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[54] **METHOD FOR PREPARING AND CHECKING A PHOTOGRAPHIC CUT WHICH IS TO BE TRANSFERRED TO A SENSITIZED PRINTING CYLINDER, AND MEANS FOR APPLYING THIS PROCESS**

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[52] **U.S. Cl.** **355/77,** 355/40, 355/133

[51] **Int. Cl.** **G03f 9/00**

[58] **Field of Search** 355/40, 46, 77, 79, 355/85, 133; 95/85

[56] **References Cited**

UNITED STATES PATENTS

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[57] **ABSTRACT**

A process for the preparation and checking of a photographic cut which is to be transferred to a printing cylinder consisting in simultaneously projecting on a screen with the aid of a pair of projectors disposed in a plane perpendicular to said cut, a point on the upper edge and a corresponding point on the lower edge of said cut, merging the images of these two points and moving the pair of projectors parallel to the cut in such a way as to project, successively, all points on the upper and lower edges of the cut and an apparatus for carrying out this process.

8 Claims, 6 Drawing Figures

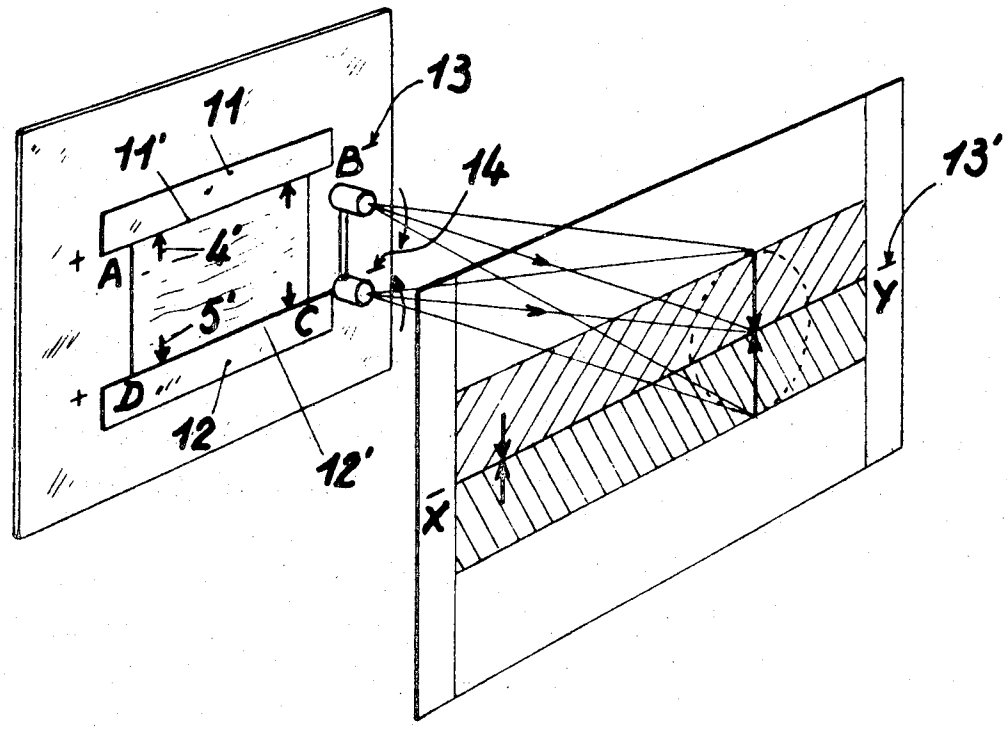

Fig.1

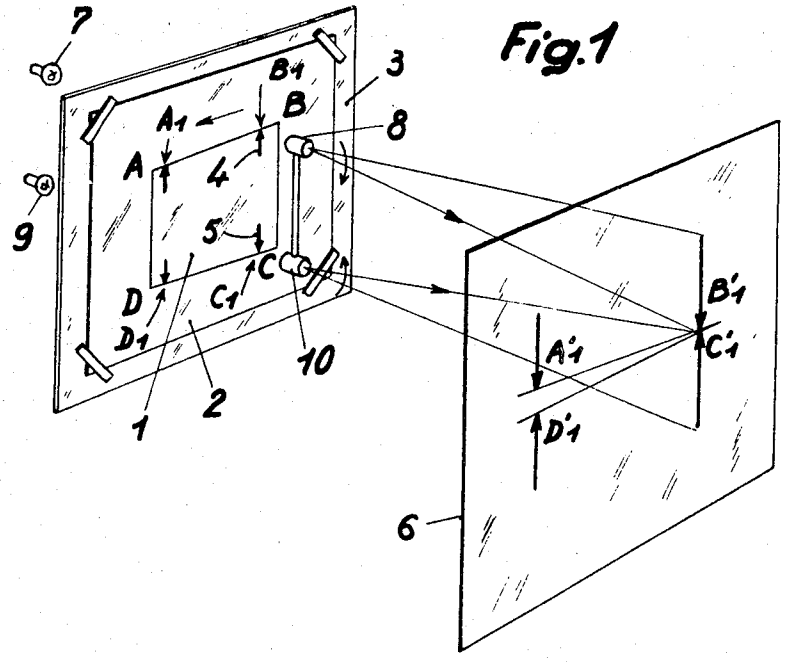

Fig.2

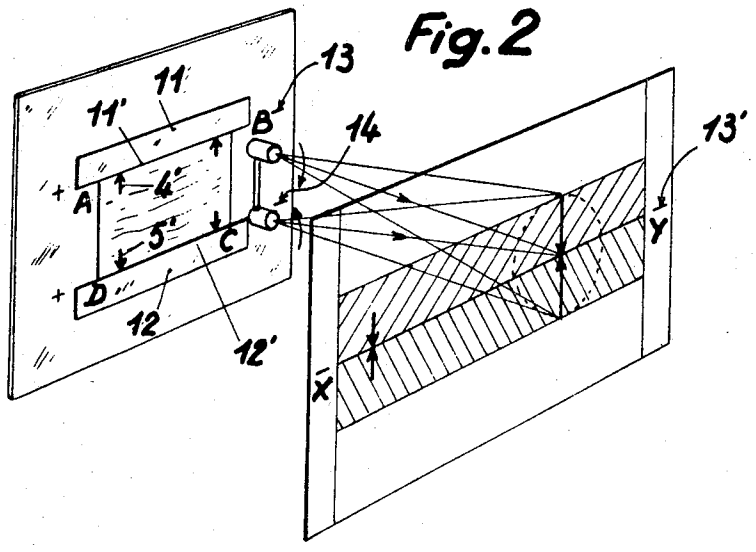

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Fig.3

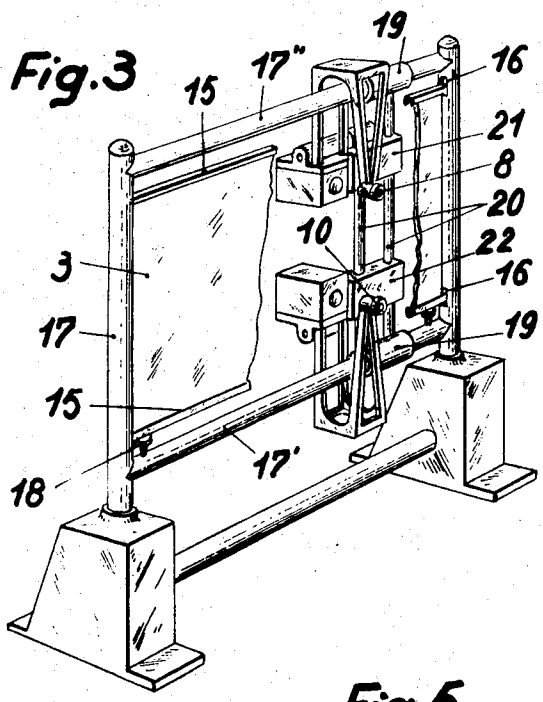


Fig.4

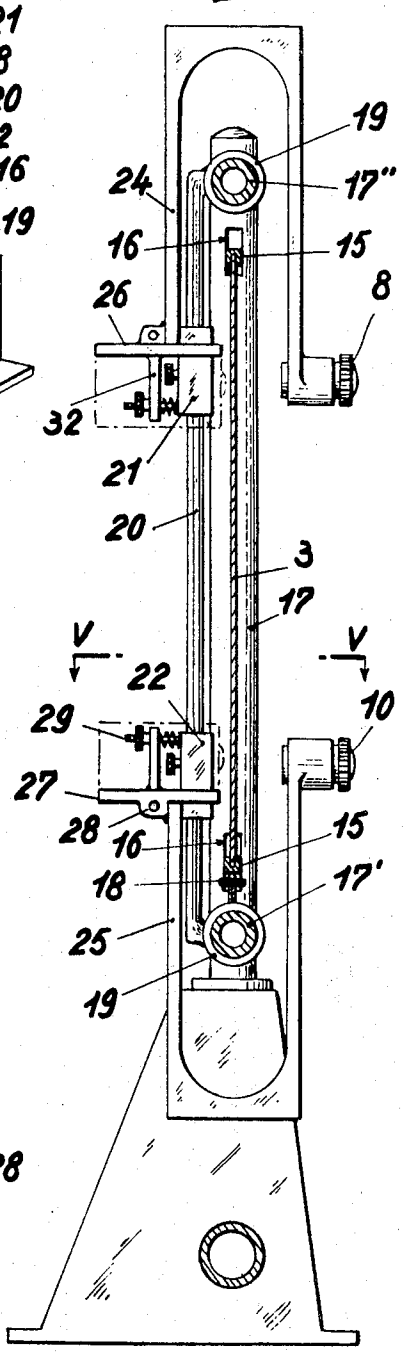
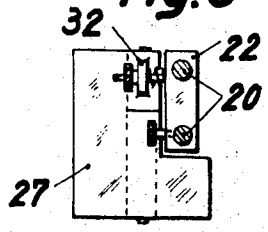


Fig.5



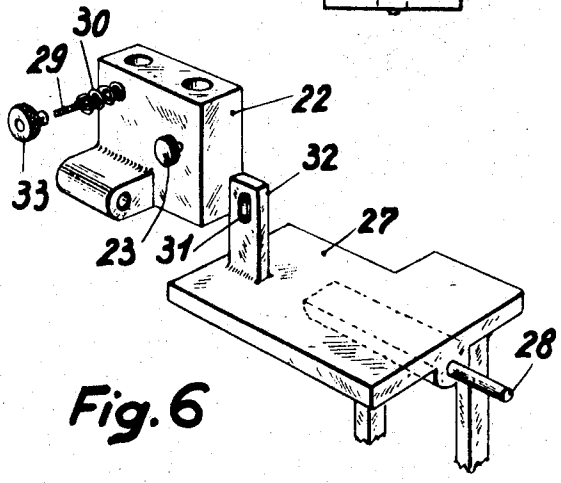


Fig.6

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METHOD FOR PREPARING AND CHECKING A PHOTOGRAPHIC CUT WHICH IS TO BE TRANSFERRED TO A SENSITIZED PRINTING CYLINDER, AND MEANS FOR APPLYING THIS PROCESS

The present invention relates to a method for preparing and checking a photographic cut which is to be transferred to a printing cylinder such as heliogravure, offset, and the like.

At the present time a heliogravure cylinder can be checked only in the final stage of its fabrication, i.e. during the first tests, and the defects which quite often appear are such that they cause the rejection of the said cylinder, these defects being those principally resulting in a discontinuity in the impression.

The discontinuity appears in three different ways for every rotation of the cylinder:

a. interruption of the pattern to be reproduced;

b. transverse offset of the pattern;

c. superposition of the pattern.

These three defects can, moreover, appear simultaneously.

The causes of these defects are due, principally, either to the cut or to the machine transferring them onto the cylinder.

It is the object of the present invention to remedy the inherent defects due to the cut.

The cut, as is known, appears in the form of a rectangular, more or less transparent image whose height is equal to the evolution of the cylinder, and has a wide, fully transparent border.

As a matter of fact, the transition between the upper and lower borders of the cut and its transparent surrounding portion is never sharp, and the two borders are never strictly parallel, hence it is necessary to position two masks in order to remedy these drawbacks. Unfortunately, regardless of the skill of the operator, it is never certain that the two masks, in turn, are strictly parallel. Furthermore, even if it is assumed that this is possible, the cut can be slightly trapezoidal, and in this case a part of the pattern is masked by one of the masks, and, during the transfer to the cylinder, the register is defective.

Such defects are at present practically impossible to check on the cut, and when they occur, the only remedy consists in retouching the cylinder engraving by hand if the defects are not too serious.

Another thing that can happen is a difference in tone between the upper and lower edges, this defect being very prominent in the course of the printing because it appears in the form of a transverse line delimiting two surfaces of different tone.

The preparation and checking process which is the object of the present invention, consists in projecting simultaneously, on a screen, with the aid of two twinned projectors disposed in a plane perpendicular to the cut, a point on the upper edge and a corresponding point on the lower edge of said cut, in merging the images of these two points, and moving the two projectors parallel to the cut in such a way as to project, successively, all points on the upper and lower edges of the cut.

Since each projector provides a reversed image of the object point projected, it will be easy to understand that when a point on the upper edge is projected simultaneously with the corresponding one on the lower edge, and when the two images are made to coincide,

the total image, comprising the images of the surrounding points, is the reproduction on a large scale of the critical zone of the cylinder, i.e. the zone where discontinuities appear if the cut is defective.

By means of this process it is possible to check the cut before transferring it to the cylinder and, optionally, to retouch it. This process also makes it possible to prepare the cut under continuous checking, i.e. to position masks with a great deal of precision, and to mark, on the said cut, references which will subsequently permit positioning it with precision, with respect to the cylinder to which it is to be transferred.

The present invention will be better understood from the following description with reference to the accompanying drawings by way of example only, in which:

FIGS. **1** and **2** are very diagrammatic views in perspective illustrating the essential phases of the method of preparation and checking of the cut,

FIG. **3** is a perspective view of a device for applying this method,

FIG. **4** is an enlarged view in vertical section of said device,

FIG. **5** is a section taken along line V—V of FIG. **4**, limited to the support of the lower projector, and

FIG. **6** is a partial exploded view in perspective of the lower device for merging the images of a point on the upper edge of the cut with those of the corresponding point on the lower edge.

Referring to the drawings, the cut **1**, a conventional one, presumed to be rectangular, and delimited by its apexes ABCD, is provided with a transparent border **2**, and is applied against a surface, likewise transparent, constituted by a transparent glass **3**.

It is assumed that the patterns to be reproduced are constituted by arrows **4** and **5** disposed in such a way that, in the course of the printing with the aid of the engraved cylinder, arrows **4** and **5** will be opposed by their point.

It is also assumed that all points of arrows **4** lie on the edge AB of the cut, and all those of arrows **5** on the edge DC.

If the cut is perfect, sides AB and DC are parallel and each arrow **4** is matched by an arrow **5** lying on a line perpendicular to the sides AB and DC. One goal of the invention consists in verigying these two points.

With this in mind, a point B on side AB is projected on a screen **6** with the aid of a projector symbolized by its light source **7** and its lens **8**, the said projector being displaceable along a straight path parallel to cut **1**.

Then, with the aid of a second projector, likewise symbolized by its light source **9** and lens **10** analogous to the preceding, a point C_1 of side DC is projected on screen **6**, the two projectors being linked in translation, and the axes of their lenses defining a plane perpendicular to their direction of displacement.

By a suitable inclination of the axes of the lenses in the plane which they define, the images B'_1 and C'_1 of points B_1 and C_1 are made to coincide, then the two projectors are displaced.

If the sides AB and DC of the cut are parallel, every image of some other point on edge AB will be matched by an image of some other point on side DC which will coincide with the said first image.

But, for example, if side AD of the cut is smaller than BC, the images A'_1 and B'_1, corresponding to points A_1 and D_1, will be separated by a space (FIG. **1**).

It can also happen that sides AB and DC are parallel, but that the points of one of the arrows do not lie on the corresponding side. In this case images B'_1 and C'_1 will be separated by a space. Now that the defect is revealed, it is immediately possible to retouch the cut to remove it and the same is true if examination reveals a difference in tone between edges AB and DC of the cut.

The positioning of masks **11** and **12** presents no difficulty if the cut is perfect, and the procedure is exactly the same, i.e. edge **11'** of the mask **11** is merged with side AB of the cut, and edge **12'** of mask **12** with side DC, if we check on the screen, by displacement of the projectors, that the images of the lines formed by the edges **11'** and **12'** of the masks have merged.

But, if sides AB and DC are not parallel, the positioning of the masks in such a way that their edges **11'** and **12'** are parallel, runs the risk of masking a part of the pattern.

Thus, with reference to FIG. **2**, and assuming that side AD is larger than side BC, and that side DC is perpendicular to the plane defined by the axes of the lenses, the images of the points of arrows **4'** and **5'** will not coincide since the edge **11'** of mask **11**, disposed parallel to edge **12'** of mask **12**, will mask the point of arrow **4'**.

These defects can be eliminated by retouching the cut and simultaneously checking the image obtained on screen **6**.

Since the edges **11'** and **12'** of the masks delimit the cut, it can be useful to materialize their prolongation on the transparent surrounding of the cut so as to dispose reference marks which allow high precision of later positioning of the said cut, with respect to the cylinder to be isolated.

With this in mind and with the aid, for example, of a stylet, whose point lies against the cut, a line **13** is drawn on the transparent surrounding in the prolongation of edge **11'** of mask **11**, and at the same time a check is made that the image **13'** of this line lies in the prolongation of the image line *xy* of the edges **11'** and **12'** of the mask.

Then, on the same side, a second line is drawn on cut **14** in the prolongation of edge **12'** of mask **12**, and a check is made that the image of this line on the screen merges with image **13'**.

An operator can, of course, start the operation again for the other side of the cut.

Now a device for the application of this method will be described and the components cited above will retain the same reference marks.

Referring to FIG. **3**, glass **3** is held at the top and bottom by two crosspieces **15** whose ends extend into openings **16** in the vertical sides of a frame **17** which can be held in a substantially vertical plane.

The lower side **17'** of frame **17** has, at each end, an adjustable screw **18** for changing the inclination of crosspieces **15** with respect to the sides of the frame for reasons which will appear hereinafter.

On each of the sides, upper side **17''** and lower side **17'**, of the frame **17**, a sleeve **19** can slide. Sleeves **19** are joined by two crossbraces **20**, disposed perpendicularly to the upper and lower sides of frame **17**. Crossbraces **20** insure the guidance of identical slides **21** and **22**, each of which can be immobilized by means of a screw **23**. Slides **21** and **22** are made integral with one end of support arms **24** and **25**, respectively, and which arms are in the form of a U, the branches of which extend on either side of glass **3**. The middle part of support **24** lies above the upper edge **17''** of frame **17**, while that of support **25** lies below the lower edge **17'** of the said frame.

The lens **8** of the projector is fixed at the end of the branch of support **24** extending between the glass and the screen, while lens **10** is fixed on the corresponding branch of support **25**. The ends of the other branches of supports **24** and **25** are made integral, respectively, with platens **26** and **27**, on each of which is fixed, respectively, the lighting device of each of the projectors.

Platens **26** and **27** are connected, respectively, to slides **21** and **22** by means of axis **28** which allows them to pivot.

The pivoting of each of the supports with respect to its slide is limited, for example, as follows: each slide has a threaded pin on which is mounted a spring **30**, extending beyond an opening **31** in a tab **32** of the corresponding platen, and receiving a nut **33**. Springs **30** tend to pivot the supports so that the axes of lenses **8** and **10** converge, but, by acting on nuts **33**, it is possible to vary this convergence so that the images projected on the screen will merge as described above.

This device works as follows: the cut is fixed on glass **3** by means for example, of adhesive tongues, then a projector is turned on, the upper one, for example, and the mobile apparatus is displaced so as to verify that the edge AB of the cut is parallel to the horizontal sides of the frame; the parallelism can optionally be rectified by acting on either of screws **18**.

Then the mobile assembly is shifted toward side BC of the cut, and the slides are adjusted according to the height of the said cut, and are immobilized on crossbraces **20** by means of screws **23**.

At this moment the two projectors are turned on simultaneously and, by acting on nuts **33**, the axes of lenses **8** and **10** are made to converge in such a way as to bring the images of points B_1 and C_1 into coincidence, springs **30** serving as brakes by applying tabs **31** against the said nuts.

At this moment, the adjustment of the device is made, and the preparation and control of the cut can be executed according to the method described above by sliding the mobile apparatus constituted by sleeves **19** and crossbraces **20**.

The present invention is not, of course, limited to the method of embodiment described and represented; on the contrary it extends to all variants of form, material and size. Thus, for cuts of large size, the fixation of the cut against the glass can be improved by aspirating the center of the latter through orifices in the said glass.

What I claim is:

1. A method for preparing and checking a photographic cut with a transparent border, designed to be transferred to a printing cylinder, consisting in, simultaneously projecting on a screen, with the aid of two similar projectors, a point on the upper edge of the cut and the corresponding point on the lower edge of the cut, causing the images of these two projected points to coincide on said screen, displacing said two projectors parallel to the cut to project, successively, all points on the upper and lower edges of the cut, manually retouching the cut to correct the same and thus the total image obtained on the screen of the cut if the image shows discontinuities, next fixing masks along the lower and upper edges of the cut so that the images on the

screen of the edges of the masks will be merged, manually retouching the cut to correct the total image when said image again shows discontinuities, providing lines on said transparent border surrounding the cut which are the prolongations of the edges of the masks, and projecting said lines on said screen to determine if the images of these two lines are merged, and are in the prolongation of the image of said two edges of the masks.

2. A device for preparing and checking a photographic cut designed to be transferred to a printing cylinder comprising, in combination, a glass on which the cut to be checked and prepared can be detachably mounted, a frame supporting said glass vertically and having at least two parallel sides, connected slides slideably mounted on said two parallel sides of said frame, a pair of projectors each adjustably connected to one of said slides, means carried by said slides for adjusting the position of said projectors relative to said glass and means on said frame for adjusting the position of said glass thereon.

3. In a device according to claim **2,** wherein said slides includes sleeves each slideable mounted on a different one of said two parallel sides of the frame, at least one cross-brace, disposed perpendicular to said frame sides and connecting said sleeves and two slides slideably mounted on said cross-brace, and each slide supporting a light source of one of said projectors on one side of said glass, and a lens of one of said projectors on the other side of said glass.

4. In a device according to claim **3,** wherein said slides also includes U-shaped pieces each integral with a corresponding one of said sleeves, the branches of said U-shaped piece extending on both sides of said glass and supporting one of said light sources on one side of said glass, and one of said lens on the other side of said glass.

5. In a device according to claim **4,** wherein said sleeves are disposed behind said glass.

6. In a device according to claim **4** wherein said projector adjusting means includes platens each integral with the corresponding end of one of said U-shaped pieces on which a projector is mounted, and means to articulate said platens along an axis parallel to the direction of displacement of said slides.

7. In a device according to claim **6,** including a threaded pin on each slide, a spring on each pin, a tab on each platen, said tab having an oblong opening with said pin extending therethrough, and an adjusting nut on said pin for compressing said spring and vary the inclination of said platen.

8. In a device according to claim **2,** including uprights on said frame cross-pieces supporting the upper and lower edges of said glass, oblong openings in said uprights of said frame with the ends of said cross-pieces therein, and said glass adjusting means comprising two screws in threaded engagement with one of said frame parallel sides with the heads of said screws supporting the lower of said cross-pieces.

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