March 14, 1961 H. C. McDONALD 2,974,426

METHOD AND APPARATUS FOR MAKING IDENTIFICATIONS

Filed Sept. 23, 1957 2 Sheets-Sheet 1

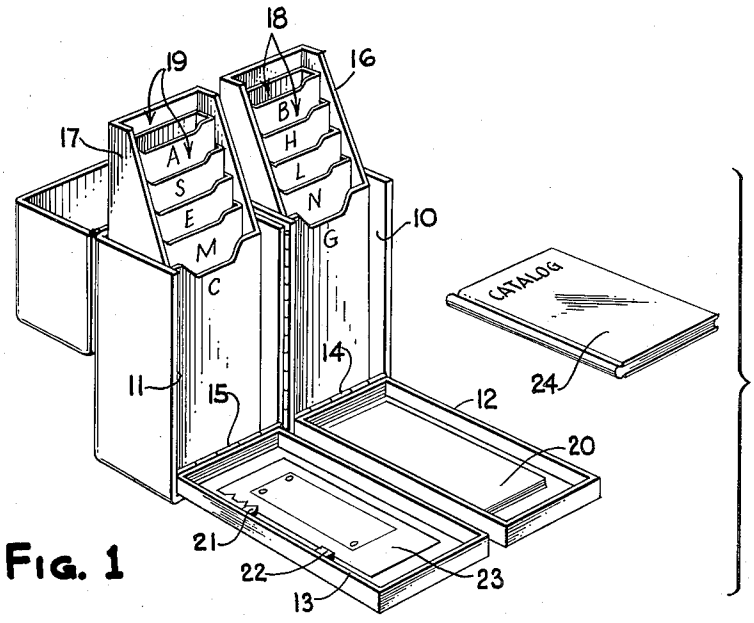


FIG. 1

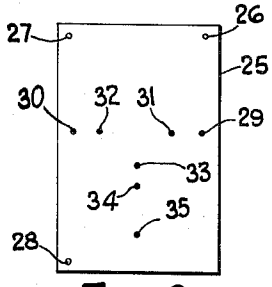


FIG. 2

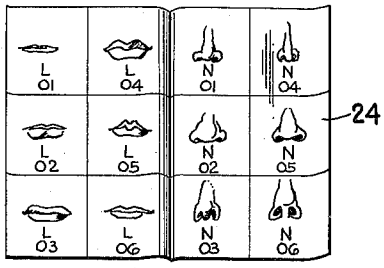


FIG. 3

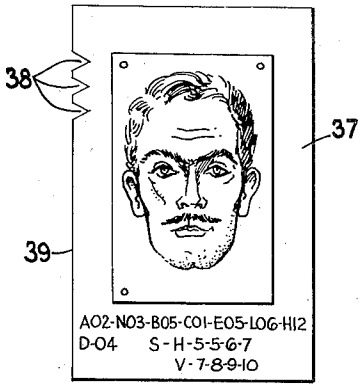


FIG. 4

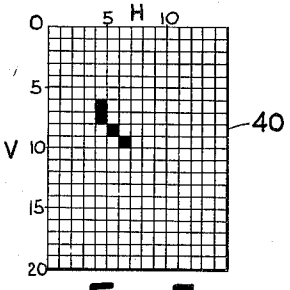


FIG. 5

INVENTOR.
HUGH C. McDONALD
BY Elliott & Pastoriza
ATTORNEYS

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METHOD AND APPARATUS FOR MAKING IDENTIFICATIONS

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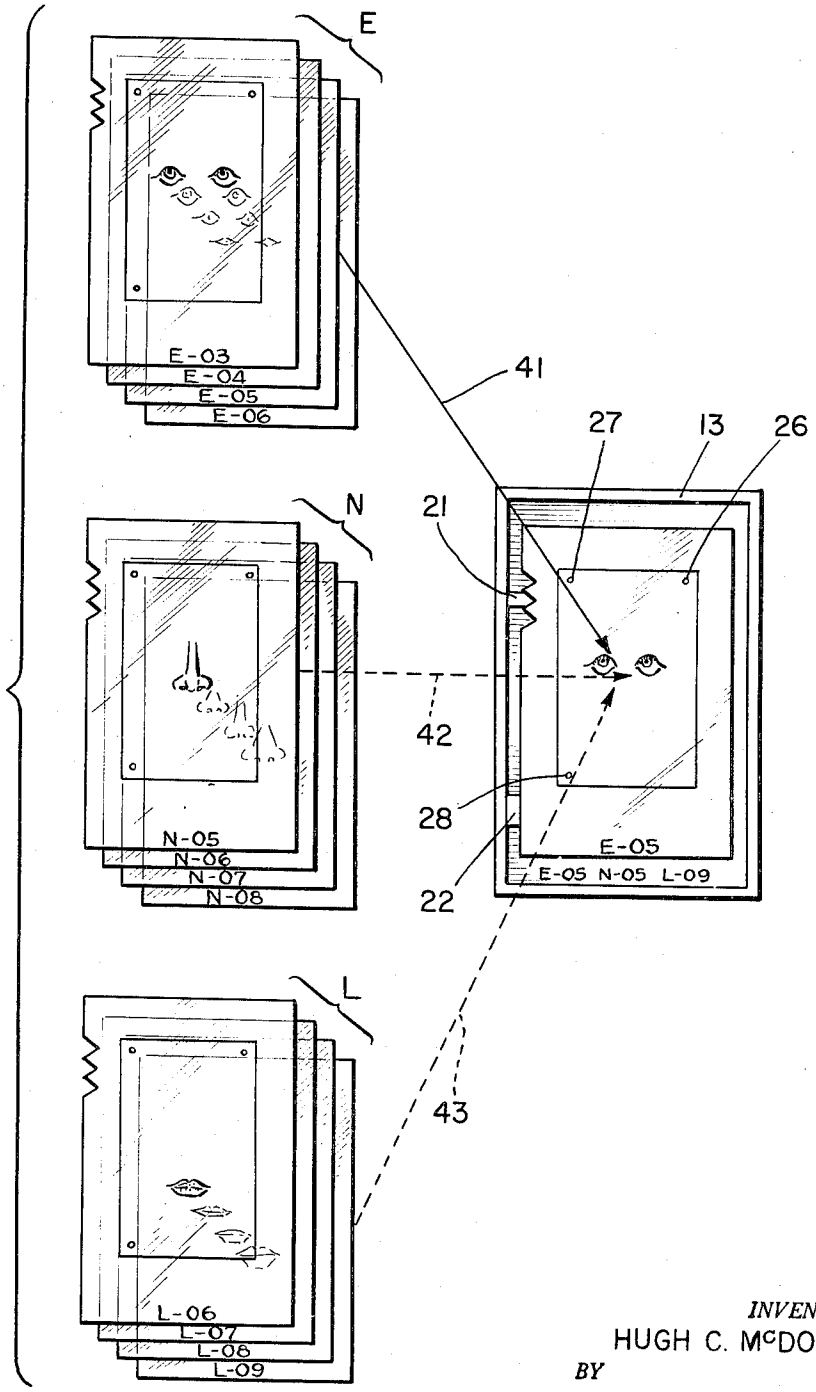


FIG. 6.

INVENTOR.
HUGH C. McDONALD
BY
Elliott & Pastoriza
ATTORNEYS

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METHOD AND APPARATUS FOR MAKING IDENTIFICATIONS

Hugh C. McDonald, Santa Monica, Calif., assignor, by mesne assignments, to Townsend Company, New Brighton, Pa.

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6 Claims. (Cl. 35—26)

This invention relates generally to identification systems, and more particularly to an improved method and apparatus for effecting an identification of a person from a relatively large number of persons by a process of elimination.

Many different identification systems are well known and in wide use at the present time. Generally, these systems may be grouped in two categories: first, systems which provide a positive identification of an individual from a number of individuals; and, second, systems which enable a reasonably reliable identification to be made of an individual by the process of eliminating large numbers of individuals who do not satisfy the requirements established by the identification system.

The former systems include finger printing, palm prints, poroscopy and even mug shots, for example, all based on the premise that nature never repeats itself. The primary disadvantage of these systems resides in the necessity of prior physical contact with the individual in order to obtain the positive identifying data.

The systems in the second category generally proceed with a negative approach to the problem of selecting or identifying one individual from a large number of persons. Essentially, the negatve approach consists of eliminating large numbers of persons who do not satisfy certain requirements of the identification and is necessarily an outgrowth of the fact that no calculated or premeditated prior physical contact has been had with the individual or suspect to be identified.

One well known example of this latter system is that of attempting to reconstruct the suspect's face from an oral description. For example, police departments often employ an artist whose primary function is to prepare sketches in accordance with an oral description until a likeness of the suspect is created. The only guide the artist has in such cases is the actual oral description given by a casual observer who may have had only fortuitous contact with the suspect. Necessarily, the value of this system resides largely on the ability of the artist to create a likeness to the suspect which is sufficient to enable a large number of other suspects to be eliminated. The likeness which the artist can achieve, in turn, depends primarily upon the accuracy with which an oral description can be given to the artist.

In the absence of some sort of scientific or methodical approach which may be consistently employed in dictating to an artist the facial characteristics of the suspect, the process of attempting to create a likeness to a suspect by artistic means will in each and every instance constitute an ad hoc operation which is both time consuming and laborious. Further, there is no way in which the resulting artist's drawing can be reconstructed by other artists in remote locations without actually reproducing exact copies of the artist's drawings and physically transporting or televising them to such locations. In other words, without a methodical or scientific approach in the creation of a suspect's facial characteristics as described by a casual observer, there is no consistent manner in which

the resulting picture can be coded for subsequent reconstruction.

Bearing the above in mind, it is a primary object of the present invention to provide an improved method and apparatus for making identifications based primarily on a negative approach wherein large numbers of persons who may be possible suspects are eliminated, but from which a facial likeness to the suspect can be created in a systematic and methodical manner.

More particularly, it is an object to provide an improved method and apparatus for enabling a consistent and precise building up of a facial likeness of a suspect solely from an oral description rendered by a casual observer of said suspect, to the end that a reasonably reliable identification may be made and the created likeness coded for subsequent reproduction.

Still another object is to provide a system of the above type which may be effectively used in both police work and in intelligence and counterintelligence operations.

These and many other objects and advantages of the present invention are attained primarily by approaching the problem from a negative standpoint. As stated heretofore, the problem consists of building up a facial picture or likeness of a suspect solely in accordance with an oral description given by a casual observer of the suspect. In making the identification, the observer is first questioned about certain supporting information. For example, such supporting information includes the height, weight, age, and clothing of the individual. From these characteristics alone, several hundred different individuals may immediately be eliminated as possible suspects.

After all of the supporting information has been obtained, the next group of questions has to do with secondary identifying information. Secondary identifying information consists of the general facial characteristics. For example, the general shape of the chin line, the brows, the eyes, the hairline, the lips, the type of nose, and whether or not the suspect wore glasses. From information gleaned on any one of these characteristics, it is possible again to eliminate a large number of persons who do not fit any one of the characteristics which the observer remembers clearly. The third set of questions has to do with primary identifying information. Primary identifying information includes age lines and scars and possibly beards or moustaches. The recognition of a scar on the individual would immediately eliminate large numbers of suspects. The same is true of age lines or beards and moustaches.

The method of the present invention has to do primarily with the consistent and accurate obtaining and recording of the above mentioned secondary and primary identifying information to the end that a methodical system is provided for building up a facial likeness of the suspect. As mentioned, the obtaining of this secondary and primary information has been done in the past by having an artist create a picture of the suspect's face from an oral description by a casual observer. In accordance with the system of the present invention various transparent foils are provided containing line drawings of various features of a human face. An operator may then overlay different combinations of the foils to "mechanically" create different human faces. The observer of the suspect examines these different faces and eliminates all those faces that do not bear a likeness to the suspect until one particular combination of foils remains. By providing each foil with a code number, the code numbers of the foils in the particular combination created may be recorded and transmitted so that the same composite face structure can be built up from duplicate foils retained at a remote location.

A better understanding of this improved method and apparatus for identification in accordance with the pres-

ent invention will be had by referring to the following detailed description in conjunction with the accompanying drawings, in which:

Figure 1 is a perspective view illustrating a kit together with associated equipment for making identifications in accordance with the invention;

Figure 2 is a plan view of a reference frame useful in carrying out some of the steps in the method of this invention;

Figure 3 illustrates some pages from a catalog employed in the present invention;

Figure 4 is an enlarged view of a composite facial structure built up in accordance with the invention;

Figure 5 shows a grid network useful for determining scar positions in accordance with a feature of the invention; and

Figure 6 is an enlarged schematic view illustrating in greater detail steps and equipment employed in carrying out the invention.

In Figure 1, there is illustrated a carrying kit for containing the various essential elements that are employed in the present invention. The kit is preferably designed with a compound hinging arrangement for providing accessible compartments such as fully set forth and described in the co-pending application of Samuel L. Sola and Cara Crocker, Serial No. 684,553, filed September 17, 1957, now Patent No. 2,875,010, for a Carrying Kit. As shown, the kit includes two main compartments **10** and **11** including working trays **12** and **13** which may be swung down to a horizontal position about suitable hinges **14** and **15**, respectively. Within the compartments **10** and **11** there are provided overlay foil holders **16** and **17** including foil receiving compartments **18** and **19** for receiving overlay foils or films such as illustrated at **20** in the working tray **12**.

The tray **13** adjacent the tray **12** is provided with an indexing projection **21** and a guide projection **22** which are spaced apart a distance less than the side length of the foils and which enables one or more foils to be indexed against the projection and thus secured in a set position such as illustrated for the foil **23** during the building up of a composite face in accordance with the invention. The carrying kit is also arranged to include a catalog **24** shown separated from the kit. The catalog **24** would normally be contained in the tray **13** when the kit is folded into its closed position. With the various foils and catalog together with the kit construction as described thus far, the method of making identifications in accordance with this invention may be carried out.

Before describing in detail the actual step by step procedure which is followed through in making up a composite face similar to that of an individual whose features are orally described, the method steps involved in making up the various foils and catalog will first be described.

Since the fundamental problem consists of attempting to build up a facial likeness of a single individual, the first step is the creation of certain facial features or characteristics. As an example, these characteristics may be listed and identified as follows:

Code:	Characteristic
A	Age line.
S	Scars.
G	Glasses.
H	Hair lines.
M	Beards and moustaches.
E	Eyes.
B	Brows.
L	Lips.
N	Noses.
C	Chin lines.
T	Head gear.

Designating each of these various characteristics as groups, the first problem was the preparation of a series of foils illustrating the particular characteristic of the group in different expressions. Further, the foils had to be prepared in a manner to register properly when in overlying position. To this end, thousands of different faces were studied from a head on view from which measurements were made whereby the average position or relative locations of facial features with respect to each other could be constructed. From these positions a reference frame **25** was created such as illustrated in Figure 2, and definite reference points were established on the frame. For example, the frame was first secured in a set position as by locating pins **26**, **27**, and **28** and first and second reference points **29** and **30** were constructed which denoted the average position of the temples. The next reference points **31** and **32** denoted the average position of the pupils of the eyes. The next reference point **33** was established at the average position of the tip of the nose. Another reference point **34** was established at the average position of the center of the lips and finally a reference point **35** was positioned at the average position of the end of the chin.

Having established these fixed reference points, various features such as the nose, lips, and chin lines coded as N, L and C were drawn by an artist on the reference frame and suitably extended or shortened as necessary such that they would terminate on these definite reference points. For example, all of the various variations in chin lines had to terminate on the lower reference point **35** at their lower ends and at the temple points **29** and **30** at their upper ends. Similarly, all of the noses constructed had to terminate in tips on the reference point **33** while all of the various different eye expressions had to have the pupils fall on the reference points **31** and **32**. Photographs were then taken of each individually drawn characteristic to provide the same on transparent films or foils. By this arrangement, overlaying of various foils, for example, a single chin line drawing with a nose drawing, could be accomplished with assurance of proper registration. The slight extension or shortening of the specific features in order to register with the reference points had to be effected within an acceptable margin of error so that the fundamental expression was not changed.

After all the different various types of expressions were photographed to provide a series of foils, each of these series of foils was then given a code number and divided into groups designated by the aforementioned code letters and filed in the various correspondingly lettered group compartments in the carrying kit illustrated in Figure 1. Corresponding pictures of these various foils are provided in the catalog **24** such as illustrated on the left hand page in Figure 3 of the catalog for the lip group L. On this page, it will be noted that various different types of lips are shown from thin lips to relatively thick lips. In the right hand page of the catalog in Figure 3, there are shown pictures of various types of noses, each of these pictures having a corresponding foil filed in the nose group compartment N of the kit. Note that each individual type of lips and nose are given code numbers.

The foils themselves containing each of the individual characteristics, such as the top foil **37** in Figure 4, are provided with notches **38** on their upper left hand margin. These notches enabled various foils to be vertically displaced from each other to provide an elongated facial expression whereby a greater likeness could possibly be built up during the identifying process. As indicated in Figure 1, the notches **38** are arranged to be received in the indexing projection **21** and the left hand lower margin **39** of the foil is arranged to rest against the guide projection **22**.

As an additional feature to the indentifying data contained on the individual foils in each of the groups, various differently shaped scars were created and positioned on the composite face by a simple co-ordinate system such as illustrated in Figure 5. For example, there is

shown a grid **40** having horizontal and vertical cross lines upon which may be located the position of a scar such as indicated by the filled in squares. Thus, from an oral description of the approximate location of a scar on a person's face, the corresponding co-ordinates can be worked out on the grid **40** and a code number indicating the location of the scar may be provided.

In the actual making of the identification, the kit of Figure 1 is first opened up into a working position as illustrated. The observer giving the oral description is then interrogated as to supporting information, secondary identifying information, and primary identifying information. The supporting information such as the general height, weight, and age of the person together with any other supporting data such as twitches, limps, and the general demeanor gives the experienced user of the identification system an intuitive feeling as to the general character of the individual's face. The observer is then questioned as to certain fundamental secondary identifying data; for example, the type of chin line, heavy, square, etc.; the type of lips, thick or thin; type of nose, and so forth.

For example, assume that the building up of the composite face of the suspect is begun by a description of the lips of the suspect. In this event, the operator of the system will open up the catalog **24** illustrating the pictures of the various foils on lips such as on the left hand page of the catalog of Figure 3. The casual observer is then asked to select one of the pictures of the various different types of lips. For example, assuming that the observer picked the catalog picture L06, the operator then reaches in the compartment L of the kit in Figure 1 and selects the foil coded 06. This foil which contains only a picture of the person's lips as illustrated in the catalog is then placed in the left hand tray **13** with preferably the center notch **38** in the indexing projection **21** and the left hand edge **39** of the foil against the guiding projection.

The observer may then be questioned as to the type of nose of the suspect and from the catalog, he selects the one picture bearing a likeness to the suspect's nose. For example, assume the observer selected the catalog picture N03 for the nose. As in the case of the lips, the operator then selects the correspondingly coded foil from the N compartment and places it over the lip foil in the tray **13**. If the observer indicates that the suspect had a long upper lip, the lowest indexing notch of the nose foil is inserted in the indexing projection **21** whereby a relatively large space between the lips and nose will appear in the overlay indicating a long upper lip. Alternatively, if the nose is relatively close to the lips indicating a short upper lip, the nose foil may be repositioned with the top notch in the indexing projection **21** whereby the appearance of the individual is that of one having a very short upper lip.

The identical process is then repeated for the various other groups of facial characteristics such as the chin line, eyes, brows, hair line, age lines, etc., the observer in each instance selecting the particular expression in each of the groups which most closely resembles that of the suspect. Actually, the observer in reality makes his selection by eliminating those facial expressions which least resemble the corresponding characteristic of the suspect until only one picture and corresponding foil in each group remains.

After all of the selections have been made and the respective foils arranged in overlying relationship, there results a composite face and facial expression which most closely resembles the suspect's face. The various code numbers on each of the foils making up the composite face may then be recorded.

Figure 4 illustrates such a composite face bearing the code number A02—N03—B05—C01—E05—L06—H12—D04. Also, the position and shape of a scar on the suspect as determined by the grid co-ordinates in Figure 5 is coded as

S—H–5–5–6–7
V–7–8–9–10

meaning that the squares designated by the co-ordinates (5, 7), (5, 8), (6, 9), (7, 10) are to be filled in.

The entire code may be transmitted by radio or other means to a remote location where an operator provided with a similar kit and transparent foils may reconstruct the face.

The foregoing procedure will be better understood by referring to Figure 6 which illustrates by way of example a plurality of groups of transparent foils, E, N, and L as would be contained in the E, N, and L file slots in the kit of Figure 1. Each group relates to a separate feature of the human face and contains a set of foils illustrating solely such feature in various different shapes and expressions. For example, in Figure 6 the group E relates to eyes, the group N to noses, and the group L to lips.

In the case of the set of foils making up the group E, various eyes are shown with successively different shapes and expressions, the only common feature being the spatial location of the pupils which corresponds to the reference points for the pupils established when initially making up the foils. Each foil in turn is provided with a code number as shown on the bottom at E–03, E–04, E–05, E–06, and so forth. Similarly, the sets of foils making up the nose and lip groups are coded as shown.

In Figure 6, the separate foils in each group are illustrated as offset from each other to expose the code numbers.

In carrying out the identification procedure as described heretofore, a single foil from each group is selected which most nearly represents the corresponding feature of the individual. Thus, as indicated by the dashed lines **41**, **42**, and **43**, the foils coded E–05, M–05, and L–09 may be selected as most nearly corresponding to the person's eyes, nose, and lips respectively and placed in overlying positions in the tray **13**. Proper relationship is assured since the various reference points employed in making up the foils as described will insure proper registration of the terminal points of the features so that a composite face will result.

The entire process of creating a likeness to a suspect's face in accordance with the foregoing method may be relatively rapidly executed and as a consequence of portability of the kit, may be accomplished at the spot locations when a suspect's description is freshest in the memory of observers and witnesses.

Modifications falling within the scope and spirit of the present invention will occur to those skilled in the art. The identification system is, therefore, not to be thought of as limited to the specific embodiment set forth for illustrative purposes.

What is claimed is:

1. A method of making identifications comprising the steps of: constructing reference points indicating the average relative locations of facial features from measurements of the relative locations of features in a plurality of different faces; changing the outline of specific corresponding features of said plurality of different faces to register with said reference points within an acceptable margin of error; reproducing each of said specific corresponding features on transparent foils as a medium therefor; assigning an individual code symbol to each of said transparent foils; and cataloging said foils, whereby overlaying of various foils of said features in accordance with a description of a person's face to be identified provides a composite facial expression bearing a likeness to said person's face, the successive designation of each code symbol on said various foils constituting an overall identifying code for said particular composite facial expression.

2. The method of claim 1, in which said fixed reference points designate terminal points for the temples, pupils of the eyes, tip of the nose, center of the lips, and end of the chin.

3. The method of claim 1, in which said specific features include: age lines, hair lines, eyes, eyebrows, noses, lips, and chins.

4. The method of claim 1, including the step of providing a grid foil having rectangular coordinates with respect to said reference points whereby the locations of scars may be determined on said grid and properly simulated on said composite facial expression, and assigned a code symbol including the rectangular coordinates of the position of said scar on said grid.

5. An apparatus for constructing a facial likeness of an individual, comprising: a plurality of groups of transparent foils, each group relating to a separate feature of the human face and containing a set of foils illustrating said feature in various different shapes and expressions, each foil in each set of said groups including reference points which are common to each feature in said different shapes and expressions in said set so that consistent positioning of the various features relative to each other when foils from different groups are placed in overlying relationship is realized, each transparent foil also including

an individual code symbol, whereby overlaying of various foils from said groups illustrating features in accordance with a description of a person's face to be identified provides a composite facial expression bearing a likeness to said person's face, the successive designation of each code symbol on the various foils constituting an overall identifying code for said particular composite facial expression.

6. An apparatus according to claim 5, in which the features to which said plurality of groups relate include: age lines, scars, glasses, hair lines, beards and mustaches, eyes, brows, lips, noses, chin lines, and head gear.

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