March 19, 1957 A. E. KUPRION 2,785,945

PHOTOFINISH APPARATUS AND METHOD

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FIG. 1.

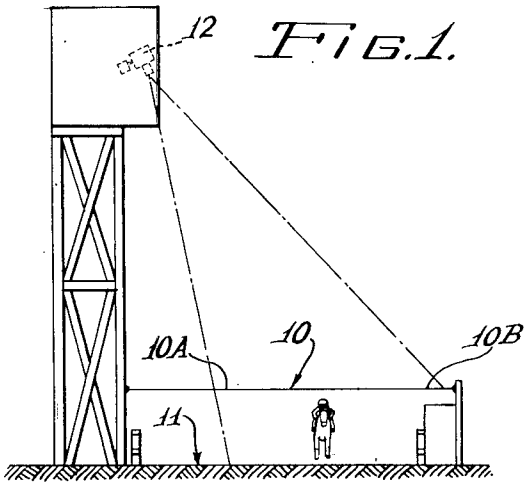


FIG. 2.

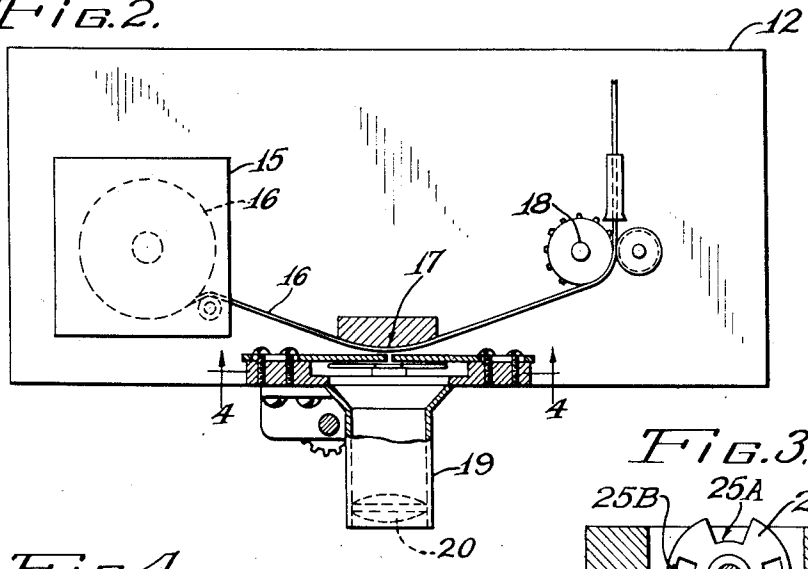


FIG. 3.

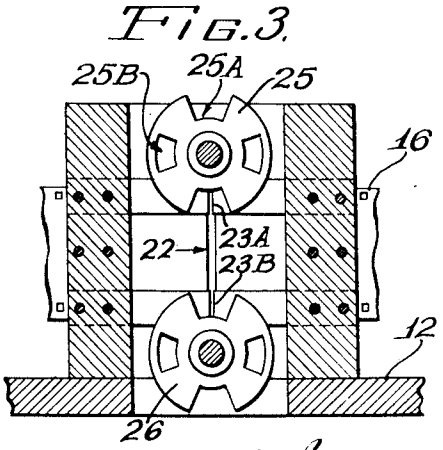
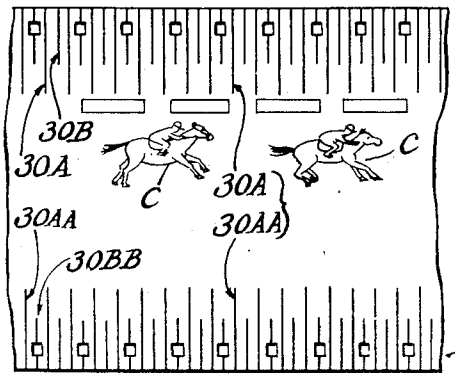


FIG. 4.



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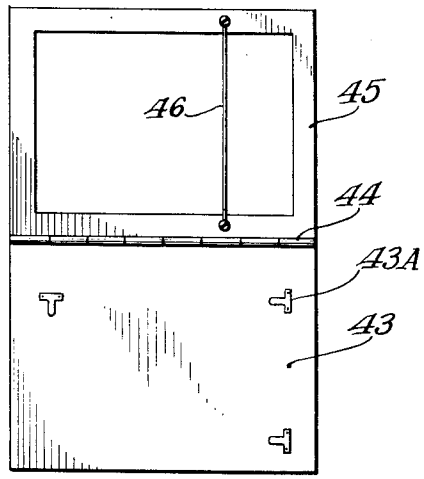
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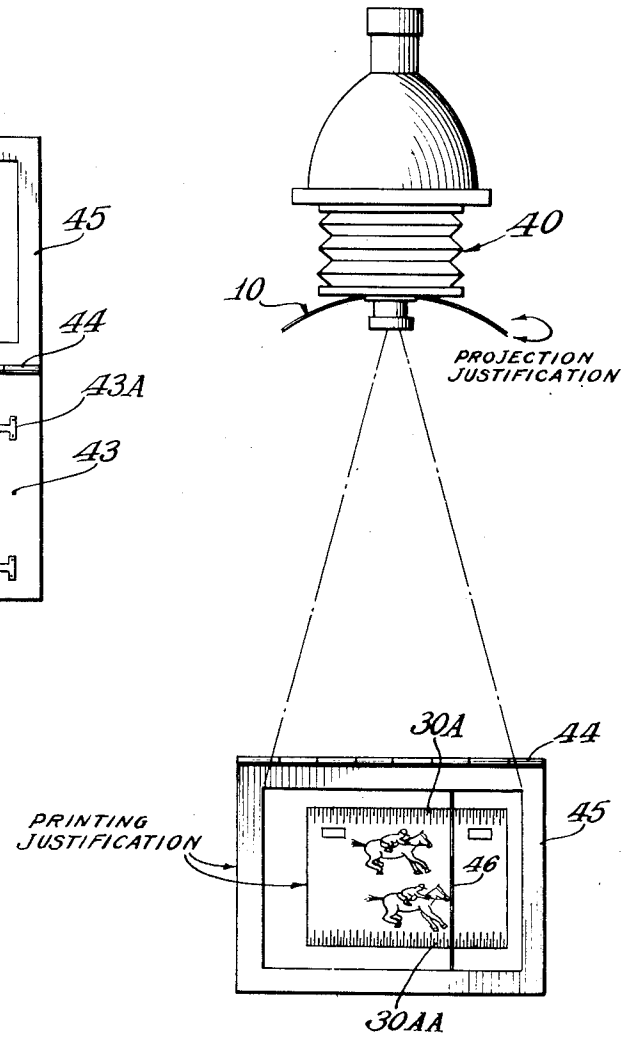
PHOTOFINISH APPARATUS AND METHOD

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FIG. 6.

FIG. 5.





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PHOTOFINISH APPARATUS AND METHOD

Arthur E. Kuprion, Louisville, Ky.

Application August 28, 1950, Serial No. 181,865

3 Claims. (Cl. 346—107)

This invention pertains to a method for preparing photographic records of the finish of a race in which the contestants cross a finish line or the like, the present method being particularly useful in conjunction with the photofinish camera and methods disclosed in my copending application, Serial No. 602,201, filed June 29, 1945, of which this application is in part a continuation.

In the practices heretofore employed in making photofinish pictures, it has been common to make a photographic negative of the finish of the race and then prepare a positive print with what is termed for convenience a "constructed" finish line on the print.

The so-called constructed finish lines are usually superimposed on the print simply as a ruled-in line. It is also known to rule-in such lines on the negative prior to printing to interpose the constructed line photographically on the print.

Problems have been recognized in other methods by reason of the fact, among other things, that such artificially created finish lines either could not be, or deliberately were not, located with the highest accuracy to be truly representative of the actual conditions at the instant the photofinish pictures are taken.

In prior practices, there were no provisions on the reproduced pictures themselves for ensuring accuracy.

Examples of methods for producing artificially constructed finish lines are shown in U. S. Patents Nos. 2,403,911 to Crowley and 2,482,621 to Jones.

According to the present disclosures, a completely accurate photofinish record is made by taking a photograph of the finish of the race in accordance with the teachings of my aforesaid copending application to produce a negative having a series of photographically reproduced images of the ends only of the finish wire as reference marks on opposite edges of the film, such that a straight-edge or a "constructed" line laid across the film in strict alignment with any pair of opposite reference marks, will accurately locate the true position of the finish wire relative to all of the images of the contestants provided such straight edge or constructed line is accurately aligned with said pair of marks.

The present method further provides for making a positive print by projecting the negative with a straight opaque filament or wire stretched across the field of view between the negative and positive to produce a photographic representation of the finish wire on the positive print.

A further step in this process requires the justification of the image of the reference marks relative to the artificial image-forming wire during the positive projection phase to align the image of the constructed line with any pair of photographic reference marks on the negative (and hence in the projected images thereof on the positive paper).

Another step in the justification operation, which is ancillary to the last-mentioned step, is that of adjusting either the negative or the positive image and artificial

finish wire so as to locate the artificial line in touching relation to the leading part (e. g. the nose of the leading horse) of leading contestants, while at the same time keeping the constructed finish line or its image on the positive field in strict rectilinear alignment with a selected pair of said reference marks.

Additional features and objects of the invention will appear as the specification proceeds in view of the annexed drawings, in which:

Fig. 1 is a schematic view of a race track showing the arrangement for making the negative;

Fig. 2 is a cross-sectional view of a camera for exposing the negative;

Fig. 3 is a cross-sectional detail of the means in the camera for imposing reference-mark images of the finish wire on the negative, the view being taken along lines 4—4 of Fig. 2;

Fig. 4 is a fragment of a photofinish negative showing the reference marks;

Fig. 5 is a plan view of the positive-printing frame in open condition;

Fig. 6 is a pictorial representation of the projecting apparatus to illustrate the justifying step.

Referring to Fig. 1, a finish wire 10 is stretched across the raceway 11 in the usual manner, and a special photofinish camera 12 is situated at a height above the wire to include in its field of view the entire useful width of the track or raceway and the opposite end regions 10A and 10B of the finish wire flanking the used area of the track, the view of Fig. 1 being foreshortened crosswise of the track for purposes of illustration.

The camera shown in Fig. 2 includes a magazine 15 for a roll of motion-picture or strip-film 16 which is threaded through the focal plane, as at 17, to a driving sprocket or roller 18 and spooled-in elsewhere (not shown) in the camera.

The camera includes an objective lens means 20 in barrel 19.

As viewed in Fig. 3, aperture means such as disclosed in my aforesaid copending application is interposed between the film 16 and lens means 20, said aperture means including a central slit 22 provided for the mid-region of the film 16; and a pair of flanking edgewise slits 23A and 23B provided opposite the upper and lower edges of the film.

The slit aperture 22 is adjusted to be included in a vertical plane with the finish wire when the photofinish camera is officially installed, so that the field of view is limited to, and inclusive of, the wire itself and a narrow band across the track on either side of the wire.

Opposite the edgewise slits are shutters 25 and 26 each including alternately wide and narrowed apertures or windows as at 25A, 25B; and said shutters are adapted to be rotated by drive mechanism (not shown) associated with the film feed of the camera such that the shutters 25—26 rotate at a predetermined speed relative to the rate of travel of the film 16 to stop (in effect, only) the latter intermittently so as to get so-called still pictures of the stationary end regions 10A, 10B of the finish line with the object of reproducing the reference marks 30A, 30B, and 30AA, 30BB in pairs at opposite edges of the film, Fig. 4.

The reference marks are alternately long and short (e. g. 30A—30B) owing to a difference in width of the shutter windows 25A, 25B, whereby to facilitate matching-up any pair of opposite marks, for example the pair 30A—30AA in the middle of the fragment shown in Fig. 4.

The image of the mid-section of the finish wire 10 is in effect suppressed in the central part of the film wherein the contestants C are to appear, by reason of the

motion of the film past slit **22**; but the contestants are recorded through said slit because the film speed is correlated to the average speed of the contestants to stop the relative motion, so to speak.

The scalar dimensions in the drawing as to the depiction of the refrence marks **30** is exaggerated for legibility.

In making a photofinish proof picture according to the methods herein disclosed, the negative **10** is placed in the usual projector **40**, Fig. 6; and the projector lamp turned on.

A special printing frame or easel of the construction shown in Fig. 5 is placed under the projector lens, as shown in Fig. 6.

The printing frame includes a heavy backing board **43** having hinged thereto as at **44** a heavy metal frame plate **45**.

Stretched across the window of the frame **45** is an opaque image-forming element **46** in the preferred form of a thin taut wire or rod secured by screws countersunk into the inside face of the frame.

The upper surface of the backing board is preferably white or faced with a white mat, and is provided with hold-down clips **43A**.

After placing the photofinish negative (having the edgewise reference marks thereon) in the projector, the next step is to justify the image-wire **46** so that it is in rectilinear alignment or parallel with any pair of said marks. This is done by moving the frame or easel while in the condition of Fig. 6 or by moving the negative in the projector.

The justifying step further requires that the image of the leading contestant or contestants be brought into contact with the wire or the image of the wire, and this is likewise accomplished by manipulation of the frame or the negative as aforesaid.

Actually, these justifying steps are very quickly made, and when made to the satisfaction of the operator, the easel or frame is opened and a piece of sensitized positive paper inserted under the clips, whereupon the heavy frame is closed without disturbing its position, and the exposure made.

The wire or image filament **46** will cause a thin white line to appear on the positive print, and if the justification has been properly made, this line will be in parallelism with all of the opposite reference marks **30** and will frequently be superimposed upon a pair of the marks, so that the rectitude of the constructed finish line can always be checked against all of the reference marks reproduced on the print or the negative, and in this connection all of the reference marks become important since the check for parallelism may be made against any of a multitude of pairs of such marks.

The accurracy of any constructed finish line made according to this method is self-evident, since any such constructed line accurately represents the actual finish wire because the constructed line includes within its own axis the image of the two ends of the wire itself.

Moreover, and very important, is the fact that the positive print can be checked for accuracy by anyone capable of laying a straight-edge across any pair of marks to test the parallelism of the white line which represents the true finish line.

The so-called finish line may be a taust wire stretched well overhead across the raceway or track, or it may be a painted or physical line on the raceway proper, or any linear representation which can be photographed in accordance with the disclosed methods or means for photographically producing a negative with edgewise reference marks such as described and which are images of the said line, wire, or the like.

While I have described a currently practical and satisfactory process which first makes a negative and thereafter makes as many positive prints as may be needed, those skilled in the art of photography will understand that it is possible to make a direct positive and reproduce either paper or film negatives, and such reproduction may likewise employ the aforesaid interposed filament method for constructing an artificial finish line.

The term film is intended to include all suitable sensitized papers, plates, films, or surfaces.

The image-forming filament may be opaque or translucent depending upon whether a dark or light line is required in the constructed finish line.

In practice, the photofinish pictures are generally enlarged prints made from the negative film on which the finish is recorded. It will be understood that a contact print may be made by the aforesaid method using a suitable mask paper to permit manipulation in the line-adjusting or justifying operation.

The method likewise contemplates use of negatives having edgewise reference marks which are artificially produced on the negative by means other then described herein for photographing the ends of the actual finish wire or line.

In general, the term photofinish record as used herein is intended to mean any photographic depiction of the finish of a race in which the contestants pass under or over some form of finish line, wire, or the like, susceptible of photographic recording or visible to the observers.

Often in a dead heat at the finish, there may be several contestants so close to the actual finish line at the end that even a considerable enlargement will not disclose a perceptible lead or difference, and in such cases, it is understood that the aforesaid justifying step in the process is satisfied when any leading part of one or the tied contestants (e. g. the nose of a horse) is brought to contact with the filament or image-forming wire **46**, such contact being a bare touching-upon or tangential type of contact to the image or wire.

Since the wire **46** in the printing frame is desirably very thin and kept as close to the paper as possible to avoid misleading shadows, bringing the contestant into "contact with the wire" is substantially the same thing as bringing it into contact with the image of the wire cast on the paper.

It will be understood further that an image-forming wire **46** may be installed as part of the projector, such a filament being sufficiently fine so that the maximum enlargement thereof resulting from projection printing will not be larger or thicker than the permissible width to appear on the print. In such case the justification will follow substantially the same procedure heretofore described, and the negative may be adjusted in the projector to bring the edgewise reference marks, and finish-line image, and contestants into alignment and contact, as required.

The photofinish picture obtained by this method records the activity immediately adjoining the finish wire as soon as the contestants enter the field of view determined by slit **22**, and the leading contestants are indisputably identifiable and no tinkering with, or manipulation of, the true negative can be effected to produce a fraudulent or inaccurate representation of the positions of the contestants relative to the finish line, since the series of edgewise reference marks depict at all times the actual location of the actual finish line, and no especial skill or equipment is needed to check the parallelism of any constructed finish line with the actual line.

The printing-frame window **45** may be provided with thin glass or the like having the finish-line image-forming means **46** painted or etched thereon.

In making a contact print the justification may be effected by asembling the negative, and the positive paper, in the printing frame with a slip of opaque white masking paper therebetween, and adjusting the position of the assembly relative to the wire **46**, and thereupon sliding the mask paper gently out of the easel for the exposure. If desired, this same masking technique may be employed in projection printing.

In accordance with the method disclosed, an accurate and readily checked photofinish record is made by photographing the contestants as they approach and cross the finish line in the central part of a film, and also photographing onto the opposite edges of the same film a series of reference marks aligned with the finish wire, and thereafter reproducing said record with a constructed finish line justified or adjusted in parallelism with, or actually inclusive of, any pair of opposite reference marks with the leading part of a leading contestant just touching upon the constructed finish line.

The method further discloses steps for making the reference marks completely accurate by photographing opposite end parts of the finish wire itself onto the opposite edges of the record film, and then photographically superimposing on the reproduction a constructed finish line by means of an image-forming filament which is aligned with a pair of the reference marks and the leading contestant, as hereinabove described, as part of the photographic process in making the reproduction.

I claim:

1. In that method of making photofinish records of racing contestants relative to a finish line which comprises making a photograph of the contestants as they approach and cross the finish line, and also photographing reference marks along opposite sides of the same film on which the aforesaid photograph is made with said marks on both sides spaced apart the same distance in the direction of movement of said contestants, and all said marks in parallelism or rectilinear alignment with said finish line, whereby said marks appear in pairs in which one mark on each side of the film will lie in a straight line with another paired mark on the opposite side of the film, and a straight line defined by any said pair of marks will be representative of the true position of said finish line relative to the photographic image of said contestants appearing on the film, improvements comprising: the further step of making a second record having a constructed finish line thereon by photographically reproducing said first-mentioned record with the image of a filament located in the reproduction in alignment with, or in parallelism with, the reference marks of any said pair and positioned relative to the leading part of the image of a leading contestant or contestants.

2. The method of preparing a photographic record of the finish of racing contestants relative to a finish line which comprises making a photographic negative including images recorded thereon of the contestants as they approach and cross said line and in which images of the opposite end regions of the line are recorded thereon and photographically rendered visible and the intermediate portions of the line are photographically rendered not visible, and making a positive from said negative by light transmitted through the latter with a relatively opaque rectilinear filament across said light and aligned with any pair of opposite images of said end regions of the line whereby to include in said positive the apparent image of a photographically constructed finish line which is accurately located and aligned with the actual position of the original line on the negative, and before exposing said positive to said light, adjusting the relative positions of the negative and positive to position the foremost parts of the images of any selected contestant or contestants in touching relation to said constructed line to reproduce a picture of said relative positions in said positive.

3. The method of making a photofinish record which comprises making a negative of contestants at the finish line, said negative having a series of images of only the opposite end regions of the finish line situated along opposite sides of a central field of view in which the contestants appear and in which the portions of said line intermediate said end regions are absent, said images of the end regions constituting reference marks, thereafter making a positive print from said negative by transmitted light and interposing between said negative and positive at the time of printing a straight opaque filament to form an image representing said finish line, and justifying the position of said filament with respect to any pair of said reference marks, and locating the foremost part of the image of a desired one of the contestants into contact with said line image and exposing and developing said print with a constructed finish line imposed thereon photographically.

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