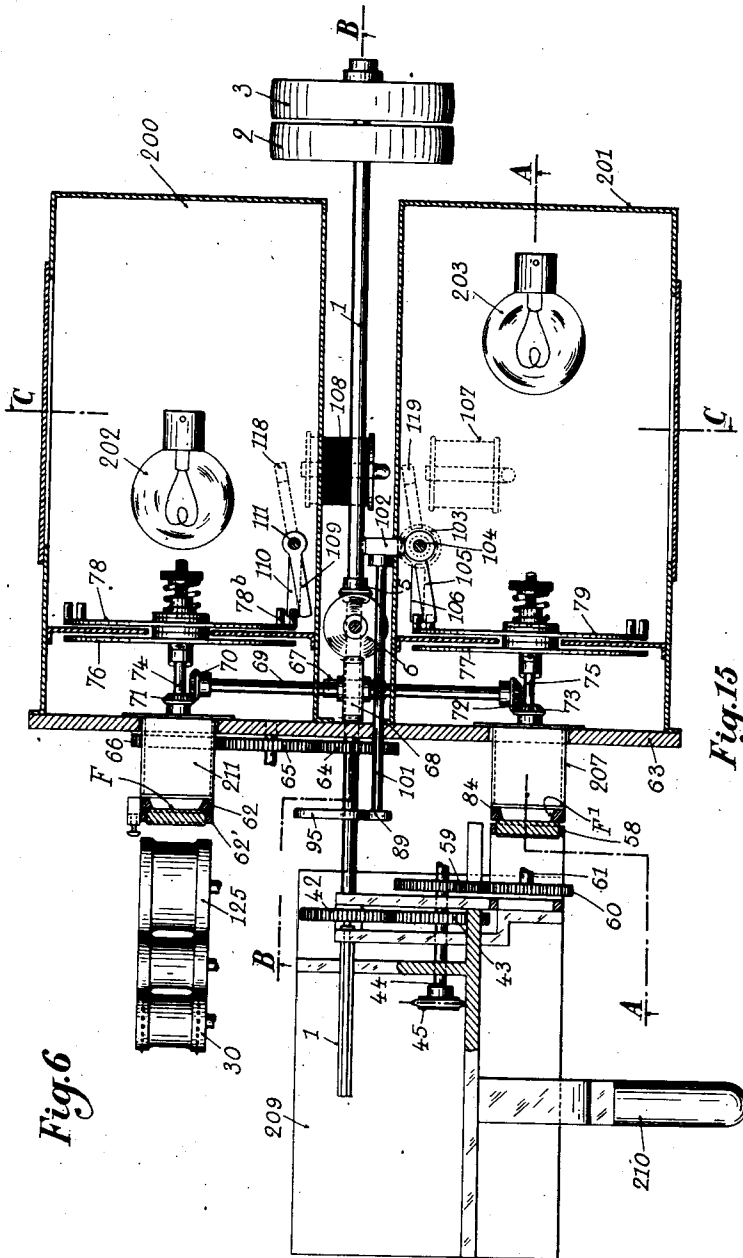


Fig. 6

Fig. 13

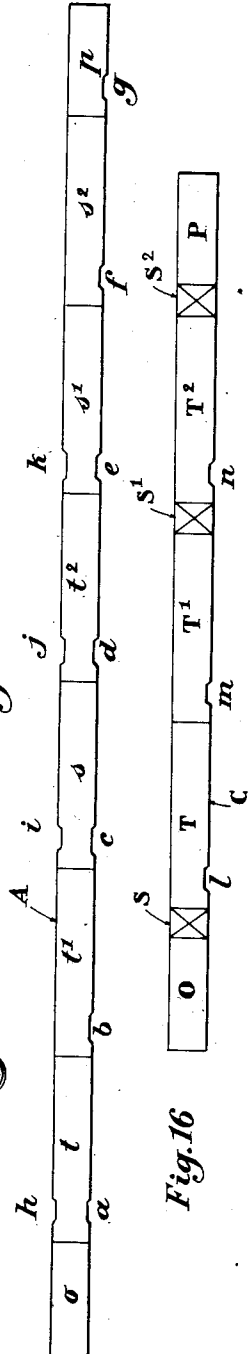


Fig. 16

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Oct. 26, 1926.

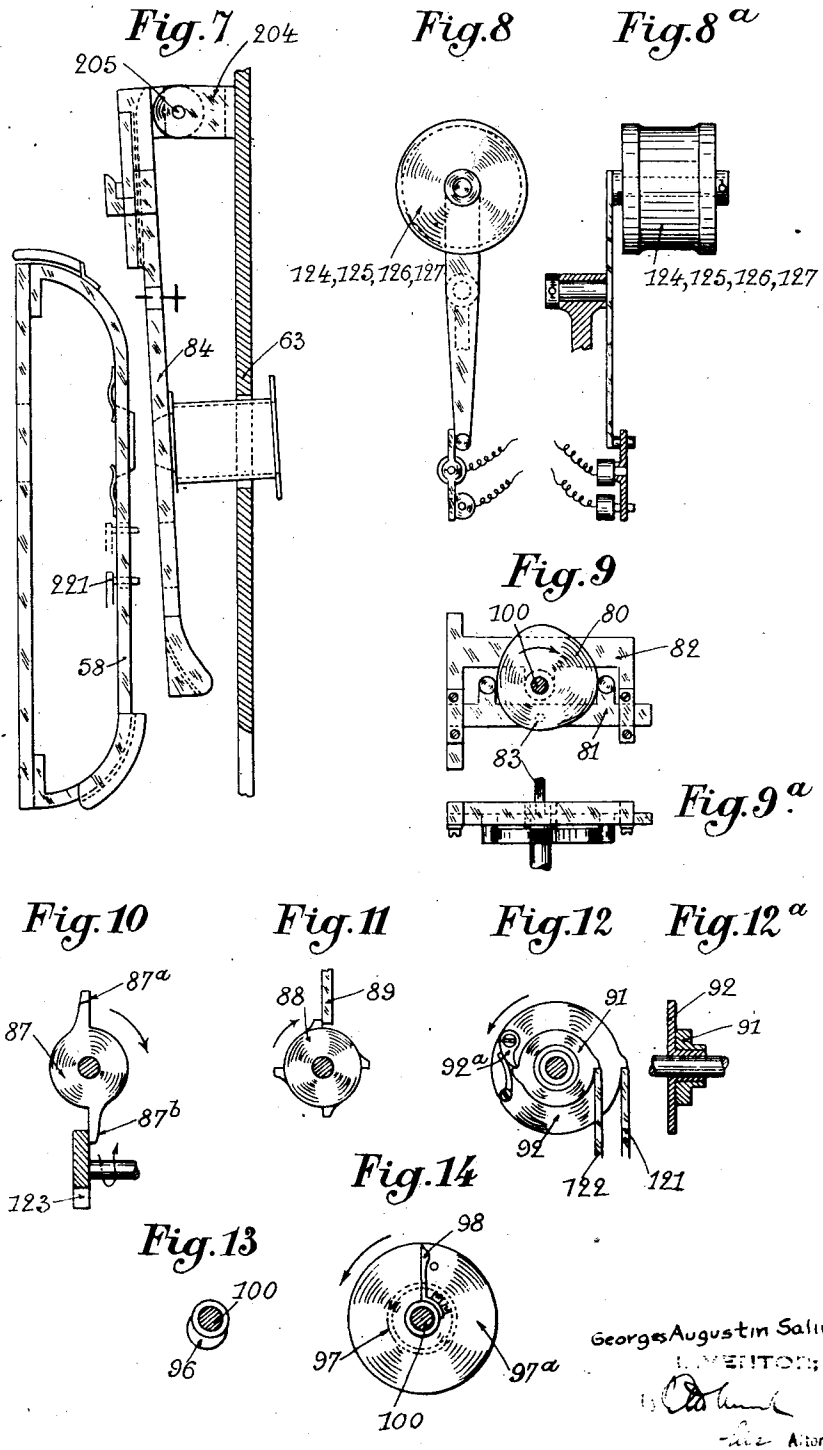
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APPARATUS FOR THE PRINTING OF CINEMATOGRAPHIC FILMS

Filed June 21, 1922

7 Sheets-Sheet 7



UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE PRINTING OF CINEMATOGRAPHIC FILMS.

Application filed June 21, 1922, Serial No. 569,936, and in France July 1, 1921.

It is known that negatives without op-
positions and negatives with great contrasts
will give sufficient results with the same time
of development, when each positive has re-
ceived an appropriate exposure, whence for
the printing of cinematographic films, is
obtained the advantage of printing appa-
ratus with automatic change of light per-
mitting the assembling of the negatives and
therefore the suppression of the mounting
of the positives.

But in order that this advantage should
be complete, it would be necessary not to be
obliged to change the titles in the negative
films each time that one is to pass from
one language to another, or to print the
titles separately in order to mount them af-
terwards.

This invention relates to a method and an
apparatus for printing cinematographic
films, which permits to directly obtain posi-
tive films upon which the titles of the origi-
nal negatives have been replaced by differ-
ent titles, for instance the translation of the
original titles into a foreign language.

According to the invention, the negative
film and the positive film to be printed
placed one upon the other are moved pro-
gressively before a lighting window, the
light of which is arrested during the pas-
sage of the titles on the negative film and the
positive film together with a supplementary
negative film, or like element, carrying the
new titles desired, are passed before another
lighting window, the light of which is ar-
rested during the passage of the pictures or
scenes already printed on the positive film.

Other characteristic features of this in-
vention will appear from the following de-
scription.

In the accompanying drawings given by
way of example:

Fig. 1 is a front elevation view of the ap-
paratus, certain members being omitted.

Fig. 2 is an elevation view of a movable
carriage forming the part of the apparatus.

Fig. 3 is a longitudinal section of the ap-
paratus taken approximately along the line
A—A, (Fig. 6).

Fig. 4 is a longitudinal section taken ap-
proximately along the line B—B, (Fig. 6).

Fig. 5 is a cross section of the apparatus,
taken approximately along the line C—C,
Fig. 6, certain members being omitted.

Fig. 6 is a horizontal section of the ap-

paratus, taken approximately along the line
G—G, (Fig. 3).

Fig. 7 shows the window moved away
from the film guide.

Figs. 8 and 8^a are a front elevation view
and a side view of the mounting of one of
the signal rollers.

Figs. 9 and 9^a are details in elevation and
in plan view, respectively, of the cam and
other members of the device for causing
the negative film to approach or to remove
from the positive film.

Fig. 10 shows the regulating device of the
said arrangement.

Fig. 11 shows the double escapement of the
same arrangement.

Figs. 12 and 12^a show in front view and
in section several members of the same de-
vice.

Fig. 13 shows a cam and

Fig. 14 a pulley forming a part of the
same device.

Fig. 15 is a diagrammatic view of the
main negative film with permanent titles.

Fig. 16 is a diagrammatic view of a roll
of an auxiliary film with added titles.

The apparatus shown by way of example,
comprises two lamps 200, 201 containing re-
spectively electric bulbs 202, 203 and mount-
ed on a vertical common wall 63. Between
the two lamps, is mounted the main driving
shaft 1 carrying the pulleys 2, 3. On the
wall 63, opposite the lamp 200, are two
brackets 210 (Fig. 4) upon which is secured
a film guide or gate 62. Said guide is
provided with a hinged door 62', as usual,
and has a window F formed therein. A
tubular member 211 arranged behind said
window extends into the lamp 200.

The gate 62 is traversed in a downward
direction by the main negative film A (Fig.
4) from which prints are desired and by the
blank positive film B which is to be printed.
The negative film A which is shown diagram-
matically in Fig. 15, comprises for instance
a blank end portion *o*, a main title *t*, a first
sub-title *t*¹, a first scene or picture *s*, a sec-
ond sub-title *t*², a second scene or picture
*s*¹, a third picture *s*², and a trade mark *p*.
Said film is provided, in its edges, with
notches *a* to *k*, as shown, for a purpose
which will be explained later on.

The negative film A coming from a win-
dow not shown, arrives at a drum 4 (Fig. 4)
provided with feeding teeth and driven by

the main shaft 1; the motion being transmitted to the toothed drum 4 (Figs. 1 and 4) through the medium of the bevel gears 5, 6, 7, 8, 9, 10 and the shafts 11, 12, 13. For drums having twenty teeth, the wheels 5, 6, 7, 8 reduce the speed of rotation of the shaft 1 in the ratio of 5 to 1, so that the shaft 13 turns with five times less speed than the shaft 1. A lower toothed drum 14 receives the motion of the shaft 13 by means of the bevel gears 15, 16, 17, 18 and the shafts 19, 20. On the shaft 20, is mounted the grooved pulley 21 for the friction drive of the corresponding winding device (not shown) for the negative film.

The blank film B to be printed passes over a toothed drum 22 (Fig. 4) which is driven by the shaft 19 by means of the bevel gears 23, 24, 25, 26 and the shafts 27, 28. The sprocket wheel 29, mounted on the shaft 28 actuates the lower toothed drum 30 by a chain, not shown, which actuates the shaft 32 and the wheel 31 (Fig. 1).

The two films A, B are drawn together through the gate 62 by a feeding mechanism arranged between the gate 62 and the wall 63. Said mechanism may comprise feeding claws 220 which extend simultaneously into the perforations of both films. Said feeding mechanism is driven by the shaft 1 through the medium of the gears 64, 65, 66 (Figs. 1 and 4), the gear 65 being mounted on the shaft of the cam for the lateral motion of the claws and the gear 66 on that of the cam for their motion of rise and descent.

Upon leaving the toothed drum 14, the negative A passes around a roller 112 (Fig. 4) carried by a bracket 112^a which may be secured by a knob 113 at a suitable distance from the drum 14. On the side of the film, which is provided with the notches *h, i, j, k* is situated a small lever 114 which may fall into said notches under the action of a spring. Said lever is carried by a shaft 230 provided with an arm 231 which actuates a small electric switch 232 for a purpose which will be explained below. A small lever 116 which is shown diagrammatically in Fig. 1 on the left of the film and is similar to the lever 114 cooperates also with the notches *h, i, j, k* and with an electric switch similar to the switch 232 for a purpose which will be also explained below. Said electric switches may, of course, be located at any desired distance from the film. A small similar lever 115 (Fig. 1) cooperates with the notches *a* to *g* in the other edge of the film A. Said lever 115 actuates a device of any desired type for varying the intensity of the light used for reproducing the images of the film A onto the film B.

The positive film B, after passing before the first lamp 200 and on the rollers 125 and 30 (Fig. 4) is suitably guided on the roller 41 (Fig. 3) and passes then in front of the

second lamp 201. It is guided across said lamp by a gate 58 (Fig. 3) mounted on a carriage 209 which may be caused to slide by means of a handle 210 along a bracket 211, so as to be brought near the lamp 201 or moved away from the latter. The film B passes on a toothed drum 41 (Fig. 3) mounted on the carriage 209 and driven by the shaft 1 through the medium of the gears 42, 43, the shaft 44, the wheels 45, 46 and the chain 47, the shaft 48, the bevel gears 49, 50, the shaft 51 whereon are mounted the toothed drum 52 and the wheel 53 driving by a chain, not shown, the wheel 54 mounted on the shaft 55 of the drum 41. The wheels 45, 46, 49, 60 also reduce the speed of the shaft 1 in the ratio of 5 to 1, so that the toothed drums 41 and 52 also rotate five times slower than the shaft 1. On the shaft 51 is a grooved wheel 56 which drives by friction the positive film winder on the right hand side (not shown). It is to be noted that the gear wheel 42 (Fig. 6) is loose on the shaft 1 in the lengthwise direction and carries a stud engaging a groove in this shaft, which allows it to follow the displacements of the carriage 209 when placing the film in operative position.

Upon the carriage 209, is mounted the feeding mechanism for the positive film B. Said mechanism which may comprise the claws 221, is actuated by the gears 59, 60 (Figs. 3 and 6), the gear wheel 59 keyed on the shaft 44 actuating the gear wheel 60 mounted on the shaft 61. On the shaft 44 is secured the cam for the lateral motion of the claws, and on the shaft 61 the cam for their rise and descent.

The supplementary negative film C (Fig. 16) which is used for printing on the positive the new titles desired, may comprise, as shown, an end portion O, a black portion S, a title T, for instance in English, corresponding to the title *t* for instance in French of the main negative, a sub-title T¹, a black portion S¹, a sub-title T², a black portion S² and an end portion P. Said film C coming from a winder, passes over the toothed drum 33 (Fig. 3) mounted on the wall 63 of the apparatus and secured on a shaft 34 which is connected with the shaft 13 by a clutch 35 (Fig. 1). The lower toothed drum 36 receives the motion from the shaft 34 by the sprocket wheels 37, 38 connected by a chain, not shown, and by the shaft 39; on this shaft is secured the grooved pulley 40 driving by friction the corresponding winder for the negative film C.

Said supplementary negative film C passes through a gate 84 (Fig. 3) which is pivoted at 205 on a bracket 204 carried by the wall 63. Said gate has a window F¹ behind which is a tubular member 207 which extends through a hole in the wall 63. On this gate, is mounted a small lever 117 (Fig. 3) similar

to the lever 114 and cooperating with the notches *l* to *n* of the film C for automatically producing the necessary changes of light.

The negative C is moved along intermittently at the same time as the positive B by the claws 221. In order to remove the negative C at the desired moments from the action of the claws 221, the gate 84 can pivot to the right (see Fig. 7) under the action of a roller carrying finger 83 (Figs. 1 and 9) carried by a slide 81 which moves in a bracket 82 under the action of a cam 80. The latter rotates freely on a horizontal shaft 100 and is secured to a cam drum 85 (Fig. 1) provided with a cam slot which acts upon the end of a pivoted lever 86, which latter actuates the clutch 35 used for coupling the shaft 34 to the shaft 13 at the desired moments. The cam drum 85 is secured to a regulating disc 87 (Figs. 1 and 10) which carries two diametrically opposite fingers 87^a, 87^b adapted to bear upon a segmental member 123 (Fig. 1) carried by a shaft of the feeding mechanism, in such manner that the disc 87 can only rotate when the fingers 87^a, 87^b are clear of the segment. The regulating disc 87 is itself secured to an escapement wheel 88 (Fig. 11) provided with four teeth by which it may cooperate with a bell crank lever 89, 95 mounted on a horizontal shaft 101 (Figs. 1 and 6). The whole of the members 80, 85, 87, 88 rotates intermittently under the action of a spiral spring 90 (Fig. 1) having one end attached to a disc secured to the escapement wheel 88, while its other end is attached to a ratchet wheel 91. The latter can rotate in the direction of the arrow (Fig. 12), so as to wind up the spring 90, under the action of a pawl 92^a carried by a disc-plate 92 which is also rotatably mounted on the shaft 100. Suitably mounted in a boss of the disc-plate 92, is a pawl or piston 94 which may be caused to slide towards the center by the arm 95 of the lever 89, 95 and pushed outwardly by a fixed cam 96 (Fig. 13) mounted on the shaft 100. When the pawl 94 is pushed outwardly, it comes into engagement with a spring blade 98 (Fig. 14) carried by the cheek 97^a of a grooved pulley 97 keyed on the shaft 13 (Fig. 1).

In the lamp 200 are mounted two rotary shutters 76, 78 adapted to close the window F (Fig. 5). The shutter 76 is keyed on a shaft 74 and performs the usual operation of cinematographic shutters. The shutter 78 is mounted on a shaft 74 by friction and is carried along intermittently by the latter in its movement of rotation. The shaft 74 is driven by the main operating shaft 1 through the medium of helicoidal wheels 67, 68 (Fig. 5), the shaft 69 and the bevel gears 70, 71. Two similar shutters 77, 79 corresponding to the window F¹ are mounted in the lamp 201. The shaft 75 is driven by

the shaft 69 through the medium of the bevel gears 72, 73. The shutters 78, 79 mounted by friction on their shafts, are each provided with a semi-circular aperture 78^a, 79^a and two pairs of escapement pins, such as 78^b, 79^b with which small levers 109, 110 and 105, 106 (Fig. 6) are adapted to cooperate. The levers 109, 110 are carried by a vertical shaft 111 provided with a finger 118 which may be drawn by an electro-magnet 108. The levers 105, 106 are carried by a similar shaft 104 provided with a finger 119 which may be attracted by an electro-magnet 107. Springs 120, 120^a (Fig. 5) tend to move the fingers 118, 119 away from the corresponding electromagnet. The electro-magnet 108 is mounted in an electric circuit controlled by the small lever 116 before mentioned and the electro-magnet 107 is mounted in a circuit controlled by the small lever 114 (Fig. 4).

The vertical shaft 104 operated by the electro-magnet 107 is also used to actuate through the medium of helicoidal wheels 102, 103 (Fig. 6) the horizontal shaft 101 upon which the bell crank lever 89, 95 is mounted.

The operation of the apparatus is as follows:

The main negative A is placed in position as shown in Fig. 4 and the positive B to be printed is placed on said negative in the gate 62. The carriage 209 has been drawn back, so that the front end of the positive B can be suitably placed, said positive coming from the toothed drum 41, Fig. 3, and passing through the gate 58. Finally the auxiliary negative C which is provided for instance with the titles in English is placed in position, i. e. brought to the drum 33 and passed through the pivoted gate 84, as shown in Fig. 3. It will be noted that the length of the film A which extends from the window F to the lever 114 should comprise the same number of images as the length of the positive B between the two windows F, F¹ along its path on the rollers 125, 30 (Fig. 4) and 41, 126 (Fig. 3). Said length will be chosen once for all, so that it will be possible to provide on the end part of each film two reference marks which will be placed in the window F and the other in the window F¹. The auxiliary negative film C will be placed in such a manner that the first black image S thereof will be situated in the window F¹. One will then ascertain that the friction mounted shutter 78 is open, that the gate 84 is moved away from the gate 58 and that the friction shutter 79 is closed.

As soon as the first image (title *t*) of the film A begins to descend across the window F, the notch *a* will act upon the lever 115 in order to give the suitable luminous intensity for the main title *t* but as the notch *b* acts

upon the lever 116, the electro-magnet 108 will be energized and will draw the lever 118 (Fig. 6). The latter will thus allow the shutter 78 to make one half revolution and close the window F. The film B will thus remain blank in the part corresponding to the title *t*. Upon the notch *b* passing on the lever 115, the light will be changed, but the shutter 78 will shut the window F and the title *t*¹ will not be reproduced. When the notch *i* comes to the lever 116, the electro-magnet 108 will be again energized and the shutter 78 will thus make a further half revolution and uncover the window F. At the same time, the notch *c*, acting on the lever 115 will give the desired luminous intensity, the pictures *s* will thus be reproduced on the positive. When the notches *b*, *j* act later on the corresponding levers, the operation will be the same as for the notches *a*, *h*, i. e. the shutter 78 will close, the change of light taking thus place without having any effect. In this manner, the subtitle *t* will not be reproduced and so on. For the third picture *s*², the notch *f* will simply change the luminous intensity and the notch *g* will act in the same manner for the trade mark *p*.

During the same time, in the lamp 201, the operation is as follows:

When the notch *a* comes to the lever 114, the portion of the positive B upon which the title T in English of the auxiliary film C is to be reproduced, comes opposite the window F¹. At this time, the lever 114 closes the circuit of the electro-magnet 107 which will draw the lever 119. The vertical shaft 104 will thus oscillate and actuate the bell crank lever 89, 95. The arm 89 will thus allow the escapement wheel 88 to make a quarter of revolution, so that the cam 80 will turn and move the gate 84 towards the gate 58 and thus apply the negative C upon the positive B. By said movement, which is instantaneous, the cam 85, through the medium of the lever 86, will act to clutch the shaft 34 whereby the auxiliary negative C will be free to descend in the gate 84 under the action of the claws 221. At the same time, the arms 105, 106 carried by the shaft 104 will allow the friction shutter 79 to make half a revolution, so that the latter will cover the window F¹.

It will be noted that the movement of the gate 84 towards the gate 58 should only take place during the upward movement of the claws 221, i. e. when the latter are drawn inside the gate 58. This result is obtained by means of the regulating disc 87 which is secured to the escapement wheel 88 and can itself only turn when the segment 123 which is timed with the claws, allows it to pass.

The gate 84 being thus near the gate 58, the claws 221 will draw along the black image S in their downward movement and

said image will be replaced by the first title T in English. At the same time, the notch *l* of the film C by acting on the lever 117 will give the desired luminous intensity. The title T will thus be reproduced on the desired portion of the positive B.

The current being cut off, when the notch *a* moves past the lever 114, the electro-magnet 107 will abandon the lever 119 which will come back under the action of the spring 120 to its original position. The bell crank lever 89, 95 will thus come back to its first position and thereby allow the escapement wheel 88 to make a further quarter of revolution which will however leave the gate 84 close to the gate 58.

In this movement, the arm 95 bears upon the pawl 94 which will be carried in a movement of rotation by the spring blade 98 carried by the pulley 97, until the cam 96 will release said pawl. The disc plate 92 upon which said pawl is mounted will thus actuate by its pawl 92^a the ratchet wheel 91 to which is secured one of the ends of the spring 90. The spring 90 will thus be wound up by half a revolution, and the half revolution which it had lost for actuating the escapement wheel 88 will be taken up, so that the spring will always have the same tension. Retaining pawls 121, 122 hold the members 92, 91 in their return movement.

The sub-title T¹ which should follow the title T upon the film B will be reproduced immediately after said title, both films B and C being drawn along together. However for reproducing said sub-title T¹, the notch *m*, by acting on the lever 117, will have changed the luminous intensity. When the notch *i* comes to the lever 114, the latter will again close the circuit of the electro-magnet 107, the shaft 104 will oscillate and the cam 80 will turn as already explained, but, this time, it will act to move the gate 84 away from the gate 58. The film C will thus be removed from the action of the claws 221 and stand still, so that its black image S¹ which is located in the window F¹ will remain there. At the same time, the shaft 34 will be unclutched and the shutter 79 will cut off the light. The portion of the film B upon which the picture *s* has been reproduced can thus pass before the window F¹ without inconvenience. When the notch *j* comes to the lever 114, the operation above described will be repeated in order to reproduce the title T² upon the film B and so on.

If during the course of the printing, the positive B should get out of "frame", one would be immediately warned by one of the signal rollers 124, 125, 126, 127 whereof Fig. 8 gives an idea of the mounting.

By adding a stop piece to the small lever 116 and a winder to receive the positive film

when coming out of the left hand guide 62 instead of causing it to pass across the right hand window F', one obtains two simple apparatus and if one causes the negative A to pass in the right hand gate 84 after the gate 62, one obtains a multiple apparatus for two printing operations.

The toothed drums will be provided with small compressing rollers (not shown).

One might replace the permanent titles of the negative A by equivalent lengths of film preferably with black images; all the printing will then be done with the added titles carried by the auxiliary film C.

An apparatus employing titles on plates would, on the left hand side (lamp 200), be like the one described, and on the right hand side (lamp 201) there would be a device for reduction of known type with automatic shifting of plates.

For titles on pasteboard cards, this apparatus would be on the left hand side also the same as the one described, and on the right hand side there would be a device for taking cinematographic views of the titles, with automatic shifting of the cards.

In both cases, the device for the release would not exist; the small lever 144 would only be necessary to actuate the shutter 79.

Finally, a combined apparatus could also be devised, with three or even four windows whereby it would be possible to use auxiliary titles either upon films, glass plates or pasteboard cards as desired.

It is obvious that the invention is not restricted to the constructional details shown or described, which have been selected only by way of example.

Having now described my said invention, what I claim as new and desire to secure by Letters Patent is:

1. An apparatus for printing two series of pictures of the same size onto a cinematographic sensitive film, comprising in combination two picture printing devices having their optical axes in different alignments, means for feeding together through the first printing device the sensitive film and a first already developed film carrying a first series of pictures, means for feeding together through the second printing device the sensitive film and a second already developed film carrying a second series of pictures, means disposed along the path of the first already developed film and adapted to be controlled by said film to bring out of operation the first printing device before predetermined portions of the sensitive film and means disposed along the path of said first already developed film adapted to be controlled by said film and spaced from the preceding means by a number of pictures equal to the number of pictures contained on the sensitive film between the optical axes of the two printing devices for bringing into operation the second printing device before the same said portions of the sensitive film.

2. An apparatus for printing two series of pictures of the same size onto a cinematographic sensitive film, comprising in combination two picture printing devices having their optical axes in different alignments, means for feeding together through the first printing device the sensitive film and a first already developed film carrying a first series of pictures, means for feeding together through the second printing device the sensitive film and a second already developed film carrying a second series of pictures, means for removing automatically said second developed film from the action of the feeding means of the second printing device, means disposed along the path of the first already developed film and adapted to be controlled by said film to bring out of operation the first printing device before predetermined portions of the sensitive film and means disposed along the path of said first already developed film, adapted to be controlled by said film and spaced from the preceding means by a number of pictures equal to the number of pictures contained on the sensitive film between the optical axes of the two printing devices for bringing into operation the second printing device before the same said portions of the sensitive film.

3. An apparatus for printing cinematographic films comprising two lamps provided with a main lighting window and a supplementary window, respectively, means for guiding a main negative film and a positive film simultaneously in front of the main window, a feeding mechanism adapted to intermittently feed said films past said window, means for guiding the positive in front of the supplementary window, a movable carriage for carrying said means, a pivoted gate for guiding a supplementary negative in front of said supplementary window, a supplementary feeding mechanism mounted in said carriage and adapted to intermittently feed said positive and supplementary negative in front of the supplementary window, means operated by notches in the main negative for causing the said pivoted gate to swing away from the positive film, a rotary shutter for the main window, means operated by notches in the main negative for rotating said shutter so as to cut off the light of the main window during the passage of the title portions of the film through said window, a rotary shutter for said supplementary window, and means operated by notches in the main negative for rotating said shutter, so as to cut off the light of the supplementary window during the passage of the picture portions of the positive across said supplementary window.

4. An apparatus for printing cinematographic films comprising two lamps provided with a main lighting window and a supplementary window, respectively, means for guiding a main negative film and a positive film simultaneously in front of the main window, a feeding mechanism adapted to intermittently feed said films past said window, means for guiding the positive in front of the supplementary window, a movable carriage for carrying said means, a pivoted gate for guiding a supplementary negative in front of said supplementary window, a supplementary feeding mechanism mounted in said carriage and adapted to intermittently feed said positive and supplementary negative in front of the supplementary window, means operated by notches in the main negative for causing the said pivoted gate to swing away from the positive film, a rotary shutter for the main window, means operated by notches in the main negative for rotating said shutter so as to cut off the light of the main window during the passage of the title portions of the film through said window, a rotary shutter for said supplementary window, and means operated by notches in the main negative for rotating said shutter, so as to cut off the light of the supplementary window during the passage of the picture portions of the positive across said supplementary window.

5. An apparatus for printing cinematographic films comprising two lamps provided with a main lighting window and a supplementary window, respectively, means for guiding a main negative film and a positive film simultaneously in front of the main window, a feeding mechanism adapted to intermittently feed said films past said window, means for guiding the positive in front of the supplementary window, a movable carriage for carrying said means, a pivoted gate for guiding a supplementary negative in front of said supplementary window, a supplementary feeding mechanism mounted in said carriage and adapted to intermittently feed said positive and supplementary negative in front of the supplementary window, means operated by notches in the main negative for causing the said pivoted gate to swing away from the positive film, a rotary shutter for the main window, means operated by notches in the main negative for rotating said shutter so as to cut off the light of the main window during the passage of the title portions of the film through said window, a rotary shutter for said supplementary window, and means operated by notches in the main negative for rotating said shutter, so as to cut off the light of the supplementary window during the passage of the picture portions of the positive across said supplementary window.

graphic films, comprising two lamps provided with a main lighting window and a supplementary window, respectively, means for guiding a main negative film and a positive film simultaneously in front of the main window, a feeding mechanism adapted to intermittently feed said films past said window, means for guiding the positive in front of the supplementary window, a movable carriage for carrying said means, a pivoted gate for guiding a supplementary negative in front of said supplementary window, a supplementary feeding mechanism mounted in said carriage and adapted to intermittently feed said positive and supplementary negative in front of the supplementary window, means operated by notches in the main negative for causing the said pivoted gate to swing away from the positive film, rotary shutters for the first window and the supplementary window, respectively, shafts upon which said shutters are frictionally mounted, respectively, escapement pins on said shutters, arms adapted to cooperate with said pins to prevent the rotation of the shutters, rock shafts for carrying said arms, electro-magnets adapted to actuate said shafts and levers controlled by notches in the main negative film and adapted to close electric circuits including said electro-magnets.

5. An apparatus for printing cinematographic films, comprising two lamps provided with a main lighting window and a supplementary window, respectively, means for guiding a main negative film and a positive film simultaneously in front of the main window, a feeding mechanism adapted to intermittently feed said films past said window, means for guiding the positive in front of the supplementary window, a movable carriage for carrying said means, a pivoted gate for guiding a supplementary negative in front of said supplementary window, a supplementary feeding mechanism mounted in said carriage and adapted to intermittently feed said positive and supplementary negative in front of the supplementary window, a cam adapted to move the said pivoted gate away from the positive film, means tending to rotate said cam, rotary shutters for the first window and the supplementary window, respectively, shafts upon which said shutters are frictionally mounted, respectively, escapement pins on said shutters, arms adapted to cooperate with said pins to prevent the rotation of the shutters, rock shafts for carrying said arms, electro-magnets adapted to actuate said shafts, levers controlled by notches in the main negative film and adapted to close electric circuits including said electro-magnets, feeding drums for the supplementary negative, a clutch controlling said feeding drums, a cam for operating said clutch and

an oscillating lever actuated by one of the rock shafts and adapted to control said cams.

6. An apparatus for printing cinematographic films comprising two lamps provided with a main lighting window and a supplementary window respectively, means for guiding a main negative film and a positive film simultaneously in front of the main window, a feeding mechanism adapted to intermittently feed said films past said window, means for guiding the positive in front of the supplementary window, a removable carriage for carrying said means, a pivoted gate for guiding the supplementary negative in front of said supplementary window, a supplementary feeding mechanism mounted in said carriage and adapted to intermittently feed said positive and supplementary negative in front of the supplementary window, a cam adapted to move the said pivoted gate away from the positive film, rotary shutters for the main window and the supplementary window, respectively, shafts upon which said shutters are mounted with friction, respectively, escapement pins on said shutters, arms adapted to cooperate with said pins to prevent the rotation of the shutters, rock shafts for carrying said arms, electro-magnets adapted to actuate said shafts, levers controlled by notches in the main negative film and adapted to close electric circuits including said electro-magnets, rotary feeding drums for the films, driving means for rotating said feeding drums, a clutch controlling the feeding drums for the supplementary negative, a cam for operating said clutch, a spring tending to rotate both of the aforesaid cams, an oscillating lever actuated by one of the rock shafts and adapted to control the rotation of said cams and means actuated by said oscillating lever, whereby the said spring can be intermittently wound up by said driving means.

7. An apparatus for printing cinematographic films, comprising two lamps provided with a main lighting window and a supplementary window, respectively, means for guiding a main negative film and a positive film simultaneously in front of the main window, a feeding mechanism adapted to intermittently feed said films past said window, means for guiding the positive in front of the supplementary window, a movable carriage for carrying said means, a pivoted gate for guiding the supplementary negative in front of said supplementary window, a supplementary feeding mechanism mounted in said carriage and adapted to intermittently feed said positive and supplementary negative in front of the supplementary window, a cam adapted to move the said pivoted gate away from the positive film, rotary shutters for the main window and the sup-

plementary window, respectively, shafts upon which said shutters are mounted with friction, respectively, escapement pins on said shutters, arms adapted to cooperate with said pins, to prevent the rotation of the shutters, rock shafts for carrying said arms, electro-magnets adapted to actuate said shafts, levers controlled by notches in the main negative film and adapted to close electric circuits including said electro-magnets, rotary feeding drums for the films, driving means for rotating said feeding drums, a clutch controlling the feeding drums for the supplementary negative, a cam for operating said clutch, an oscillating lever actuated by one of the rock shafts and adapted to control said cams and a segmental member (123) actuated by the supplementary feeding mechanism and adapted to control the rotation of the cam which moves the pivoted gate away from the positive film.

8. An apparatus for printing cinematographic films, comprising two lamps provided with a main lighting window and a supplementary window, respectively, means for guiding a main negative film and a positive film simultaneously in front of the main window, a feeding mechanism adapted to

intermittently feed said films past said window, means for guiding the positive and a supplementary negative in front of the supplementary window, a supplementary feeding mechanism adapted to intermittently feed said positive and supplementary negative in front of the supplementary window, means operated by notches in the main negative film for removing the supplementary negative film from the action of the supplementary feeding mechanism, a rotary shutter for the main window, means operated by notches in the main negative for rotating said shutter, so as to cut off the light of the main window during the passage of the title portions of the film through said window, a rotary shutter for the supplementary window, means operated by notches in the main negative for rotating said shutter so as to cut off the light of the supplementary window during the passage of the picture portions of the positive across said supplementary window and means operated by notches in the negative films for varying the luminous intensity of the lamps.

In testimony whereof I have signed my name to this specification.

GEORGES AUGUSTIN SALINS.