

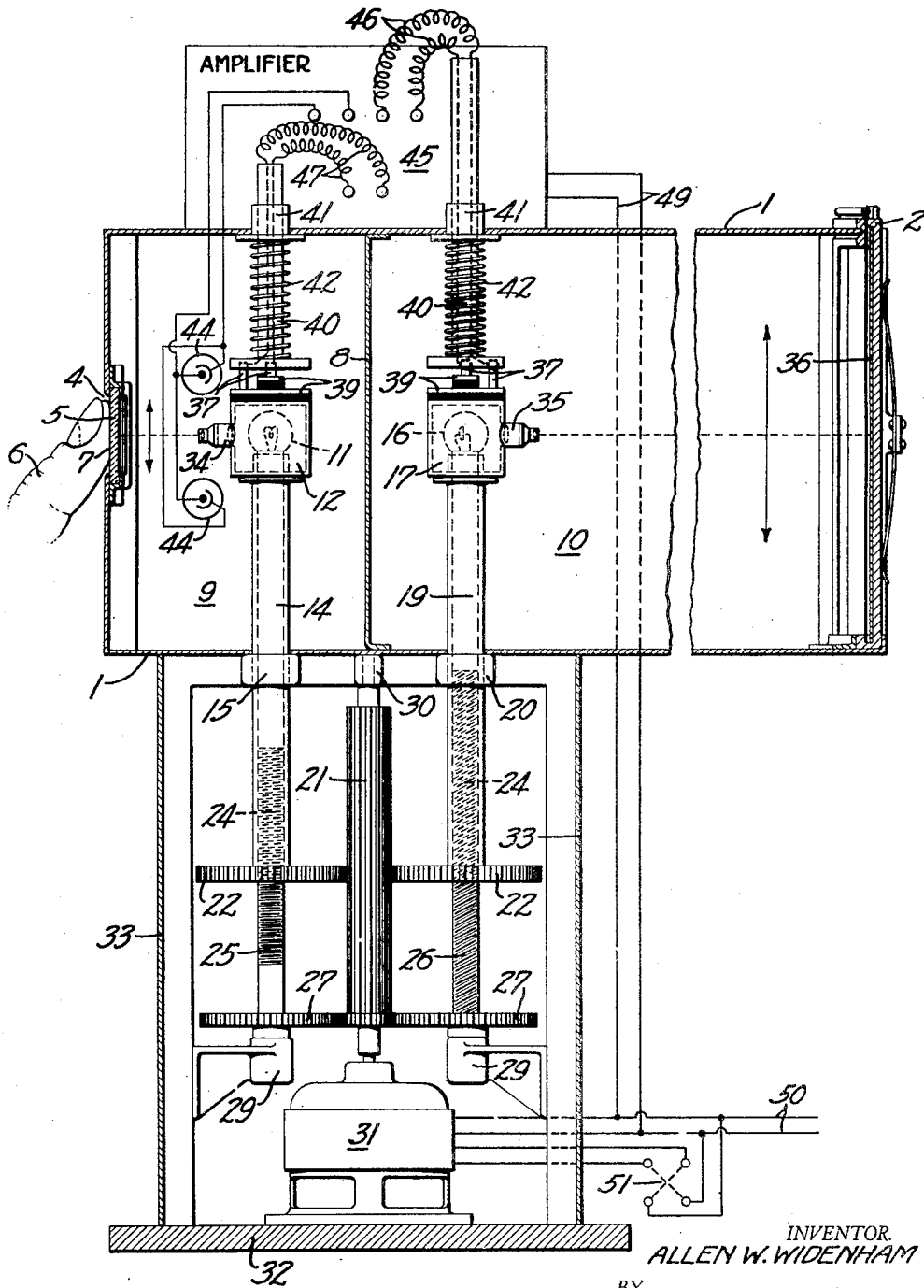
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SKIN CONTOUR RECORDER

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SKIN CONTOUR RECORDER

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2 Claims. (Cl. 178—7)

My invention relates to the recording of skin contours and more particularly to a method of recording skin contours for identification, or like purposes.

5 Among the objects of my invention are:

To provide a method of recording skin contours for identification purposes; to provide a method for creating an enlarged photographic record of a skin area; to provide a method for obtaining a skin contour record having extremely fine detail; to provide a method for obtaining an enlarged photographic record of a skin area without resort to photographic enlargement; to provide a method for scanning skin contours to produce an enlarged record; to provide a method for increasing skin contour contrast to facilitate scanning of skin area; and to provide a method for permanently recording finger prints or the like electrically.

20 Other objects of my invention will be apparent or will be specifically pointed out in the description forming a part of this specification, but I do not limit myself to the embodiment of the invention herein described, as various forms may be adopted within the scope of the claims.

25 In the recording of skin contours as at present practiced, certain skin areas, such as those of the balls of the fingers, soles of the feet or similar identifying skin portions, are pressed on an ink pad and the inked surface thereafter applied to a paper. The resultant print is created by ink transfer from the skin to the paper much as ordinary printing is done, and as a consequence the print is of exactly the same size as the original skin area. Any enlargement must be made from the print, not from the original skin, and as a result all of the paper defects are enlarged as well as the record desired. Furthermore, such enlargement usually involves several photographic transfers, each of which contributes to loss of detail. Film grain size also enters into the enlargement as a disturbing factor.

30 All of the above disadvantages combine to prevent the making of a good enlarged record, and the broad aspect of my invention is an original record of the contours of a skin area, preferably in enlarged form, created by scanning the area, to form a train of electrical impulses which are used to make the final record, preferably by simultaneous scanning of a light-sensitive surface by a light beam modulated by said impulses. I prefer to artificially increase the contrast between the furrows and ridges of the skin area, before scanning.

55 The drawing is a longitudinal view, partly

in section and partly in elevation of one form of mechanism which may be used to practice my method in the recording of finger prints. Certain portions of the device are shown diagrammatically and reduced to lowest terms to facilitate illustration.

A light-tight case 1 is provided at one end with a light-sensitive record holder 2. I prefer to curve this record holder, as will be described later.

10 The opposite end of the case is provided with an aperture 4 closed by a transparent, preferably thin glass plate 5 on which a finger 6 may be pressed to present a skin area 7 to the inside of the case. A partition 8, also light tight, separates the case into a relatively small transmitting chamber 9 and a relatively large receiving chamber 10.

An exciter lamp 11 is enclosed by a transmitting turret 12 and is mounted in the transmitting chamber 9 on a transmitting shaft 14 passing through a transmitting chamber bearing 15.

25 Similarly, a recording lamp 16, preferably gas filled, and of the crater type construction is enclosed in a receiving turret 17 in the receiving chamber 10 and mounted on a receiving shaft 19 passing through a receiving shaft bearing 20.

Both of these shafts are revolved by an extended gear 21 meshing with shaft gears 22 fastened to each shaft. Each of the shafts is also provided with an inner thread 24. A finely threaded screw 25 is fitted to the inner thread on the transmitting shaft and a coarser threaded screw 26 is fitted to the receiving shaft, both of the screws being driven by screw gears 27 also meshed with the extended gear 21. Suitable bearings 29 support the screws. An extended gear bearing 30 supports the upper end of the extended gear 21, the lower end being fastened to a driving motor 31 positioned on a base 32 on which the case 1 is supported by a gear enclosure 33. While I have shown the device as vertically positioned, it will be obvious that it will operate perfectly in any desired position.

45 Rotation of the motor 31 will revolve each turret simultaneously with the same number of revolutions per unit of time, and both turrets will progress either up or down within their respective chambers, due to the compounding action of the revolving screws. The distance covered in the progression, however, will differ, this difference being determined by the relation of the threads on the finely threaded screw 25 to those on the coarser threaded screw 26. I prefer, in this case, to make the ratio 1:3 so that, for ex-

ample, as the transmitting turret progresses one inch, the receiving turret will progress three inches. I also prefer to so mesh the gears and screw threads so that both turrets will be at the top or bottom of their stroke at the same time, the drawing, however, showing them at the exact center of their travel, the only time they will be in line.

A transmitting lens and diaphragm system 34 is fastened to the transmitting turret so as to focus a sharply defined spot of light from the exciter lamp on the flattened skin area 7 of the finger 6. In order to preserve this focus, I prefer to slightly curve the glass plate 5 into cylindrical form, the axis passing through the lamp. In practice I have found it possible, and so prefer to use, a spot having a diameter of one one-thousandth of an inch. During rotation of the turret the spot will sweep across the skin area presented to it.

Similarly, the receiving turret 17 is provided with a receiving lens and diaphragm system 35 fastened to the receiving turret so as to focus a second sharply defined spot of light in the plane of the record holder 2. I prefer to curve this record holder also, as before mentioned, so that when a light-sensitive record 36 is placed therein, such as sensitized paper, or photographic film, it will form a portion of an enlarged cylinder having an axis passing through the recording light source. In accordance with the desired 1:3 ratio the ratio of the length of the transmitting light path to that of the receiving path should be 1:3 and the size of the receiving spot should be three one-thousandths of an inch.

Connections are made to the exciter lamp, and to the recorder lamp by brushes 37 cooperating with slip rings 39, the brushes being carried by travelling rods 40 sliding in rod bearings 41. Compression springs 42 insure proper contact.

Mounted on the inside of the transmitting chamber 9 is a pair of photoelectric cells 44, of standard construction, diagrammatically represented, so positioned as to receive light reflected from the skin area as the light spot passes thereover. The output of the photocells is passed to the input of an amplifier 45, there to be amplified in the usual manner, and the output applied to the recorder lamp 16 through recorder lamp connections 46. Steady current for the exciter lamp may be supplied thereto from the amplifier through exciter lamp connections 47 or from any dependable source of current.

The amplifier is supplied with current through amplifier leads 49 attached to mains 50, and the motor 31 is also supplied therefrom. I also prefer to provide the motor with a reversing switch 51.

In operation, a finger or other member, treated as will be later described, is pressed against the glass plate 5. The amplifier and exciter lamp are energized, and with the turrets positioned at the top of the stroke the motor is started to cause the simultaneous rotation of the turrets and downward travel thereof. Both transmitting and receiving light spots are synchronously sweeping across their respective areas in successive lines. As they do so, any variations in light in the photocells causes a corresponding variation in the intensity of the receiving spot, which in turn varies the exposure of the sensitized surface.

When the turrets have reached the bottom of their travel path, the entire skin area and record area have been synchronously scanned, and upon development, the record will be found to have a

contour picture of the skin area, enlarged in size. This record may then be used for identification or similar purposes. The time required for scanning may be determined by the speed of the motor, and in the present case if the turrets are revolved at 2,000 R. P. M., a one inch skin area is covered in thirty seconds with the progression of the transmitting turret, the turret being regulated to make 1,000 lines per inch of skin area.

An enlarged record is thus made directly from the skin area without resorting to the prior methods of straight photographic enlargements.

I have found, however, that a clearer record can be obtained by pre-treating the skin area to be scanned in order to increase the light contrast between the higher and lower portions of the skin. I prefer to do this by depositing light-absorbing material in the furrows and pores only, thus leaving the ridges in natural condition. I have found that if black material, such as india ink, for example, is spread over the skin and the surface immediately wiped or scraped, that the ink will be removed from the ridges but not from the furrows or pores. The ink dries quickly and penetrates the most minute crevices. The inked surface may then be scanned as described.

The normal skin, however, is somewhat dark, because of capillary blood immediately below the surface, and I have found that additional contrast may be obtained when the skin area is pressed firmly against an unyielding surface to expel the blood from the capillaries. The transparent plate 5 serves as this surface and when the ink-treated finger surface is pressed firmly against it, the ridges become practically a dead white as against the black ink deposit in the furrows and pores. The resultant record is therefore exceptionally sharp and defined, and is in fact, a far better record and more perfect in detail than that obtained directly by prior printing methods. Other means and methods of increasing contrast will suggest themselves to those skilled in the art.

Several other features of my invention may be pointed out. The apparatus may be easily constructed in compact form and made highly portable.

The degree of enlargement may be easily changed by changing focal distances, diaphragm apertures, and screw threads. Records may be made either on paper, as a positive, or on film as a negative by changing the phase of modulation of the recorder lamp and adding a reversing gear to the drive of one of the turrets.

The final record is not disturbed by magnified paper defects of a small original nor by enlarged film grain size. All amplification is done with adjustment of aperture size, distances, and electrical amplification, and as the scanning spot may be made smaller than the degree of detail necessary for a proper record, aperture distortion does not enter as a limiting factor. It has been found that all pores and all identifying furrows and ridges are clearly recorded with the spot as used.

The final record, due to the contrast increase, has the character of a zinc etching, i. e., a black and white print, but as the photocells are, as is well known, extremely sensitive to minute light changes, a half-tone character is imparted to the record as well, giving an exceptionally distinct reproduction of the original skin area.

There are many places where my device may be used. Its benefit in taking ordinary finger prints will be apparent, but apparatus embodying

my method may also be used to record the contours of the soles of babies' feet in hospitals, by doctors in obtaining enlarged records of pigmented skin areas, birthmarks, etc., in which excess pigment itself acts to create contrast with the associated tissue. Many other uses will be apparent to all those skilled in the art.

I claim:

1. The method of recording skin contours which comprises the steps of depositing a light-absorbing material in the furrows and pores only of a skin area, applying pressure to said area to remove capillary blood from the ridges of said area, scanning said area by differentiating be-

tween said light-absorbing material and the pressed ridges of said area to form a train of electrical impulses, and utilizing said impulses to create an enlarged record of the said area.

2. The method of recording skin contours 5 which comprises the steps of depositing a foreign material in the furrows and pores alone of a skin area, scanning said area by differentiating between said foreign material and the exposed ridges of said area to form a train of electrical 10 impulses, and utilizing said impulses to create an enlarged record of said area.

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