April 4, 1939. J. H. SPRAY 2,153,211

COMPOSITE PRINTING OF MOTION PICTURE FILM

Filed March 21, 1935 2 Sheets-Sheet 1

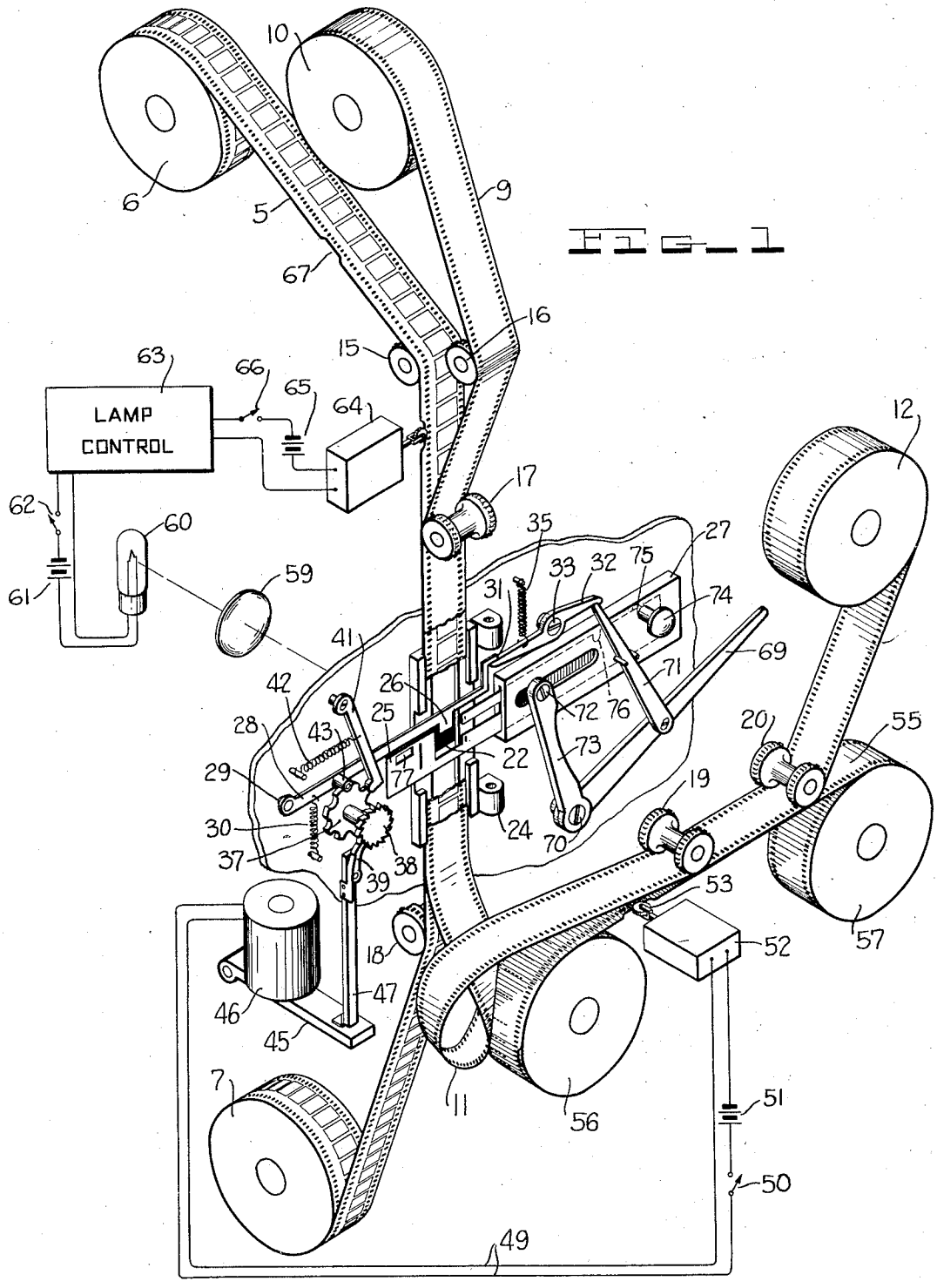


Fig. 1

INVENTOR
Joseph H. Spray
BY Irl R. Gorham
ATTORNEY

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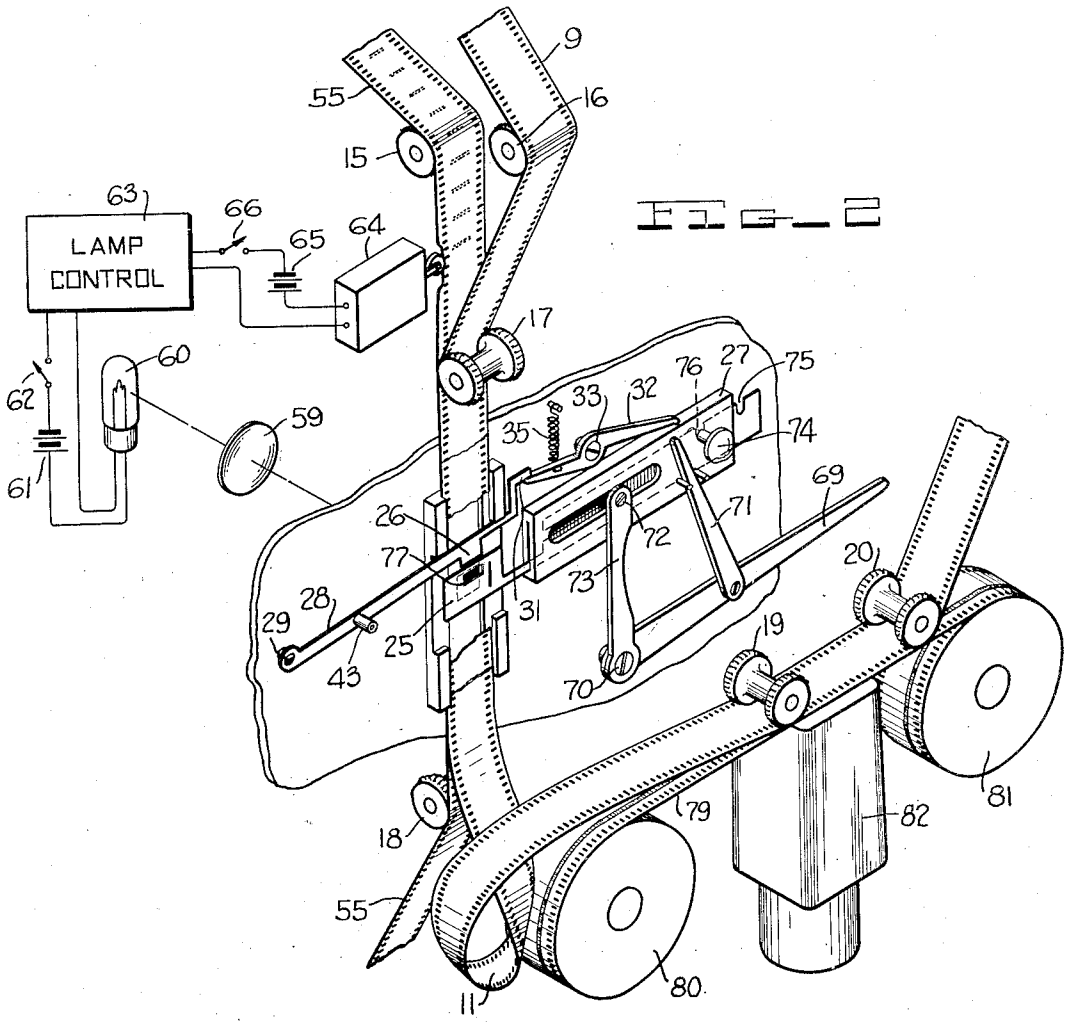


Fig. 2

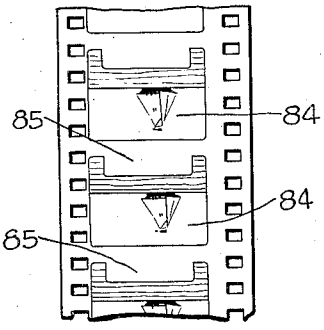


Fig. 3

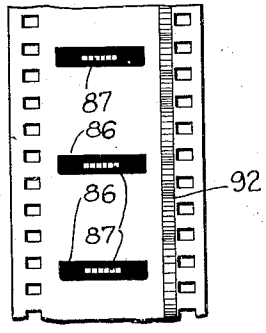


Fig. 4

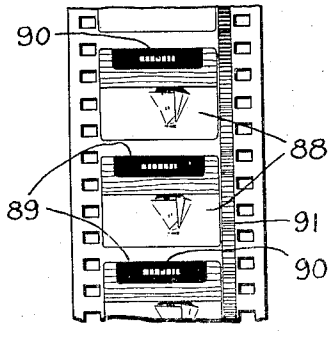


Fig. 5

INVENTOR
Joseph H. Spray
BY Isl R. Goshaw
ATTORNEY

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COMPOSITE PRINTING OF MOTION PICTURE FILM

Joseph H. Spray, Rutherford, N. J., assignor to United Research Corporation, Long Island City, N. Y., a corporation of Delaware

Application March 21, 1935, Serial No. 12,203

6 Claims. (Cl. 95—75)

This invention relates to the production of motion picture positive prints, and particularly to the printing of positive prints wherein a title, which may be dialogue or explanatory words, appears simultaneously in the frame with the picture. Such prints are particularly desirable for use in countries foreign to the one in which the talking motion picture was made as they considerably facilitate understanding and increase the interest of the story by the visual translation of the sound during the picture action. These titles may be repeated in several languages simultaneously, and they may or may not be accompanied by sound. They may be located at the top, sides or bottom of the picture frames to which they relate.

Heretofore the making of positive prints with the titles thereon has been accomplished by a double printing process which is substantially no more than printing the titles on the print over or superimposed on the pictures. If these titles are in white letters, that is, the positive print being transparent where the letters appear, it is realized that in a scene having a light background, it becomes extremely difficult, if not impossible, to read the title. Even though the background is not entirely white, nevertheless the letters may merge with the lighter portions of the scene thus obliterating at least a portion of the title. The same difficulty arises in the event that the titles are in black, since a dark or black background will substantially eliminate the title in this background.

The object of this invention is to overcome these difficulties and is accomplished by reserving certain predetermined portions of the picture frames in which the title is to appear and printing the titles in these portions. The titles, preferably light, may then be given a plain background, preferably dark, each letter of the title therefore, having a sharp and uniform contrast with the background. In making such a positive print the picture and title areas occupy mutually exclusive portions or areas of the picture frames in which the titles appear, the printing of the pictures and related titles being accomplished at different times or points.

In operation, the picture portion may be printed first and the title later, or vice versa. In the first case, at the time the picture is printed, a mask is placed in the picture aperture for blocking the printing light from the blank positive stock where the title is to appear so that that portion of the stock is unexposed. The title is later printed in this reserved area through a title aperture. In the second case, when the title is printed first through the title aperture, the mask blocks the printing light from the areas on which the title has been printed during the printing of the pictures. It is understood, of course, that the blank positive stock is not developed until after both exposures.

The apparatus for accomplishing the above printing process includes a printer with the usual driving mechanism, picture aperture and printing lamp. There is added to these elements, a mask supported on a mechanism for adjusting it in and out of the picture aperture. The control of this adjustment is obtained from the title negative itself which has been previously edited by notching the edges. When this negative is run synchronously with the picture negative and positive stock past a breaker box, well known in the art, the mask mechanism is activated, thus moving the mask in and out of the picture aperture. During the title printing, the notches in the title negative operate a similar breaker box which controls the energization and intensity of the printing lamp for printing the titles. As the title negative preferably has opaque letters on a transparent background, the positive film will have transparent letters on a dark or black background, according to the printing light intensity.

The operation of the apparatus will be more fully understood by referring to the following specification in conjunction with the accompanying drawings in which:

Fig. 1 is a diagrammatic perspective view of the essential elements of the invention in one printing adjustment.

Fig. 2 is a diagrammatic perspective view of certain elements of the apparatus in another printing adjustment.

Figs. 3 and 4 are sections of film showing the latent images impressed on the positive stock by each printing adjustment; and

Fig. 5 is a section of film showing a developed positive print made with the apparatus of Figs. 1 and 2.

Referring now to Fig. 1, a negative picture film **5** is supplied from a reel **6**, and is taken up by a reel **7** after passing through the printing apparatus. Similarly a blank positive film **9**, supplied from a reel **10**, makes a right angle turn at the loop **11**, and is taken up at reel **12**. These films are guided and driven through the apparatus by rollers or sprockets at **15**, **16**, **17**, **18**, **19** and **20**. The emulsion sides of the picture negative **5** and positive stock **9** are brought in contact with one another and remain in contact while intermit-

tently driven through a printing aperture 22 by a pull down mechanism not shown but well known in the motion picture art.

To better explain the fundamental operation of the invention, the films 5 and 9 have been broken immediately above and below the printing aperture, while the pressure plate has been eliminated, this plate being mounted on hinges 24. The size of the printing aperture is controlled by an opaque slider 25, shown in Fig. 1 with its picture printing opening in register with the film. The printing aperture, however, is reduced or restricted by a rectangular mat or mask 26 integral with, or as a separate element attached to, an arm 28 which is pivoted at 29 and under tension of a spring 30. This spring tends to pull the mask in and maintain it in the aperture 22. The arm 28 has an extension 31 which rests on one terminal of a lever 32 pivoted at 33, this lever being under tension of a spring 35 which tends to hold the mask 26 out of the aperture 22. It is to be noted that the lever 32 plays no part in the operation of the mask in and out of the aperture during the picture printing operation, but maintains it out of register with the printing aperture when the mask is not being operated.

The position of the mask 26 is controlled by a pawl and ratchet mechanism consisting of a slotted wheel 37 keyed to a ratchet 38, a pawl 39, an arm 41 under tension of a spring 42, and an extension 43 attached to the arm 28. The pawl 39 is operated by an armature 45 actuated by a solenoid 46, the connection between the pawl and the armature being an extension arm 47. The solenoid 46 is energized over a pair of conductors 49 having a switch 50 and energy source 51 therein, the conductors being connected to a breaker box 52 with its film wheel 53. This breaker box construction may be any well known type. Its operation is controlled by a film 55 which I call a title skeleton. It is supplied from a reel 56 and taken up by a reel 57 and is run through the sound track printing portion of the picture and sound printer although it could be operated on separate apparatus running at the same speed. As shown, it has been previously indexed by cutting notches along the edge thereof for operating the breaker box 52 to control the mask 26 as follows:

With the switch 50 in closed position, the breaker box 52 makes contact and energizes the solenoid 46 when the wheel 53 drops into a notch on the film. This energization of the solenoid causes the pawl 39 to turn the ratchet 38 and the wheel 37 one division. If the mat 26 is already in the printing aperture, as shown in the drawings, this impulse raises the mask 26 by placing the arm 43 on one of the extended portions of the wheel 37 and simultaneously drops the free end of the arm 41 into one of the notches of the wheel. This latter action prevents the wheel 37 from rotating and consequently maintains the mask 26 out of the printing aperture since the arm 43 must remain on the extended portion of the wheel. Upon deenergization of the solenoid 46 the armature 45 drops and the pawl 39 is lowered to the next succeeding notch of the ratchet 38. When the title negative has been run until another notch operates the breaker box 52, the mask 26 is dropped into the aperture 22 by the turning of the ratchet 38 and wheel 37 another division, which permits the arm 43 to drop into a notch and places the arm 41 on an extended portion of the wheel 37.

The above description pertains to the apparatus for placing the mark 26 in and out of the aperture 22. Simultaneously with this operation, the usual printing light control is accomplished through well known apparatus with or without a lens 59, but including a printing lamp 60, an energy source 61, a switch 62, a variable resistance control box 63, a breaker box 64, an energy supply 65, and a switch 66. The control box 64 is actuated by notches 67 in the picture negative which are placed therein in accordance with the density of the negatives to be printed. The variable resistance box shown at 63 may be any type well known in the art having a series of resistance positions for varying the intensity of lamp 60 as contact is made or broken at box 64.

With the apparatus adjusted as just described, the picture portions of the frames are printed, the portion printed being under control of the title skeleton or negative. That is, the notches in the skeleton are so placed with respect to the titles that the mat or mask 26 is positioned in the aperture 22 at the sections of the film where the titles are to be printed in the second running of the positive. The first notch inserts the mask and the subsequent notch removes it, the picture negative and positive stock moving through the printer in the usual manner. It is to be understood that different types and shapes of masks may be operated with the mechanism just described.

The remaining elements of Fig. 1 are perhaps better illustrated in Fig. 2 to which I now refer, identical elements being given the same numbers. In Fig. 2 the apparatus is adjusted for printing the titles in the spaces reserved therefor by the mask 26 during the picture printing operation. The picture printing aperture, as shown in Fig. 1, is exchanged for a title printing aperture, as shown in Fig. 2, by means of a lever 69, adapted to be manually operated. This lever is pivoted at 70 with an intermediate arm 71 for operating the lever 32. The aperture plate 25 is slidable in a sleeve 27 and operated therein by an arm 73 attached to plate 25 at 72. The arm 73 is fixedly mounted to lever 69. The plate 25 is held in its respective position by a pin 74 which fits a notch 75 for the picture printing operation, and a notch 76 for the title printing adjustment. It is to be noted that in the title printing adjustment, the mask 26 is maintained in a raised position out of register with the title printing aperture 77 and in an inoperative condition by the lever 32 under tension of the spring 35. When the picture printing aperture is placed in registration with the film, the lever 71 raises the right end of the lever 32 thus allowing the aperture 26 free operation.

In the title printing operation, the title skeleton 55 is run in the printing position in contact with the blank positive stock 9, the positive running in the same position as before. The breaker box 64 now controls the printing light through the skeleton notches, but in this instance, every other position of the lamp control box breaks the lamp circuit, or in other words, places therein an infinite resistance to extinguish the lamp during the periods when the titles do not occur on the negative. The first notch thus turns the lamp on and the following notch extinguishes it, different lamp resistances being used at the "on" positions if so desired.

The positive stock is now printed with both pictures and title. However, during this title printing operation, the positive may also have printed thereon a sound track from a sound track

negative 79 supplied from the reel 80 and taken up by reel 81, in the usual manner. The positive stock and sound track negative 79 are run in contact with one another past a sound track aperture with the printing light in a housing 82, thus completing the entire printing in the second operation. In the case where the title is printed first, a sound track may be printed at the same time, the complete positive being completed after the picture printing step.

In Fig. 3 the section of film shown represents the result of the picture printing operation at a point where the titles are to appear, the drawing showing a developed positive at this stage for purposes of illustration. This section of film shows picture portions 84 with the reserved spaces 85. When the title is printed first, the section of film in Fig. 4 shows the result in the form of a developed latent image on the positive. In this case the title sections 86 are shown dark and the light portions 87 contain the words of the title, inasmuch as the title negative had dark titles on a light background. The sound track 92 is also printed in this operation.

In Fig. 5 the complete positive film after development is shown having picture portions 88, title portions 89 and the titles 90. The sound track is shown at 91 which completes the positive print, it being understood that all printing operations are completed before any development occurs.

In the above description and in the showing in the drawings, it is to be understood that those parts not shown, such as the driving means for the film, pull down mechanism, and framework, may be any well known type of motion picture printing apparatus wherein the picture is printed in a step by step process at one point and the sound printed continuously at another point. Also the invention is applicable to an optical printer or one of the continuous type. With the invention applied to any type, however, the title negative automatically reserves a space within the picture frame along the proper sections of the film for the printing of the titles and automatically controls the printing light when the titles themselves are printed. The controlling apparatus is positive in its action and the mechanism is substantially foolproof since the mask cannot be operated when the title aperture is in operating register. The apparatus is not limited to the printing of only dark or black backgrounds, but may produce other types of backgrounds depending upon the type of title negative and light intensities used. Furthermore, other inserts besides titles can be printed with this apparatus, as well as prints having more than two components in each frame.

What is claimed is:

1. In a system for printing positive motion picture film from a motion picture negative film, a picture aperture, means for moving said films past said aperture at a certain rate of speed, a mask adapted to be placed in the same portion of said aperture at predetermined intervals during the printing of said picture, and means for controlling the adjustment of said mask, said means including another film, and a breaker switch operated by said last mentioned film, and a ratchet mechanism operated by said switch for placing said mask in said aperture upon one energization and removing said mask upon another energization.

2. An automatic control for eliminating printing of certain areas of a positive at predetermined intervals from a negative film in contact therewith at a printing aperture comprising a lever having a mask at one end thereof adapted to be inserted in the printing aperture, means for removing said mask from said aperture, said means including a wheel having alternate raised and indented portions, means for moving said wheel from a raised portion to an indented portion with a single impulse, said means including an electrical relay, and means for energizing said relay at predetermined intervals for serially removing and inserting said mask from said aperture.

3. A printing mechanism comprising means for forming a printing aperture, a slide containing an aperture of a definite size, a lever having a mask thereon comparable in size to the aperture in said slide, a manually operable lever for inserting said printing aperture having a mechanism for locking said mask in a position without said aperture, said means operable to another position for removing said slide from said printing aperture and releasing said locking mechanism for said mask, and an impulse relay for removing and inserting said mask at predetermined intervals when said slide is without said aperture.

4. In a printing device for printing onto a sensitive film from title and picture negative films, means forming a printing aperture, means for moving said films past said aperture, a pair of masks adapted to be successively positioned in said aperture, means automatically controlled by one of said negative films for positioning in and removing one of said masks from said aperture, manually operable means for positioning in and removing the other of said masks from said aperture, and means interconnecting said manually operable means and said automatically controlled mask for retaining said first mentioned mask out of said aperture while said other mask is in position.

5. Title printing apparatus comprising a picture gate, an arm having a mask adapted in one position to cover a portion of said gate and adapted in another position to be removed from said gate, a pivotal support for said arm, a cam follower for said arm, a rotatable serrated cam for said follower, a pawl and ratchet for operating said cam, an electro-magnet for operating said pawl, and film means controlling said electro-magnet.

6. Title printing apparatus comprising a picture gate, an arm having a mask adapted in one position to cover a portion of said gate and adapted in another position to be removed from said gate, a pivotal support for said arm, a cam follower for said arm, a rotatable serrated cam for said follower, a pawl and ratchet for operating said cam, an electro-magnet for operating said pawl, film means controlling said electro-magnet, and a resilient latch cooperating with the serrations in said cam for impositively holding said mask.

JOSEPH H. SPRAY.