N° 25,161 A.D. 1912

(*Under International Convention.*)

*Date claimed for Patent under Patents and Designs Act, 1907, being date of first Foreign Application (in France),* 29th Jan., 1912

*Date of Application (in the United Kingdom),* 2nd Nov., 1912

*At the expiration of twelve months from the date of the first Foreign Application, the provision of Section 91 (3) (a) of the Patents and Designs Act, 1907, as to inspection of Specification, became operative*

*Accepted,* 22nd May, 1913

COMPLETE SPECIFICATION.

# Improvements in Kinematographic Apparatus for Projection in Natural Colours by the Three-colour Process.

We, La Société des Etablissements Gaumont, of 57, rue St. Roch, Paris, in the Republic of France, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention has for its object improvements in kinematographic apparatus for projection in natural colours by the three-colour process.

It has already been proposed to produce three-colour kinematographic views projecting three images simultaneously and imparting to the band or film displacements corresponding to the height of the three proofs. For this purpose kinematographic apparatus are used which comprise three superposed objectives between which and the film or in front of which the coloured screens are placed.

The apparatus constructed in the manner described may be sufficient for taking pictures but is unsuitable for projection apparatus because it is indispensable for projection to effect very exact adjustment of the objectives in order to obtain exact superposition or registration of the projected images.

These adjustments are as follows:—

(1) The focussing of one of the objectives and the axial displacement of the others for obtaining each image of the same size upon the screen for a given distance.

(2) To turn the objectives slightly about a vertical axis outside the optical centre in order that the homologous points of the images of the film may be exactly superposed upon one and the same substantially vertical line.

(3) To cause the objectives to turn slightly outside the centre around a transverse horizontal axis in order to obtain the required convergence of their optical axes prolonged as far as the screen, in other words for obtaining absolute superposition of the images.

(4) To cause the interval or the relative inclination of the optical axes of the objectives to vary in order to adapt them to the pitch of the film or in other words

[*Price* 8*d.*]

the variable interval between the proofs to be projected simultaneously three by three.

This adjustment can be obtained in the first case by a vertical displacement of the optical axes of the extreme objectives or in the second case by pivoting the said objectives around axes located outside their optical centre.

These adjustments can be obtained with the objective fittings which formed the subject of the British Patent Application of the Applicant Company applied for on the 8th February 1912 No. 3220 and of its Addition of the 30th October 1912, No. 24,873 but it is desirable to supplement them by a fifth adjustment which consists in rotating the whole constituted by the three objectives and their fitting around its axis in such a manner that the three optical axes occupy one and the same plane which coincides with the plane of three homologous points of the images of the film or which is parallel therewith.

This adjustment is essential if the apparatus which serves for taking pictures is not perfectly plumb, that is to say if the optical axes of the three objectives are not in the same vertical plane or if, owing to defective constructions or adjustment, this vertical plane is not parallel with the edges of the film because then a given point of the subject would not occupy the same position upon the three images relatively to the edges of the film.

This adjustment might also be effected by displacing the objectives horizontally parallelly with their optical axis and each of them independently and in the proper direction for obtaining superposition upon the screen.

In cinematographic apparatus for the projection of one-colour-proofs it has been proposed to simultaneously move the condenser, the lens, the source of illumination and the exposure opening with respect to the said proof.

The improvements which form the object of the present invention consist broadly in mounting the entire optical system constituted by the three objectives and the three condensers upon one and the same support adapted to slide vertically in such a manner as to enable the whole to be centred in the vertical direction relatively to the images, then in mounting the three objectives upon this support in one and the same cylindrical fitting so that they can be rotated together around the axis of this fitting, thereby effecting the supplementary adjustment referred to above, these objectives being furthermore arranged in the manner described in the Patent Specifications referred to above in such a manner that the other adjustments enumerated above can be effected.

The invention is illustrated in the accompanying drawing, in which:—

Figure 1 is a vertical section, and

Figure 2 is a plan and partial horizontal section of a portion of a kinematographic apparatus embodying these improvements.

Figure 3 is a side elevation with the portion carrying the objectives removed.

Figures 4 and 5 are respectively a partial longitudinal and cross section of a modified construction.

Upon the plate or slide $I^2$ carrying the objective there is fixed a sleeve or fitting $B^1$ in which a fitting $O^1$ is able to slide; this latter fitting carries at its extremity a socket $A^1$ carrying at its front portion a frame F, the frame F together with the socket being capable of longitudinal displacement. The objective B is immovably fixed and the objectives A and C are mounted in such a manner as to permit of the four adjustments referred to at the commencement of this specification.

The socket $A^1$ which carries the objectives enters with easy friction the rack fitting proper constituted by the two tubes $O^1$ and $B^1$ sliding one within the other and which are operated by means of the rack and pinion system $E^1$ which serves exclusively for focussing.

The socket $A^1$ carries a toothed sector $P^1$ meshing with a screw $N^1$ fixed on a shaft rotating in two bearings $C^1$ and $D^1$ integral with the fittings $O^1$ and ending in an operating knob $K^1$.

An opening formed in the fitting $O^1$ permits of angular displacement of the

sector $P^1$ which causes the fitting $A^1$ on which it is fixed to participate in its movement. It is therefore only necessary to rotate the knob $K^1$ in one direction or the other in order to cause the fitting $A^1$ to rotate in the proper direction.

In the modification illustrated in Figures 4 and 5 the socket $A^1$ carrying the three objectives also enters the rack-fitting proper $O^1$ with slight friction.

This fitting $O^1$ carries two projections $C^1$ and $D^1$ serving as bearings for the shaft $E^1$ of the operating pinion $F^1$ of the rack $I^1$ fixed on the socket $A^1$.

Between these two projections $C^1$ and $D^1$ an opening is formed in the socket $O^1$ to permit of the passage of the rack and of a sort of fork H astride the pinion and the rack and intended to prevent lateral movement of one relatively to the other.

The shaft $E^1$ of the pinion ends on one side in a knob K integral with this shaft.

Between the knob K and the bearing $C^1$ a spiral spring L coiled around the shaft $E^1$ serves to separate this knob from the bearing $C^1$ and to press the knob M against the bearing $D^1$. The other extremity of the shaft $E^1$ ends in a threaded portion upon which the knob M is screwed.

By rotating the knob K in one direction or the other the socket $A^1$ is caused to advance or recede by the intermediary of the pinion $F^1$ and of the rack $I^1$ and focussing can thus be effected.

By turning the knob M in one direction or the other a displacement to the right or to the left of the shaft $E^1$ and consequently of the fork H and of the rack $I^1$ is produced, this movement resulting in a slight rotation of the socket $A^1$.

On the outer portion of the frame F the three fixed coloured screens $A^2$ $B^2$ $C^2$ are mounted in a small readily detachable frame; the obturating disc controlled in the ordinary manner rotates in front of these screens.

As regards the film it travels in the passage $D^2$ and is controlled in such a manner that at each operation it is displaced to an extent corresponding to the height of the three proofs which present themselves simultaneously in a window $E^2$ of adequate height behind which the condensers $F^2$ are mounted in a frame $G^2$ rendered integral by means of an angle piece $H^2$ with the slide $I^2$ carrying the objective or formed in one piece with the latter, in such a manner as to constitute an optical system adapted to move with it and the objectives that it carries with a view to permitting of the framing of the image.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. Improvements in cinematographic apparatus for projection in colours by the three-colour process which consists in fitting the entire optical system constituted by three objectives and three condensers upon one and the same support adapted to slide vertically in the apparatus to permit of the vertical centering of the whole relatively to the images.

2. Improvements in cinematographic apparatus, as claimed in Claim 1 which consists in mounting upon the aforesaid support the three objectives in one and the same cylindrical fitting, in such a manner that the whole can be caused to rotate around the axis of said fitting.

3. A constructional form of a kinematographic projection apparatus as claimed in Claims 1 and 2 consisting of a support adapted to slide vertically on the frame of the kinematographic apparatus and rendered integral by means of an angle arm with a frame carrying three superposed rectangular condensers upon the inner sleeve of which support an endless screw is mounted which meshes with a segment provided with worm teeth keyed upon a sleeve adapted to rotate inside the first and carrying in a rectangular box or frame the three superposed objectives, one of which is fixed in position while the other two (the upper and the lower) are mounted in frames each adapted to pivot around two axes, one vertical and the other horizontal.

4. In a cinematographic apparatus as claimed in the foregoing claims the provision at the front part of the box carrying the objectives of a small readily detachable frame carrying the three superposed screens.

5. A modification of the device of the kind referred to enabling the system constituted by the three objectives to be rotated around the horizontal axis of their common fitting in which the rack integral with the objective socket or sleeve and the pinion controlling it are embraced by a fork through which there passes the shaft of the pinion which is carried by two projections from the outer sleeve in which the objective socket moves and which is provided at its threaded extremity with a nut, the rotation of which produces the transverse displacement of the shaft and consequently by the intermediary of the fork a certain angular rotation of the inner sleeve integral with the rack.

6. Cinematographic apparatus for projecting in natural colours by the three colour process constructed arranged and adapted to operate substantially as described.

Dated this 2nd day of November, 1912.

HASELTINE, LAKE & Co.,
7 & 8, Southampton Buildings, London, England, and
60, Wall Street, New York City, U.S.A.,
Agents for the Applicants.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1913.

A.D. 1912. Nov. 2. № 25,161.
THE COMPLETE SPECIFICATION OF SOC. DES ETABLISSEMENTS GAUMONT.

(2 SHEETS)

SHEET 1.

Fig. 1.

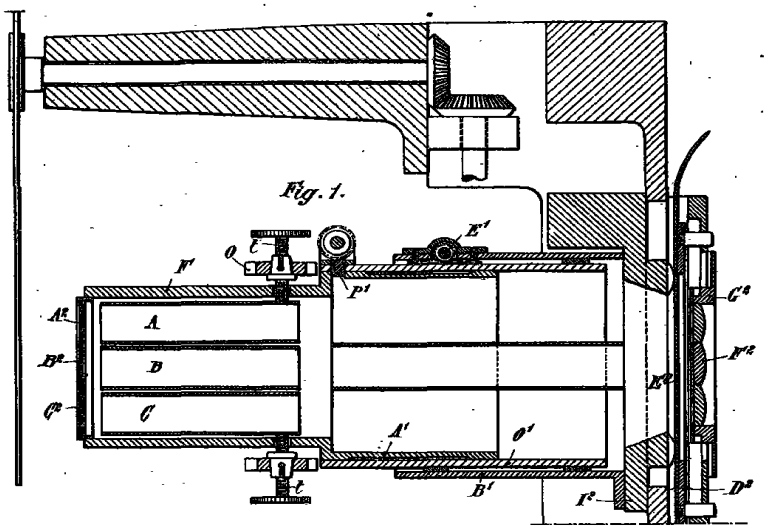
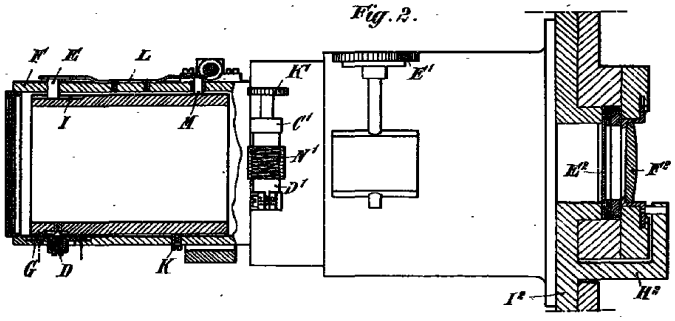



Fig. 2.




SHEET 2

Fig. 3

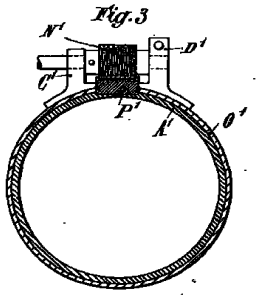



Fig. 5

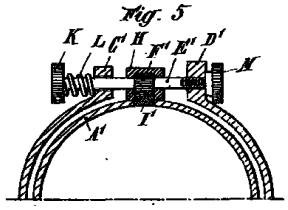
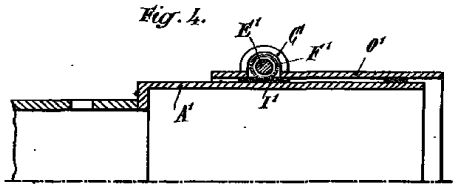



Fig. 4.



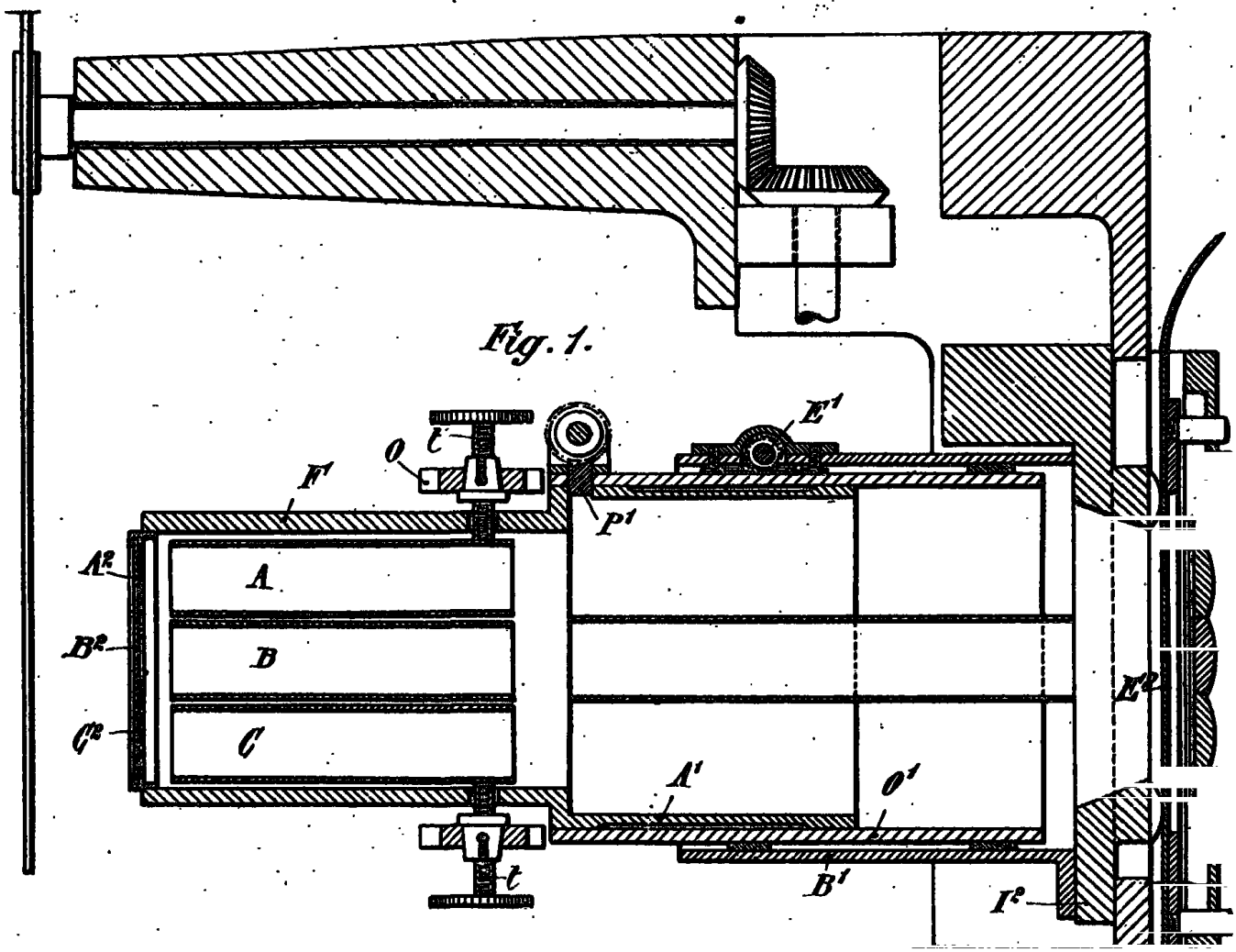



Fig. 1.

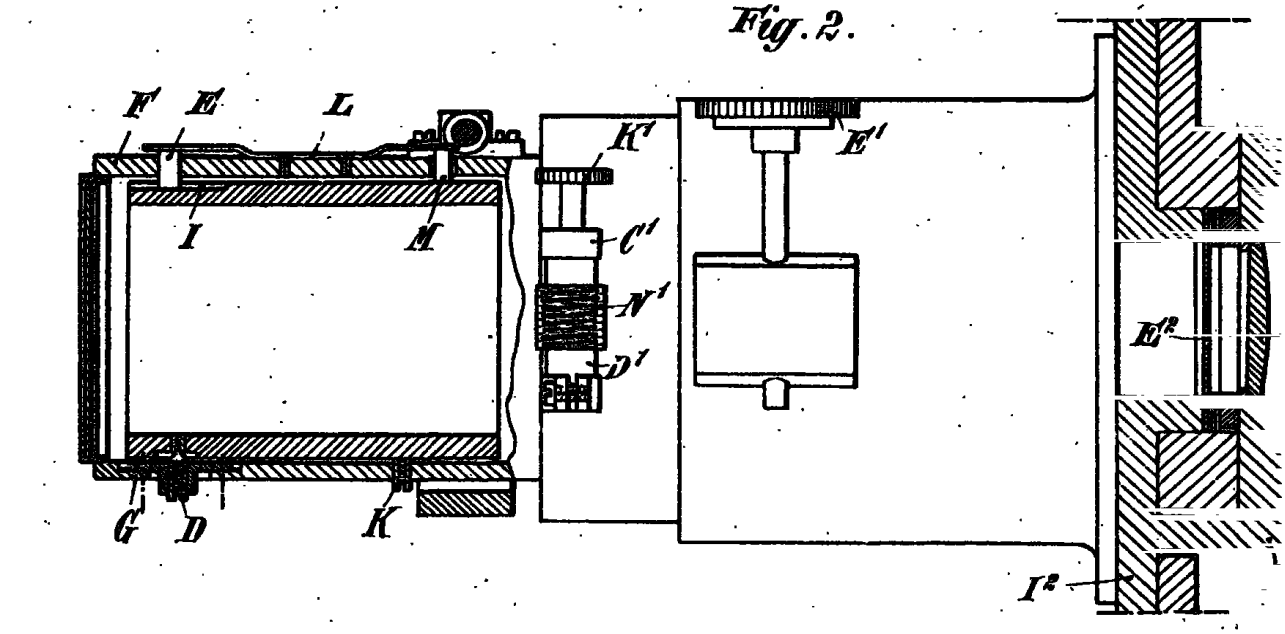



Fig. 2.

Fig. 3

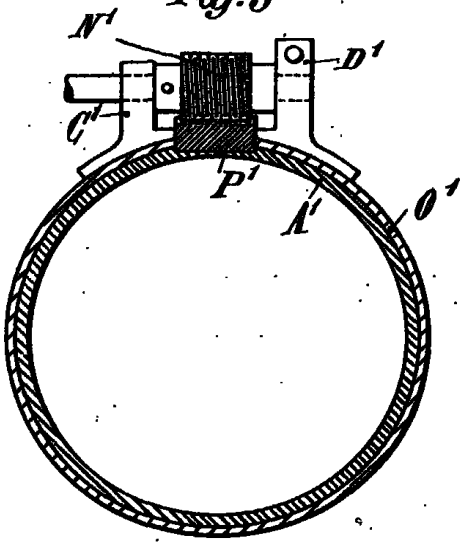



Fig. 5

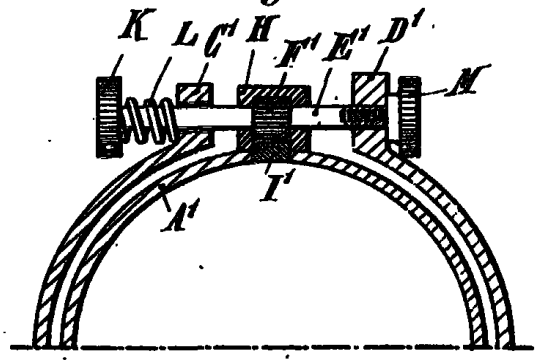
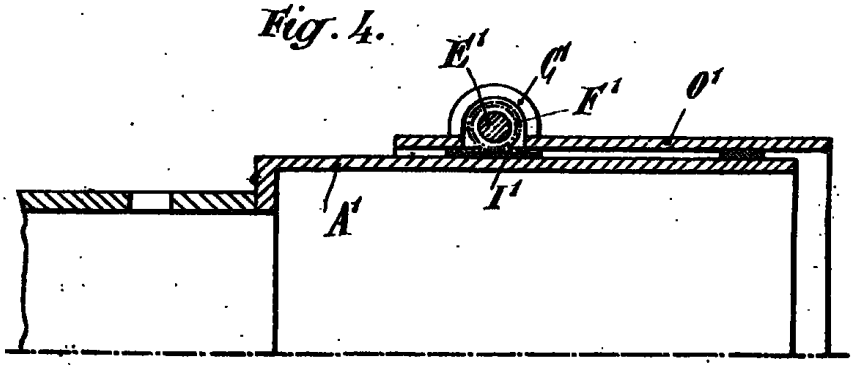



Fig. 4.






Malby & Sons, Photo-Litho.