July 9, 1935. J. L. WILLIAMS 2,007,589

APPARATUS FACILITATING THE CLASSIFICATION OF FINGER PRINTS

Filed Oct. 23, 1930 2 Sheets-Sheet 1

Fig. 1.

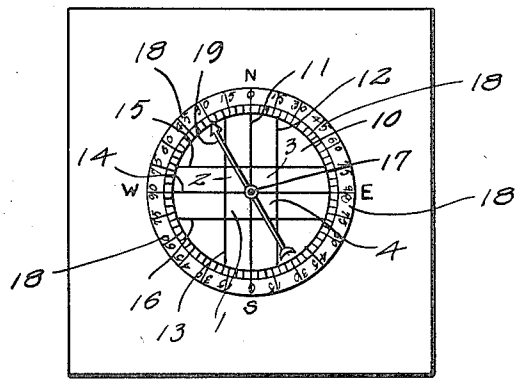


Fig. 2.

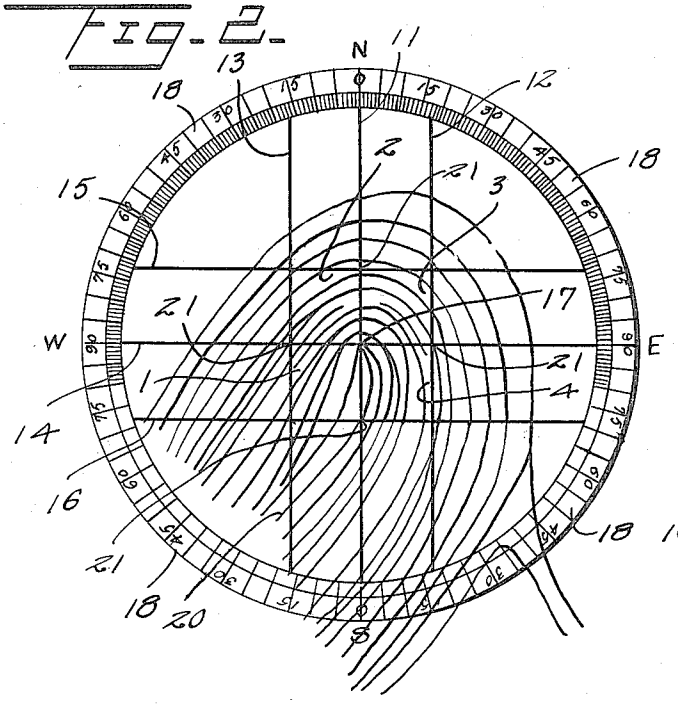
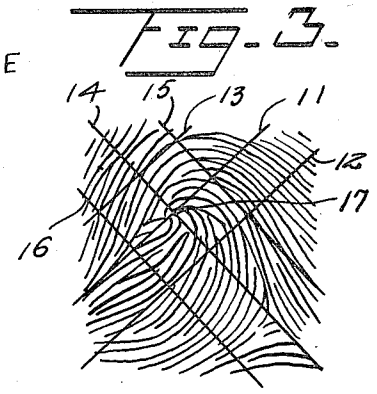


Fig. 3.



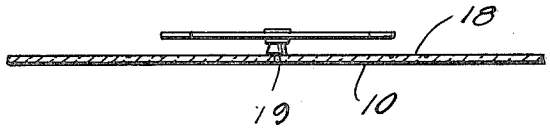


Fig. 5.

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APPARATUS FACILITATING THE CLASSIFICATION OF FINGER PRINTS

Filed Oct. 23, 1930 2 Sheets-Sheet 2

Fig. 4.

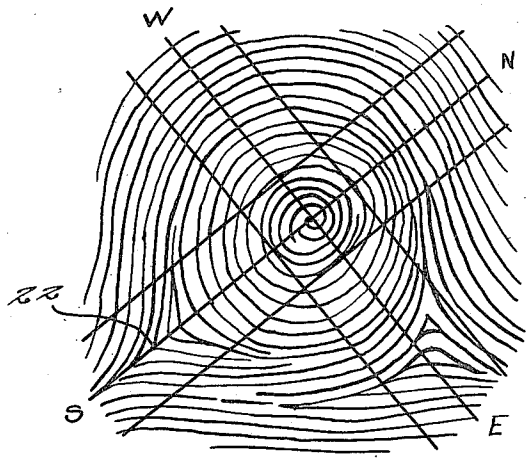


Fig. 6.

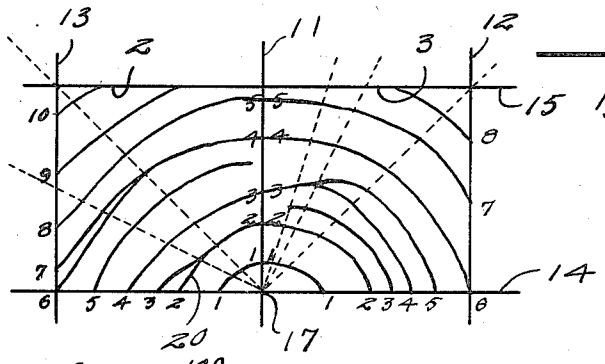
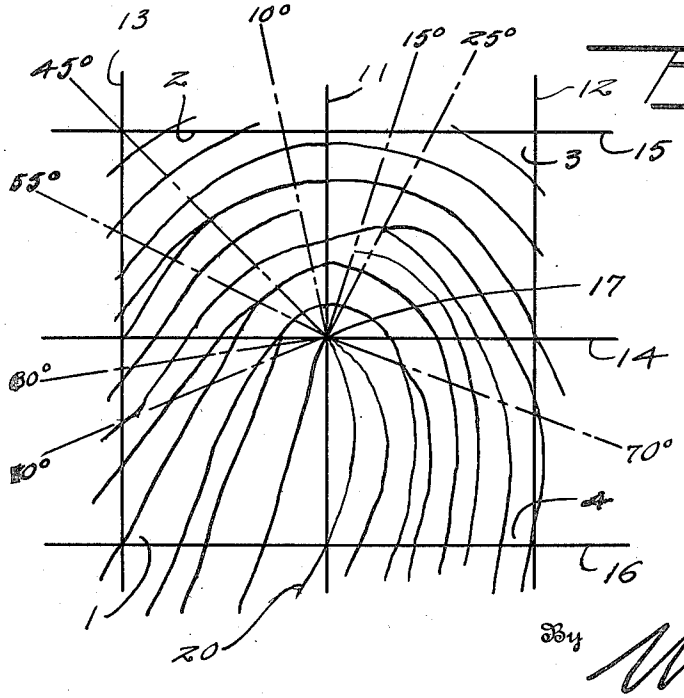


Fig. 7.



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2,007,589

UNITED STATES PATENT OFFICE

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APPARATUS FACILITATING THE CLASSIFICATION OF FINGER PRINTS

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Application October 23, 1930, Serial No. 490,708

2 Claims. (Cl. 33—1)

This invention relates to a device for facilitating the classification or identification of finger prints.

An important object of the invention is to provide a device which facilitates a fine sub-division and classification of finger prints in such manner that one finger identification can be positively established.

A further object of the invention is to provide a device whereby a classification may be made which permits of positively identified characteristics of a finger print being cryptically transmitted by telegraph or other means of communication, for comparison with a finger print to be identified.

A still further object of the invention is to provide apparatus of such character that the identification or classification of a finger print is rendered extremely simple, and may be rapidly accomplished while employing as a basis for such classification, the basic rules of identification at present employed in classification.

As is well known to those familiar with the art, each finger print pattern has a central core about which the ridges of the core are patterned. The arrangement of the ridges in the present day system forms the first sub-division for determination of the classification of a print, and with this present classification may constitute a loop, a whorl, an arch, and under these main headings may be sub-divided by some particular characteristic. In the use of my device this sub-division is generally limited to two main sub-divisions, long and short cores. In each instance, the core and its immediate surrounding ridges are the means of determination, and the method of using the device broadly stated consists in establishing the core center, sub-dividing the area about this core center into a plurality of sections, the position of which is determined by the relation of the core to the pattern, and then positively identifying each of the characteristics falling in each section as to its position within the section.

The method of establishing these sections by the use of the improved device may be best determined by reference to the accompanying drawings wherein for the purpose of illustration I have shown several types of finger prints and the determination of the characteristics thereof.

In the drawings:—

Figure 1 is a plan view of the apparatus for use in the determination and classification of finger prints, constructed in accordance with my invention;

Figure 2 is an enlarged plan view showing the apparatus imposed upon a finger print and orientated with relation thereto in preparation to identification or classification thereof;

Figures 3 and 4 are semi-diagrammatic views illustrating the method of applying the apparatus to prints of this character;

Figure 5 is a longitudinal sectional view through the apparatus;

Figure 6 is an enlarged fragmentary view of the print shown in Figure 2, illustrating one type of classification;

Figure 7 is an enlarged view illustrating determination of the location of characteristics by their angular relation to the axis or center of the pattern.

Referring now more particularly to the drawings, the numeral 10 generally designates a transparent sheet having arranged thereon two groups of parallel lines, these groups being preferably arranged at right angles to one another.

The first group includes what may be well termed north and south axis 11 and east and west meridians 12 and 13, arranged at opposite sides thereof, while the second group includes an east and west axis 14 and north and south parallels 15 and 16. Intersection of the lines of the groups produces a central axis 17 surrounded by four squares 1, 2, 3 and 4. Surrounding this axis and arranged in circular form are degree graduations sub-divided into four groups 18, each group starting with 0° at one end of the north and south axis 11, and terminating at 90° at one end of the east and west axis 14. The axis is preferably in the form of a pivot removably receiving a compass needle 19. The structure just described constitutes the sole equipment necessary to the determination of a finger print in accordance with my invention.

In the use of the device described the finger print is roughly sub-divided into two main classes hereinafter referred to as long core prints and short core prints. Long core prints are prints in which the core is supported by a central ridge line 20, of sufficient length to enable the axis 17 to be superimposed upon the peak or center of the core and the intersection of one of the axes line with one of the meridians or parallels placed thereon. Selection of the intersection which is to be imposed upon this ridge line 20 of the intersection 21, which is to be superimposed upon the ridge line 20, is made in such fashion that the north and south axis 11 extends in the general direction of the flow of the pattern, in other words, in the general direction in which the ridge lines extend.

This, in some cases, will necessitate use of the intersection 21 of the east and west axis, but in most instances will permit use of the lower intersection 21 of the north and south axis.

The coincidence of the north and south axis 11 with the line of flow will not be exact, except in rare instances, and by its extension in the direction of the line of flow it is meant to be understood that it extends more nearly in the line of flow than does the east and west axis.

With some patterns where there is no distinct core, as in the pattern of Figure 3, determination of the location of the axis is provided by establishing a core or a center point in the pattern from which a ridge line extends, upon which an intersection 21 can be imposed, while maintaining the north and south axis upon the line of general flow of the pattern. In other instances, as in a whorl, where there are no radial ridges available to provide a location for the intersection, the delta 22 has employed as a means for determining the location of the north and south axis, the center or main axis by superimposing upon the core center, in the usual manner. It will, of course, be understood that fixed rules will be provided to enable a determination of the arrangement of the north and south axis 11 and the main axis 17 in use with combination patterns, and patterns which have neither core nor delta, a detailed explanation of which will not be necessary to an understanding of this invention. The disposition of the central axis 17 and the orientation of the main or north and south axis 11 having been accomplished, it will be found that the portion of the print is sub-divided into four areas by the lines 11 to 16 inclusive, and that a positive area of the complete print has been set aside for minute scrutiny.

It will be obvious that characteristics of the ridge lines lying within these squares may be very easily located and descriptively recorded, and that this descriptive record may be very easily employed for indexing and sub-indexing the individual prints. The most convenient methods of indexing the prints by the use of the device are:—

(1) By counting ridge lines occurring within each square;

(2) By identifying forks or terminals of ridge lines; and

(3) By exactly locating the angular position of any characteristic within the 90° arc from the central axis 17, which the square under investigation occupies.

The first method of determination is obvious, and needs no explanation. The second method of using the device is accomplished by diagonally sub-dividing the square from the axis 17 and then counting and numbering the ridge lines on each of the sides of the square thus produced from the axis 17, as diagrammatically illustrated in Figure 6. In this figure it will be noted that the ridge line 2, at the upper side of the figure, sub-divides to form the ridge lines 2 and 3, at the lower side of the figure, that the ridge line 4 at the upper side of the figure sub-divides to form the ridge lines 6 and 7 at the lower side of the figure, and that the ridge line 5 at the lower side of the figure terminates within the square. These characteristics can be generally designated as follows:—

$$\frac{2}{2\ \&\ 3}:\frac{4}{6\ \&\ 7}:\frac{0}{5}$$

It will be noted that the ridge numbers at one side of the figure are employed consistently as numerators and the ridge line numbers at the opposite side of the figure are employed as denominators. This cryptograph presents exactly the various characteristics which appear in the square.

In the third method of using the device, the compass needle is employed and placed upon the axis provided at the pivot. The compass needle, being magnetized, will, of course, swing to a position where it points to the north pole and the scale and print are arranged before the user with the north point of the scale directed northward so that the same and the needle coincide. It is preferable that the operator sit facing the north so that he will look along the north and south line of the scale. The sheet and print are then rotated to bring the needle successively in alinement with the characteristics of the square and the positions of these characteristics, the indication being associated with the number of the ridge. In the square illustrated, for example, say that the fork of ridge line 2 occurs at 55° from the 90° graduation, that the fork of the ridge line 4 occurs at 45° upon the graduation, and the termination of lower ridge line 5 occurs at 10°. We have therefore, a square containing three characteristics located at these three points. Angles at which the characteristics occur may be associated with the cryptograph previously given, as follows:—

$$\frac{2}{2\ \&\ 3},\ 55:\frac{4}{6\ \&\ 7},\ 45:\frac{0}{5},\ 10$$

The second cryptograph quite obviously gives not only the ridge line upon which characteristics may be sought, but also the actual location of the characteristics in these ridge lines. It must be borne in mind that each square provides only one-fourth of the completed cryptograph, and that accordingly, by use of this method of determination the specific location of each and every characteristic of a central area may be accurately determined and accurately transmitted for comparison with other prints. The compass needle is employed as a convenient means of determining the angle. This means may obviously, however, be varied if so desired.

I claim:—

1. Apparatus for use in identifying and classifying finger prints, comprising a transparent sheet having perpendicularly related crossed lines defining an axis, means for defining an area about said axis, a protractor scale surrounding said axis, said axis being formed as a pivot, and a member circumferentially shiftable with relation to the sheet adapted to engage said pivot and coact with said protractor scale.

2. Apparatus for use in identifying and classifying finger prints, comprising a transparent sheet having perpendicularly related crossed lines defining an axis, means for defining an area about said axis, a protractor scale surrounding said axis, said axis being formed as a pivot, and a compass needle adapted to be supported from said shaft and coact with said protractor scale.

JAMES L. WILLIAMS.