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SENSITOMETER

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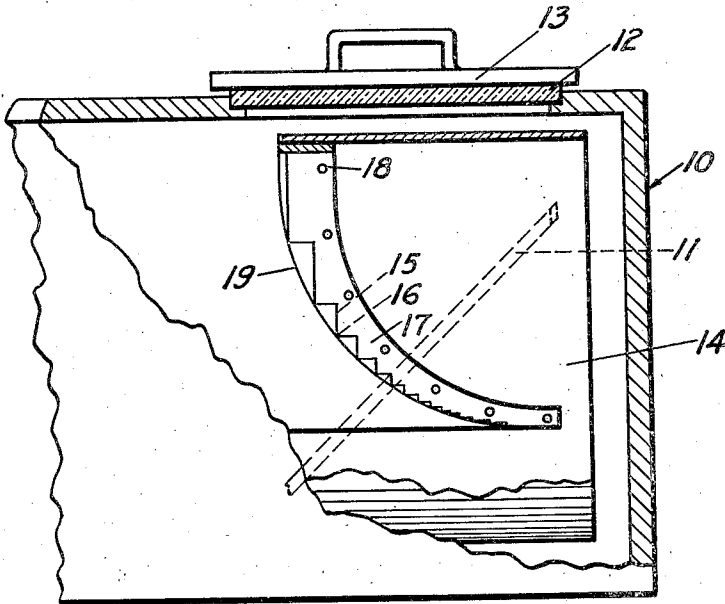


FIG. 1.

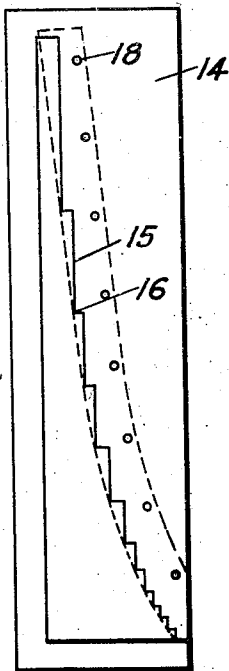


FIG. 2.

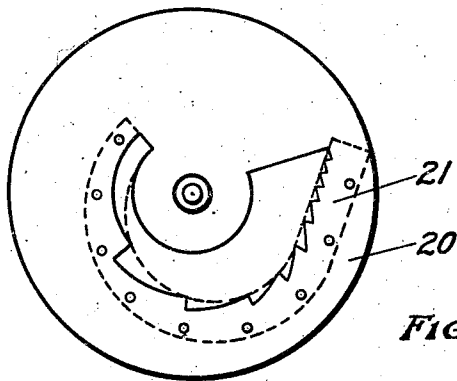


FIG. 3.

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SENSITOMETER

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3 Claims. (Cl. 95—10)

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This invention pertains to the art of photographic sensitometry and concerns a method and mechanism for converting time-scale sensitometers adapted to produce stepped exposure strips to a type for producing continuously modulated exposure strips.

In the art of sensitometry, the use of stepped strips has become very common while continuously varying or continuously modulated strips are rarely used, and in all cases where such strips are employed, they are exposed in accordance with variations in light intensity rather than variations of time of exposure. For most purposes the stepped strips are more desirable, or at least serve very satisfactorily, but when interpreting such strips in a recording instrument such as a recording densitometer, stepped strips are far from satisfactory; and in fact, a recording instrument will give only very approximate or entirely unsatisfactory results with such strips. Recording instruments do function very satisfactorily with the continuous-type strips, but since those are not now made except with intensity-scale instruments, that would require a very extensive conversion of existing equipment if recording densitometers were to be employed more generally.

In solving the problem outlined above, a method and means for converting time-scale instruments of which there are a great number in use, makes it possible to convert to recording-type densitometers but to expose continuously modulated strips on existing time-scale instruments. This change is effected without destroying the original identity of the time-scale sensitometer, and the mechanism herein described may be employed for rapid conversion of an instrument to production of continuous strips, and again, allows reconversion of the machine to its original form.

Time-scale instruments, of which there are a great number, generally function by directing light rays against a sensitized strip of standard shape and size, and the light falling upon the strip is modulated lengthwise of the strip in accordance with a series of exposures of varying lengths of time. Normally, there are twenty-one steps, each varying in accordance with a predetermined increment of exposure time so that beginning with the minimum exposure, each succeeding step will have $\sqrt{2}$ times as much exposure as that preceding. To accomplish this, the light-modulating means or time-of-exposure varying means is logarithmically stepped.

According to the invention, a mask is provided for the stepped exposure aperture, and that mask

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is so shaped as to cover the steps thereby to prevent the production of a series of distinctly different exposures each of which varies by a substantial increment from that preceding. This mask is curved to follow the points of the logarithmic steps of the exposure aperture. Accordingly, a logarithmically curved contour of the exposure aperture will thereafter modulate the light falling upon the sensitized strip and will cause that strip to have an infinitely great number of independent exposures, each varying slightly from the preceding, applying to it along its length. It will vary in density accordingly, that is, by a continuous rather than stepped variation.

The mask is preferably attached to the exposure disk or cylinder, or the like, and such attaching means as is used is preferably of a type to permit easy and quick conversion to and from one system or the other. The invention will be described in detail with respect to one specific embodiment thereof as outlined in the accompanying figures of drawing in which:

Fig. 1 is a section through part of a time-scale sensitometer to which the invention has been applied.

Fig. 2 is a developed view of the rotating cylinder, the exposure aperture therein, and the mask as applied thereto.

Fig. 3 is a view showing the invention as applied to a similar instrument but one having a disk rather than a cylinder for timing the exposures.

Now referring to Fig. 1, so much of a typical time-scale sensitometer has been shown as is necessary for illustrating the application of the invention thereto. The instrument includes a casing generally indicated by numeral 10, and at the opposite end, has a light source which is directed upon a reflector or mirror 11 from which rays of the light are directed upwardly through a window 12 and against a sensitized strip (not shown) which is held in position by a platen 13. A cylinder or drum 14, part of which is cut away in this view, rotates under power and at a predetermined speed. The cylinder has an opening therein which is defined at one side by a line cut by a plane perpendicular to the axis of rotation for the cylinder (see Fig. 2). The opposite side of the aperture is defined by a series of steps indicated by numeral 15 and having points 16. These steps, twenty-one in number according to standard practice, are logarithmically varied, the longest being adjacent the first-mentioned side of the aperture while the shortest step limits the

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exposure at the opposite side. Part of this aperture is shown in Fig. 1, and since the instrument is one well known to the art, further description at this point is not necessary.

To effect the exposure of a continuous type strip, a mask 17 is applied either to the inside or to the outside of the rotating cylinder or drum. This mask is to be attached by a plurality of connecting elements 18 such as screws or some other detachable connecting means. The mask is so shaped that the edge or contour 19 follows the points 16 of the steps so that the steps themselves are completely covered, but the curve in following the points of the steps will produce on the sensitized strip a corresponding logarithmically varying exposure thereby to vary the density along the strip from a corresponding maximum to a corresponding minimum such as would have been produced by the stepped aperture, but wherein all intermediate points along the strip will vary continuously or by infinitely small increments.

In Fig. 3, a modification has been illustrated in which the invention is applied to that type of time-scale sensitometer employing an exposure disk 20 rather than a cylinder or drum. Here the aperture has a corresponding series of exposure-varying steps. Instead of being parallel to a straight line at one side of the aperture, these steps are made up of parallel concentric arcs cut at appropriate points by radial lines logarithmically spaced. A mask 21 is attached by similar connecting means to one side of the disk, and corresponds to that above described in that it covers the steps and has an exposure-determining contour which follows the points of the steps, i. e., is logarithmically curved.

The invention has been described as applying to sensitometers adapted to expose the standard strips, but it is to be understood that it is applicable to any of the instruments primarily constructed for exposing stepped strips and on which

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it may be desirable to produce similar strips modulated by continuously varying the time of exposure. Certain examples have been cited as to the form which the invention may take, and advantages flowing therefrom have been enumerated; but it is to be understood that other constructions will naturally occur to those skilled in the art and that the use of the invention is not by any means limited to only those advantages here cited. The inventive concept may be carried out in a number of ways. This application is, therefore, not to be limited to the precise details described but is intended to cover all variations and modifications thereof falling within the spirit of the invention and the scope of the claims.

I claim:

1. Means for converting a time-scale sensitometer having a stepped exposure aperture to one adapted to produce continuously modulated strips, including a mask for covering the aperture steps, and means for securing the mask in position over the said steps.

2. Means for converting a time-scale sensitometer having a stepped exposure aperture to one adapted to produce continuously, modulated strips, including a mask having a logarithmically curved edge aligning with points of the aperture steps to which it is to be applied, and connecting means for securing the mask in position to cover said steps.

3. In a time scale sensitometer, an apertured member for permitting passage of light to a sensitized layer, the aperture in said member having one side thereof stepped in logarithmically increasing progression, and a detachable mask having a continuously and logarithmically curved edge aligning with points of the aperture steps, and connecting means by which the said mask is attached and detached thereby selectively to permit exposures of stepped or continuous type.

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