

UNITED STATES PATENT OFFICE.

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PHOTOGRAPHIC-EXPOSURE METER.

SPECIFICATION forming part of Letters Patent No. 659,727, dated October 16, 1900.

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To all whom it may concern:

Be it known that I, CHESTER W. BROWN, a citizen of the United States, residing at Jackson, in the county of Jackson and State of Michigan, have invented new and useful Improvements in Calculators for Determining Photographic Exposures, of which the following is a specification.

This invention relates to a device to be carried in the pocket or otherwise for determining the length of time for exposing photographic plates according to the rules of photography applicable to varying conditions—namely, the power of light, condition of the subject to be photographed, speed of the plate to be used, and the size of the stop employed. To those versed in the art subject, light, plate, and stop are chiefly to be considered, as all exposures are governed by these. For example, if the subject be light color and distant, the sunlight very bright, the plate "quick," and the size of the stop large then the exposure must be instantaneous. According to improved methods now in vogue these exposures are determined by fractional parts of seconds and minutes graduated on shutters of lenses which operate automatically.

The object of this invention is to provide a small portable device that will automatically calculate time for the length of exposure to be given to plates with respect to the conditions above named.

It consists of three circular disks of unequal size having letters and figures around their exposed circumferential edge, by which the necessary calculations are determined.

Referring to the drawings, Figure 1 is a front view of my calculator device. Fig. 2 is a section on the line xy of Fig. 1. Fig. 3 is a back view of the same.

This calculator consists of three circular disks 1 2 3, made of any suitable material, each being of different size from the other and mounted one upon the other, the smallest one being in front. These disks are secured together by a central rivet 4, which serves as a common pivot around which each disk can revolve. The exposed edges of these disks are each provided with a circumferential space having radial graduations 5

5' 5³, those on each disk containing figures and letters different from those on either of the others, and by rotating the disks different combinations are obtained to produce the calculations desired. On the circumferential edge of the larger disk 1 appear decimals indicating seconds of time and fractions thereof, which in the present instance range from .005 to ten seconds. These decimals serve the twofold purpose of first selecting the setting-point for the calculator according to the value of the light given decimally on tables hereinafter to be referred to and after being set relative to the other disks to determine by its chronological divisions the length of time for making an exposure, as will presently be seen. In the graduations on the middle disk 2 are recorded a suitable number of letters which are employed to indicate the different conditions of the subject to be photographed. This disk also has the focal letter "F" displayed thereon in a different manner from the other letters and which is the indicator for pointing to the desired decimal on disk 1 selected for the value of light. The disk 3, the smallest one, is provided with two sets of numerals, one set progressing in one direction for indicating the "speed" of the plate and the other set progressing from the same initial point in the opposite direction for the focal value of the "stop." This disk has the sign "U. S. 4," which, being equivalent to the conventional " f ," an abbreviated sign for the diameter of a stop which is one-eighth of the focal length of the lens with which it is used, is the indicating means for obtaining the speed of the plate in one instance and denotes the length of exposure in the other, as will be fully explained.

Three tables 6 7 8 in the present instance are printed on the disks of the calculator; but they may be printed separately to accompany the device and are for "light value," the subjects, and "plate-speeds," respectively. In the first-named table 6 are arranged the months, hours, and decimals designating light value. The table 7 shows the condition of the sunlight, whether bright or dull, and the character of subject—such as "open landscape," "snow," "sea," and "distant views"—giving letters to indicate these conditions.

The table 8 gives a numerical value from "0" to "17" of sensitized plates classed according to their speed, some plates having an instantaneous speed, while others are very "slow." The sign "0" indicates the quickest plate and is determined on the calculator by "U. S. 4." The next plate in order of quickness would be determined by "1," "2," and so on. Table 6 is the guide for disk 1. Table 7 is the guide for disk 2, and table 8 is the guide for disk 3.

The three disks not only serve to correspond with the three tables referred to, but also to give the time of exposure with respect to the different sizes of the stop.

The operation is as follows: For example, by reference to the "light-value table 6" during the months of March and September and the hours of 1 and 2 p. m. the decimal is found to be .012. Having located this decimal on disk 1, the focal letter "F" on disk 2 is turned to register with it. Then table 7 is referred to for a letter to designate the subject to be photographed with respect to the condition of the sun. The sun being brightest and the subject an open landscape the letter "D," for instance, is given. The disk 3 is now turned to bring the sign "U. S. 4" thereon to said letter "D." This sign "U. S. 4," as has been stated, serves the purpose of indicating the size or diameter of the stop and the speed of the plate. If a very quick plate be used, such as indicated by "0" in table 8, and a stop of about the size "U. S. 4," the result or length of exposure would be .006 of a second, which is found on the circumferential space on the largest disk opposite the said "U. S. 4." The next-size stop, "U. S. 8," would register to ".012" and the next stop to ".025," and so on. If a slower plate be used, such as is indicated by the numeral "8," the disk 3 containing this number would be turned until "8" registers with "D," and as "U. S. 4" remains the indicator for the "time" for one stop the time for exposing a plate of speed "8" under same conditions would be .025 of a second, as indicated

on the largest disk. A slow plate, such as indicated by "14," would be .07 of a second.

The focal letter "F" on disk 2 is changed from one position to another only when calculations for different months and hours are desired.

It is obvious that for different conditions calculations are made by resetting the disks to other letters and numerals.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

An instrument for calculating time for making photographic exposures according to rules applicable to varying conditions, comprising three disks, 1, 2 and 3, mounted to rotate one upon the other and each provided with a circumferential space on which are radial graduations, those on one adapted to coincide with those on the others—the radial graduations of disk, 1, having figures indicating seconds of time and fractions thereof, the radial graduations of disk, 2, having characters indicating the relative conditions of the sun and the subjects to be photographed and also containing a focal character, "F," and the radial graduations of the disk, 3, having two sets of characters, of which one set progresses in one direction and indicates different plate speeds, and the other set progresses in the opposite direction from the same initial point and indicates the focal value of the stop; and also provided with three tables, 6, 7 and 8, table 6, designating the light value for different months and hours in seconds of time and fractions thereof corresponding to the aforesaid graduations of disk, 1, table, 7, designating the condition of the sunlight in its relation to the subject, corresponding to the graduations of disk, 2, and table, 8, designating the different speeds of plates corresponding to the graduations of disk, 3.

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Witnesses:

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