Feb. 20, 1934. H. E. TURNER 1,948,013

INSTRUMENT FOR INDICATING THE REQUIRED VOLTAGE FOR MAKING RADIOGRAPHS

Original Filed Sept. 30, 1929 2 Sheets-Sheet 1

Fig. 1

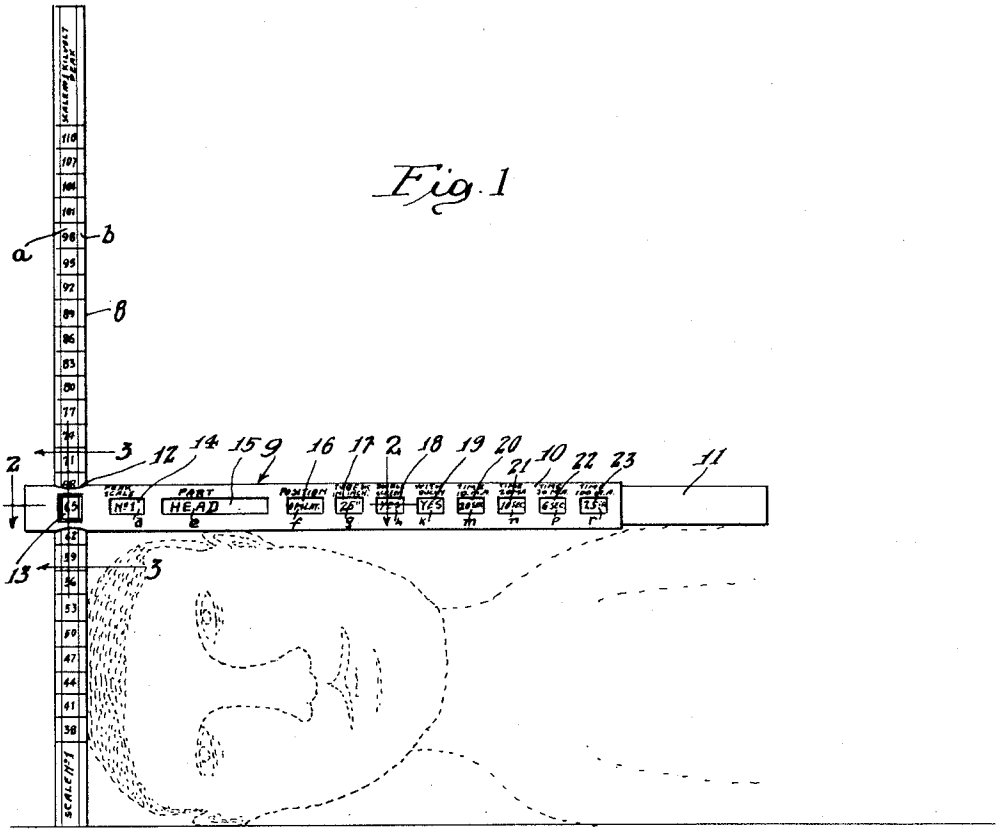
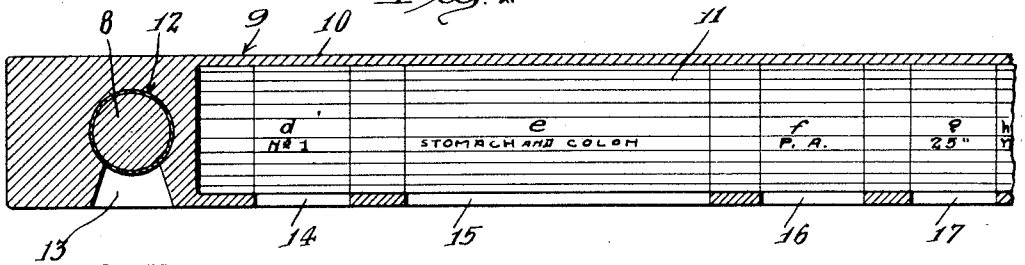


Fig. 2



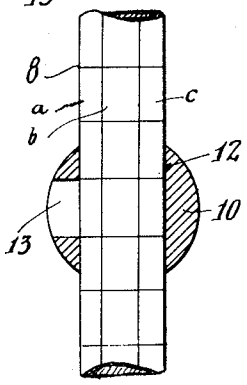


Fig. 3

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Fig. 4

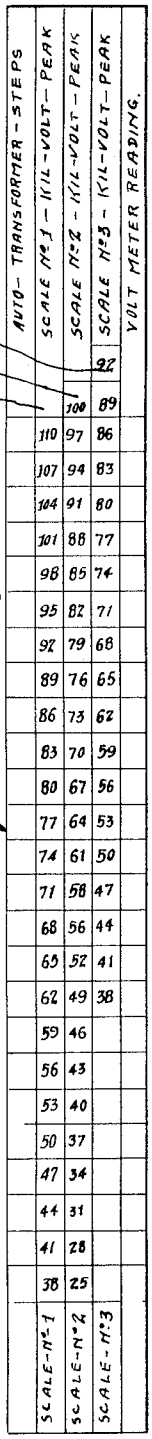


Fig. 5

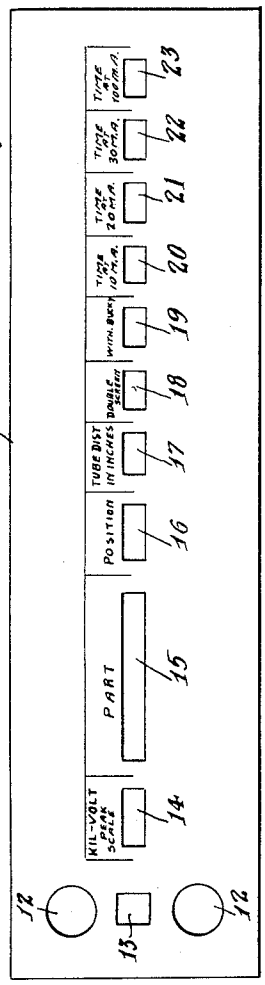
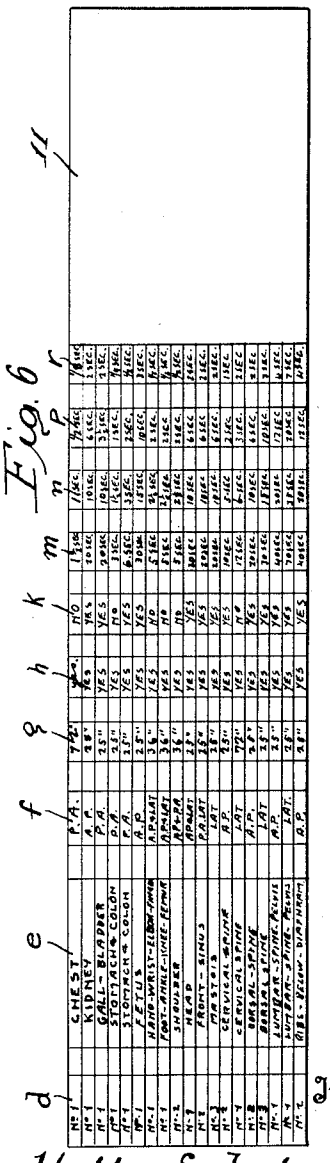


Fig. 6



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UNITED STATES PATENT OFFICE

1,948,013

INSTRUMENT FOR INDICATING THE REQUIRED VOLTAGE FOR MAKING RADIOGRAPHS

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Application September 30, 1929, Serial No. 396,378. Renewed December 3, 1932

5 Claims. (Cl. 33—169)

This invention relates to instruments for indicating the required voltage for making radiographs.

The invention is useful, for example, in connection with the making of X-ray radiographs of different parts of the body in conjunction with a given procedure of technique.

An object of the invention is to facilitate the making of excellent radiographs or, in other words, radiographs exposed for the proper length of time to show to the best advantage the image of the part or parts that are under examination.

Another object is simplicity of construction and operation.

Further objects and advantages will appear in the subjoined detailed description.

The accompanying drawings illustrate the invention.

Figure 1 is a side view of an instrument for indicating the required voltage for making radiographs, constructed in accordance with the provisions of this invention. The instrument is shown in measuring position in connection with a person's head, which is indicated in dotted lines.

Figure 2 is an enlarged fragmental horizontal section on the line indicated by 2—2, Figure 1.

Figure 3 is an enlarged fragmental detail, partly in section, on the line indicated by 3—3, Figure 1.

Figure 4 is a developed view of the tabular matter on the standard.

Figure 5 is a developed view of the outer face of the outer section of the horizontal arm.

Figure 6 is a developed view of the peripheral face of the inner section of the horizontal arm.

Referring to the drawings, there is provided a standard 8 on which is shiftably mounted a horizontal arm 9 which, in this instance, is of sectional construction, a section 10 and a section 11 in sliding engagement. In this instance the section 10 is tubular and is in telescopic relation with the inner section 11. The section 11 rotates within the section 10 for a purpose that will appear hereinafter.

The arm 9 constitutes a slide and for this reason the section 10 is provided with a hole 12 extending therethrough near one end thereof, the diameter of the hole 12 being sufficient to permit of free sliding of the standard 8 within said hole so that the arm 9 may be readily adjusted to different heights along said standard.

The arm section 11 is provided with tabular matter which will be more clearly seen by referring to Figure 4. The tabular matter is divided into columns which are indicated at *a*, *b* and *c*. The numerals in these columns indicate peak kilovoltage. In this instance, column *a* is termed scale 1, column *b* scale 2 and column *c* scale 3. These scale numbers are marked at the heads of the columns or scales and may also be marked at the foot.

It will be clear that, as the slide is moved up and down on the standard, it is brought into registration with different voltage indicating numbers and that by turning the standard about its axis, the voltage numbers in the different columns may be faced to the front. Though the instrument could be constructed with the idea in view of employing either the upper or lower edge of the slide as a marker for registering with different portions of the standard, I prefer to provide an opening 13 in the arm section 10 in alignment with the hole 12, said opening 13 constituting a window of approximately the width of any one of the columns *a*, *b*, *c* so that the figures in any one of the columns can be read through said window 13, according to the position to which the standard is turned.

The voltage numbers in the scales *a*, *b*, *c* bear a fixed relation to the distance from said numbers to the lower end of the standard, as will be made clear hereinafter.

The peripheral face of the section 11 is provided with tabular matter illustrated in Figure 6. This tabular matter is divided into columns, column *d* containing scale numbers and, consequently, indicating which of the scales *a*, *b*, *c* is to be employed.

A second column *e* contains the names of different parts of the human anatomy. A third column *f* contains various abbreviations as follows: P. A. indicating post-anterior, LAT indicating lateral, A. P. indicating anterior-posterior. A fourth column *g* contains numerals representing lineal measurement. These numbers, in this instance, indicate the number of inches that the X-ray tube is to be placed from the part that is to be exposed to the X-rays.

A fifth column *h* contains the words "Yes." A sixth column *k* contains the words "Yes" and "No." A seventh column *m* contains numbers indicating the exposure time in seconds with a current strength of 10 milliamperes. An eighth column *n* contains numbers indicating the exposure time in seconds with a current strength of 20 milliamperes. A ninth column *p* contains numbers indicating the exposure time in seconds with a current strength of 30 milliamperes, and a tenth column *r* contains numbers indicating the

exposure time in seconds with a current strength of 100 milliamperes.

The numbers, words and abreviations in the tabular matter on the arm section 11 are arranged in horizontal columns or lines and, when the arm section 11 is in place inside of the arm section 10, but one line at a time can be read by the operator, since the matter in said lines is seen through various windows or openings 14, 15, 16, 17, 18, 19, 20, 21, 22 and 23, registering with the respective columns *d, e, f, g, h, k, m, n, p* and *r*.

Above the respective windows 14 to 23 inclusive are the following legends: "Kil-volt peak scale", "Part", "Position", "Tube dist. in inches", "Double screens", "With bucky", "Time at 10 M. A.", "Time at 20 M. A.", "Time at 30 M. A." and "Time at 100 M. A." The meaning of these legends, which are more or less abbreviated, has been given above with the exception of the columns that register with the windows 18 and 19. It is obvious that when "Yes" appears through the window 18, double screens are to be employed, and when the "Yes" appears through the window 19, the bucky diaphragm is to be employed and, furthermore, that when "No" appears through the window 19, the bucky diaphragm is not to be employed.

The problem that presents itself to every operator of an X-ray apparatus is the determination of the voltage that is to be used for making the radiographs of different parts of the anatomy in conjunction with a given procedure of technique and to answer this problem the invention is operated as follows: Assuming, for example, that the operator desires to make a radiograph of the head of a person and that he desires the radiograph with the head in the lateral position, as indicated in dotted lines in Figure 1, the operator rotates the arm section 11 within the cylinder section 10 until "Head" is exposed through the window 15 and "LAT." is exposed to view through the window 16. Scale 1 is exposed through the window 14, thus indicating that scale *a* on the standard is to be brought into registration with the window 13.

Having then turned the standard to bring the scale *a* to this position, the operator places the standard in a vertical position with the lower end thereof resting on the table or other surface on which the head of the person rests, all of which is illustrated in Figure 1. The operator lowers the slide till it rests on the upper side of the head and assuming, for example, that "65" is exposed through the window 13, the operator immediately knows that to get the best results in the radiograph he should employ 65 kilovolts. Also indicated through the various windows is a tube distance of 25 inches, the use of double screens, the use of a bucky diaphragm, and the requisite number of seconds required for the exposure when employing currents of 10, 20, 30 or 100 milliamperes; for example, if a current of 20 milliamperes is used, the exposure will be for 10 seconds.

It will be seen that if the radiograph is to be of the dorsal spine in the anterior-posterior position, No. 2, or the *b* scale will be turned so as to register with the window 13, or if the dorsal spine is to be photographed in the lateral position, No. 3 will appear through the window 14, thus indicating that the scale *c* is to be turned so as to register with the window 13.

Of course the tabular matter may be changed to suit different technique, the voltage numbers shown in the scales *a, b, c* being those required with the particular technique as indicated on the slide.

I claim:

1. An instrument of the character described comprising a standard, an arm slidably and rotatably engaging the standard and extending horizontally therefrom, said arm being provided with a column of the names of anatomical parts and with scale indicia aligned with said names, the standard being further provided with a plurality of different scales of numbers representing different values of potential, said scales being identified by the respective indicia on the arm, the value of each number being dependent upon the distance of said number from the lower end of the standard and upon which of the scales said number is associated with.

2. An instrument of the character described comprising a standard, an arm comprising two sections slidably engaging the standard and extending horizontally therefrom, one of the arm sections being rotatably mounted within the other and having indicia thereon, and said other section being provided with windows through which to read said indicia on the inner section.

3. An instrument of the character described comprising a standard, an arm comprising two sections slidably and rotatably engaging the standard and extending horizontally therefrom, one of the arm sections being rotatably mounted in the other and having indicia thereon, and said other section being provided with windows through which to read said indicia on the inner section.

4. An instrument of the character described comprising a standard, and an arm slidably and rotatably engaging the standard and extending horizontally therefrom, the standard being provided with a plurality of different, parallel scales of numbers, the scales being separately identified by indicia, the arm being provided with a column of indicia corresponding to the first-mentioned indicia and a column of data, each of the indicia of said column being visually associated with a datum in said column having a definite relation to the numbers in the scales on the standard.

5. An instrument of the character described comprising a standard, and a sectional arm slidably and rotatably engaging the standard and extending horizontally therefrom, one arm section being provided with windows and the other arm section being rotatably mounted inside of said first-mentioned arm section, the standard being provided with a plurality of parallel different scales of numbers, the scales being separately identified by indicia, the inner arm section being provided with a column of indicia corresponding to the first-mentioned indicia, and a column of data, each of the indicia of said column being in horizontal alignment with a datum over said column of data having a definite relation to the numbers in the scales on the standard, and said data being selectively registrable with the windows by rotation of the inner section.

HARRY E. TURNER.