Dec. 18, 1934. C. BONAMICO 1,984,456

SOUND RECORD CINEMATOGRAPH FILMS IN NATURAL COLORS

Filed June 5, 1931 2 Sheets-Sheet 1

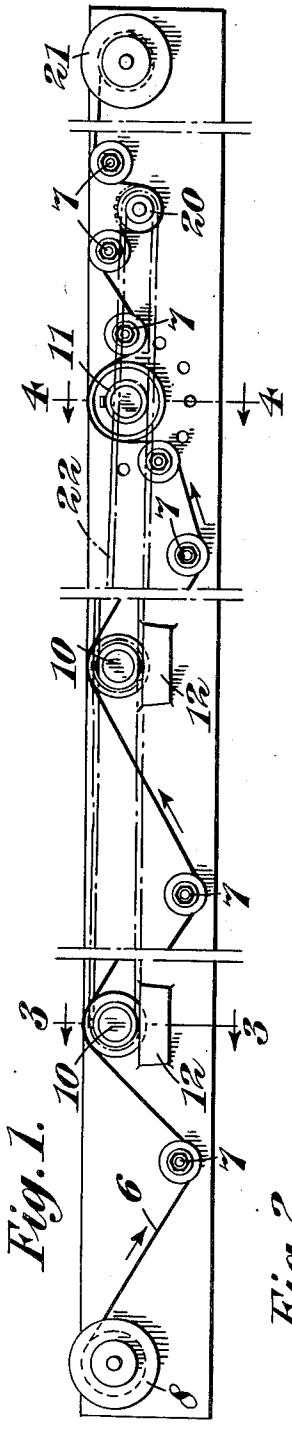


Fig. 1.

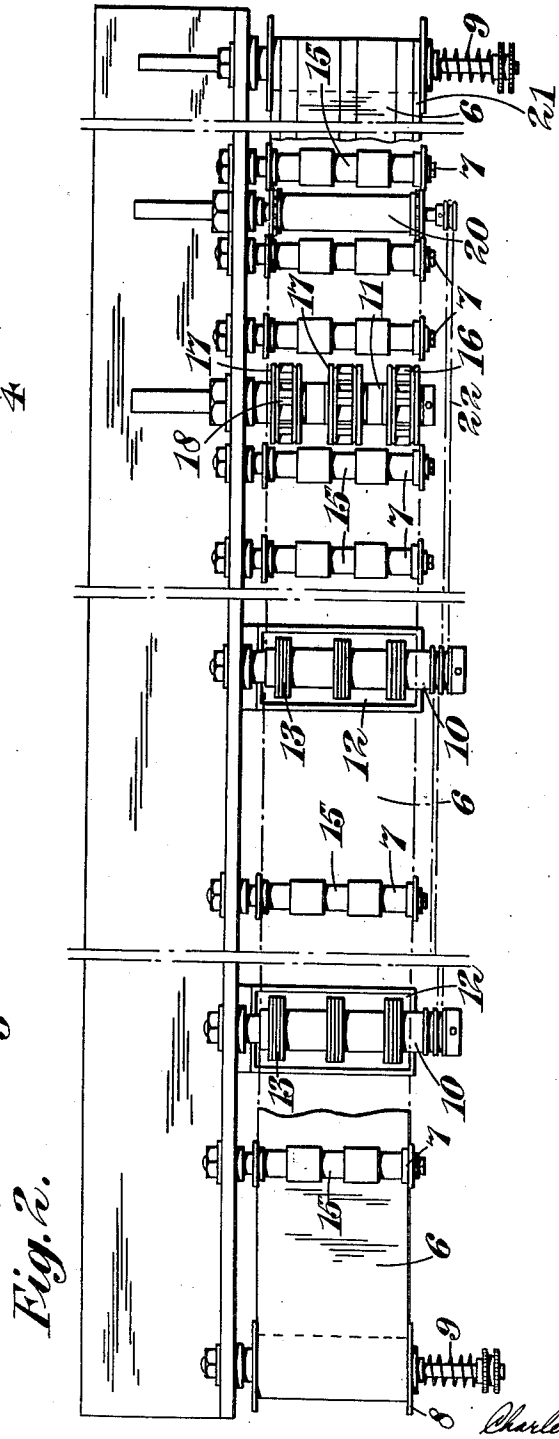


Fig. 2.

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SOUND RECORD CINEMATOGRAPH FILMS IN NATURAL COLORS

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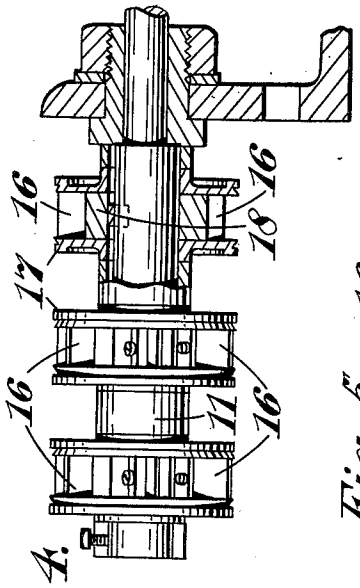


Fig. 4.

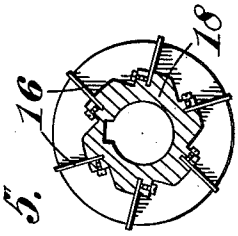


Fig. 5.

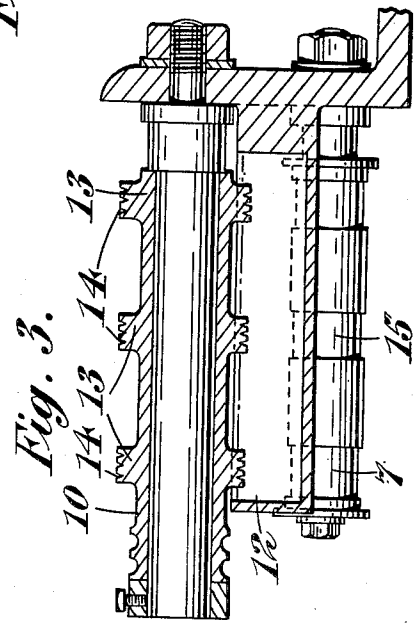


Fig. 3.

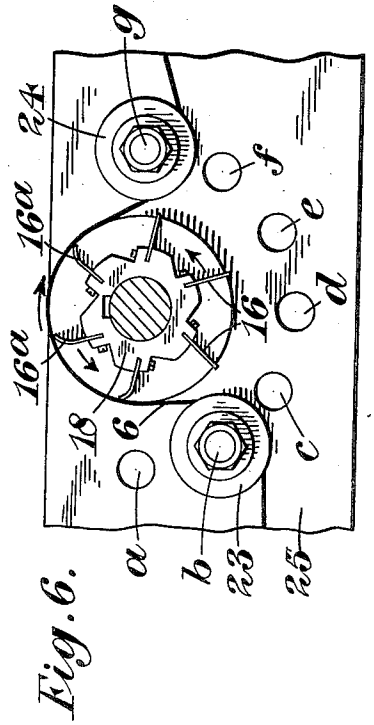


Fig. 6.

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UNITED STATES PATENT OFFICE

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SOUND-RECORD CINEMATOGRAPH FILMS IN NATURAL COLORS

Charles Bonamico, London, England, assignor to Spicers Limited, London, England, a British company

Application June 5, 1931, Serial No. 542,407
In Great Britain June 14, 1930

7 Claims. (Cl. 91—33)

This invention comprises improvements in or relating to sound-record cinematograph films in natural colors.

In sound-record films the sounds are generally recorded on a narrow strip of film, preferably about one-tenth of an inch in width measured inwardly from the sprocket holes and running down one side of the film, this strip of film on which the sound is recorded being known as the "sound track".

In the case of sound-record films in natural colors it is essential that the sound track shall not bear any color screen pattern, as otherwise objectionable sounds will be produced due to the unequal transmission of light by the various dyestuffs constituting the elements of the color screen.

It is the object of this invention to provide a sound-record cinematograph film in natural colors having a clear sound track.

According to this invention a clear sound track is obtained by first applying a color screen to the whole surface of the film, and then removing the color screen from those portions of the film which are to serve as the sound track or sound tracks by mechanical means, such for example as a scraping tool.

Preferably, after applying the color screen to the whole surface of the film, those portions of the surface which are to serve as the sound track or sound tracks are treated with a softening agent such for example as a mixture of butyl acetate and diacetone alcohol before submitting the film to the action of the mechanical means to remove the color screen.

The invention includes apparatus for use in providing, by the above described method, one or more clear sound tracks on a film, on the surface of which is imprinted a multicolor screen, comprising in combination one or more troughs to contain a softening agent, such for example as a mixture of butyl acetate and diacetone alcohol, a roller dipping into each of said troughs, and adapted to apply the softening agent to those portions only of the film which are to serve as sound tracks, and a scraping device adapted to remove the color screen from those portions of the film to which the softening agent has been applied.

According to a feature of the invention the rollers may be provided with circumferential collars adapted to apply the softening agent to the film along a number of parallel longitudinal strips. Preferably, for the purpose of enabling the distance between the adjacent parallel strips on the film to which the softening agent is applied to be varied, the collars are so mounted as to be adjustable along the length of the rollers.

According to a further feature of the invention the periphery of each of the collars is provided with one or more narrow circumferential grooves which tend to retain by capillarity the liquid picked up from the troughs, and thus ensure that an adequate amount of softening agent shall be applied to the film.

In the preferred form of the invention the width of each collar is equal to twice the width of the sound track required on a standard film (said width including the distance from the inside edges of the sprocket holes to the adjacent edge of the film) and the collars are spaced apart by a distance, measured from centre to centre, equal to twice the width f a standard film plus an amount to compensate for the lateral contraction of the film during the subsequent operation of applying a substratum and an emulsion to the film.

The invention includes, in apparatus as described above, the provision of guide rollers for the film located between the rollers associated with the troughs for the softening agent, said guide rollers being provided with circumferential grooves arranged, for the purpose specified, to lie opposite those portions of the film to which the softening agent has been applied.

According to a further feature of the invention the scraping device may comprise a rotating cylinder which carries one or more blades arranged around its periphery, said blades being adapted to register with those portions of the film to which the softening agent has been applied.

Preferably, the scraping device is positively driven in a direction opposite to the direction of travel of the film, at a peripheral speed of about 30 metres per minute relative to the film.

According to yet another feature of the invention, each blade on the scraping device is located between two spacing members on which the film rests during its passage over the device, and the blades project slightly beyond the plane of the spacing members so as to cut into the surface of the film.

The invention includes in combination with the scraping device, two guide rollers, preferably provided with circumferential grooves adapted to lie opposite the softened portions of the film, so mounted as to enable their distance apart to be varied, for the purpose of altering the time of contact of the film with the scraping device.

According to a still further feature of the invention, the film after passing over the scraping

device is engaged by a driving roller, adapted for example to co-operate with sprocket holes in the edge of the film, said driving roller being arranged to draw the film through the apparatus at a speed of about 3 metres per minute.

The invention includes a film strip for use in producing sound-record films in natural colors when produced by the special method described and claimed herein.

A practical embodiment of the invention will now be described in detail by way of example with reference to the accompanying drawings which are diagrammatic only, and in which:

Figure 1 represents a side elevation of the apparatus according to the invention;

Figure 2 is a plan, Figures 1 and 2 are both broken away to save space;

Figure 3 is an enlarged view along the line 3—3 in Figure 1 looking in the direction of the arrows;

Figure 4 is an enlarged view along the line 4—4 in Figure 1 looking in the direction of the arrows;

Figure 5 is a sectional view of the scraper device.

Figure 6 is an enlarged view of the scraper device and its associated guide rollers for the film.

Like reference numerals indicate like parts throughout the drawings.

The film 6, which is preferably a cellulose acetate film, carrying a surface coating of collodion, to which a multicolor screen has been applied by the process described in British Patent No. 322,432, is unwound continuously from a storage spool 8. This spool is provided with a spring friction brake 9 to prevent the film from being unwound too rapidly.

The film is first passed over a series of guide rollers 7 and softening rollers 10. The softening rollers 10 rotate in troughs 12 which contain a softening agent, preferably a mixture of butyl acetate and diacetone alcohol diluted to the required strength with spirit. Acetone may if desired be added to the solution. The softening rollers are provided with a number of collars 13, which dip into the softening solution and apply the latter to the film in a series of parallel longitudinal bands.

In the drawings, for simplicity, only three collars 13 are shown on each softening roller. In actual practice, when treating a film of the normal width, i. e. about 21 inches, seven such collars are generally provided on each softening roller. The collars 13 are provided with narrow circumferential grooves 14, which tend to retain by capillarity the liquid picked up from the troughs 12, and thus ensure that an adequate amount of softening agent shall be applied to the film. Each of the guide rollers 7 is provided with grooves 15, corresponding in width to the collars 13, so that those portions of the film to which the softening agent has been applied shall not contact with the guide rollers.

After passing over three softening rollers 10, the film reaches the scraping device 11. This comprises a rotating cylinder 18 having a number of sets of blades 16 fixed around its periphery. Each set of blades is located between spacing members 17, on which the film is supported whilst passing over the scraping device. The scraping device is positively driven so as to rotate in the opposite direction to that in which the film moves. A convenient relative speed between the blades and the film is 30 metres per minute. The blades 16 are set so as to project slightly beyond the spacing members 17 as indicated in Figure 5. It will be understood that the blades 16 are so disposed that they register with those portions of the film to which the softening agent has been applied by means of the rollers 10. The blades 16 therefore scrape the collodion coating, together with the color screen formed therein, from the film along a series of parallel longitudinal bands corresponding in width to the width of the collars 13 on the softening rollers 10.

Two guide rollers 23, 24 similar in characteristics to the guide rollers 7, maintain the film 6 taut against the blades of the scraping device 11. These blades 16*a* against which the film bears at any instant during its passage over the scraping device are bent backwardly, as shown in Figure 6, so that their edges are just flush with the spacing member 17. A constant pressure is thus obtained during scraping of the collodion film and color screen from the film base, without any danger of tearing or damaging the film base.

In order to obtain the correct time of contact of the blades against the film, and hence an optimum scraping effect, a number of holes *a–f* are provided in the panel 25 on which the rollers 23 and 24 are mounted. By mounting the rollers in different holes, the time of contact of the film with the scraping device may be varied, being a maximum when the rollers are closest together, as at *d* and *e*, and a minimum when they are furthest apart, as at *a* and *g*.

After leaving the scraping device 11 the film, which presents the appearance of a number of parallel color-screen bearing portions separated by narrower clear sound-track portions, passes over further guide rollers, over the driving roller 20, which may if desired be provided with projections to engage corresponding holes in the edge of the film, and is finally wound upon the take-up spool 21.

The driving roller 20 is interconnected by belting 22 with the softening rollers 10, as indicated in Figure 2, and is conveniently adjusted so that the film is fed thorugh the apparatus at a rate of about 3 metres per second.

The width of the collars 13 is conveniently made equal to twice the width of the sound track required on a film of standard width, and the distance between adjacent collars, measured from centre to centre, is made equal to twice the width of the standard film, i. e. about 69.8 mm. The film is then subdivided, by cutting along the middle of the clear sound-tracks and the intervening color-screen bearing portions, into a number of strips of standard width, each having a clear sound track running down one edge.

In order to allow for the lateral contraction of the film during the operations of substratuming and coating with emulsion, it is preferable to mount the collars 13 adjustably on the rollers 10. The lateral contraction during the above operations amounts to about 0.5%, varying with the qualities of the film. To allow for this contraction therefore the distance between the centres of adjacent collars should be made about 70.15 mm.

It will be appreciated that slight irregularities and indefiniteness in the separating edge between the sound track and the color screen coated portion of the film will not be a serious disadvantage, since when making the record on the sound track a mask is employed so as to give a sharp and well defined edge to the track and to protect the color screen portion of the film from the action of the light. The fact that the edge of the color screen portion of the film is slightly ir-

regular will not have any noticeable ill effect on the clearness or definition of the color image when the film is projected.

I claim:—

1. Apparatus for use in producing a clear track for a sound record on a film for natural color cinematography, which comprises in combination a trough for a softening agent, means for feeding the film past the trough, a roller adapted to dip into the trough and to apply the softening agent to a plurality of narrow strips on the film, a scraping device for removing the softened portions of the film and guide rollers for maintaining the film in contact with the applying roller and with the scraping device and having circumferential grooves arranged to lie opposite to those portions of the film to which the softening agent has been applied.

2. Apparatus for use in producing a clear track for a sound record on a film for natural color cinematography, which comprises in combination a trough for a softening agent, means for feeding the film past the trough, a roller adapted to dip into the trough and to apply the softening agent to a plurality of narrow strips of the film, and a rotating cylinder provided with a plurality of blades arranged around its periphery and adapted to register with and to remove the softened portions of the film.

3. Apparatus for use in producing a clear track for a sound record on a film for natural color cinematography, which comprises in combination a trough for a softening agent, means for feeding the film past the trough, a roller adapted to dip into the trough and to apply the softening agent to a plurality of narrow strips of the film, a rotating cylinder, a plurality of blades and two spacing members carried by the cylinder, the blades being located between the spacing members and around the periphery of the cylinder and arranged to project slightly beyond the spacing members and to register with and to remove the softened portions of the film.

4. Apparatus for use in producing a clear track for a sound record on a film for natural color cinematography which comprises in combination a trough for a softening agent, means for feeding the film past the trough, a roller adapted to dip into the trough and to apply the softening agent to a narrow strip on the film, a rotating cylinder provided with a plurality of blades arranged around its periphery and adapted to register with and to remove the softened portions of the film, and means for adjusting the arc of contact between the film and said rotating cylinder.

5. Apparatus for use in producing a clear track for a sound record on a film for natural color cinematography which comprises in combination a trough for a softening agent, means for feeding the film past the trough, a plurality of rollers spaced apart across the width of the film and adapted to dip into the trough and to apply the softening agent to a plurality of narrow strips of the film, and a rotatable cylinder provided with a plurality of blades arranged around its periphery and adapted to register with and to remove the softened portions of the film.

6. Apparatus for use in producing a clear track for a sound record on a film for natural color cinematography which comprises in combination a trough for a softening agent, means for feeding the film past the trough, a roller adapted to dip into the trough and to bear against a narrow strip of the film and to apply the softening agent thereto and having circumferential grooves in its face which bears against the film, and a rotatable cylinder provided with a plurality of blades arranged around its periphery and adapted to register with and to remove the softened portions of the film.

7. Apparatus for use in producing a clear track for a sound record on a film for natural color cinematography which comprises in combination a trough for a softening agent, means for feeding the film past the trough, a plurality of rollers each of width equal to twice the width of clear track required and spaced apart across the width of the film through a pitch equal to twice the width of a standard film plus an allowance for contraction of the film during sebsequent operations, which rollers are so arranged as to dip into the trough and to apply the softening agent to the film, and a rotatable cylinder provided with a plurality of blades arranged around its periphery and adapted to register with and remove the softened portions of the film.

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