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<b>UTILITY PATENT APPLICATION TRANSMITTAL</b>  <i>(Only for new nonprovisional applications under 37 CFR 1.53(b))</i>	Attorney Docket No.	16223-00151
	First Inventor	Chester O.D. Thompson
	Title	KEY BLANK IDENTIFICATION SYSTEM...
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## UTILITY PATENT APPLICATION

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Docket No.: 16223-00151

## KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING

### CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** This application claims the benefit of priority of U.S. Provisional Patent Application Ser. No. 61/215,152 filed on May 1, 2009, and U.S. Provisional Patent Application Ser. No. 61/275,654 filed on September 1, 2009, each of which are hereby incorporated by reference in their entirety.

### FIELD OF ART

**[0002]** This invention relates generally to the field of systems for identifying objects and, more particularly to systems for utilizing electronic means for identifying key blanks that are compatible with an unknown key.

### BACKGROUND OF THE INVENTION

**[0003]** The art of key replication is well known. Commonly, a key intended for duplication (the master key) is copied on to an appropriately identified key blank utilizing any number of different systems known in the art. The process of identifying an appropriate key blank to use when making copies of a key can be a difficult, tedious and time consuming affair. It is important that each master key be copied onto the proper key blank so as to prevent numerous adverse consequences caused by reproducing a master key onto an inappropriate key blank. However, choosing the correct key blank can be difficult even for experts in the field.

**[0004]** There are hundreds, if not thousands, of key blanks, and many blanks are not readily distinguished from others. Identifying the correct key blank for use in duplication involves selecting a blank from hundreds or even thousands of possibilities, where differences between key blanks may be very subtle. These hard-to-notice subtleties significantly increase the level of difficulty for all operators of such key replication systems, both inexperienced trainees and experts alike.

**[0005]** Once a key blank is chosen, it goes through a cutting process. The typical cutting process simply traces the profile of the master key onto the key blank, such that the key blank will exactly match (within the error limits and accuracy of the tracing machine) the original master key. Normally, a mechanically linked cutting wheel actually cuts into the key blank while it mimics the movement of the tracer as the tracer moves longitudinally along the profile of the master key. If the incorrect key blank is provided during this process, the key blank being formed into the duplicate key may not possess the correct longitudinal length, thereby causing a failure. When this type of failure occurs, the entire process of selecting a key blank for replication and then mechanically cutting the key must begin again. Worse still, if the blank has the proper length but does not possess the appropriate thickness, contour, groove or other traits, the failure may not be discovered until the key is actually inserted into the lock.

**[0006]** Businesses that offer key cutting services are often times not staffed by experienced locksmiths. Instead, employees are usually trained to “eyeball” what is thought to be the correct blank and then cut a duplicate key. Such informal and imprecise key blank identification invariably increases the rate of failures for the duplication process. These failures often occur at the expense of the industry and to the extreme dismay of the key holder. Therefore, the industry

would welcome an easy-to-use key blank identification system that increases the accuracy and efficiency of key replication.

**[0007]** Not surprisingly, numerous attempts have been made to improve identification systems and/or key replication systems. Many of these improvements include imaging systems designed to determine the proper key blank based on physical parameters of the key to be copied, such as length, shape, and groove characteristics.

**[0008]** While many of these systems provide useful improvements for determining a proper key blank, they still suffer from various deficiencies. Specifically, many of these systems compare scanned data from a master key to be copied with data from known key blanks in order to determine if the master key matches the key blank. However, in some instances the scanned key parameters and the key blank data are insufficient to determine a matching key blank. In such cases, additional information about the master key and the key blank would be useful in narrowing the field of prospective key blanks. Accordingly, an improved system and method for determining a key blank is needed.

## SUMMARY

**[0009]** A key identification system is provided. The key identification system comprises an imaging system to capture an image of a master key, and a logic to analyze the image. The imaging system may be configured to capture an image of a groove in the key from an angle between perpendicular and parallel to the blade of said master key. The logic analyzes the captured image to compare characteristics of the groove with groove characteristics of known key blanks.

[0010] The key identification system may account for the orientation or positioning of the master key with respect to the imaging system or key holder to determine groove characteristics of the master key. For example, the logic may analyze a contour of the groove and determine groove characteristics of the master key based on the contour and the orientation and positioning of the master key.

#### DESCRIPTION OF THE DRAWINGS

[0011] Objects and advantages together with the operation of the invention may be better understood by reference to the following detailed description taken in connection with the following illustrations, wherein:

[0012] FIG. 1 illustrates a master key;

[0013] FIG. 2a illustrates a first example configuration of a key ID system;

[0014] FIG. 2b illustrates a second example configuration of a key ID system;

[0015] FIG. 3 illustrates an example silhouette of a key tip;

[0016] FIG. 4 illustrates an example configuration of a key ID system with reflectors;

[0017] FIG. 5 illustrates an example scanned image of a master key blade silhouette;

[0018] FIG. 6 illustrates an example projection of a tip outline onto the image of a tip;

[0019] FIG. 7 illustrates an example calculated data set of tip groove contours;

[0020] FIG. 8 illustrates an example matching comparison between master key tip contour data and stored key blank data; and

[0021] FIG. 9 illustrates an example unmatched comparison between master key tip contour data and stored key blank data.

**[0022]** FIG. 10 illustrates the coordinate references for the outline camera image.

**[0023]** FIG. 11 illustrates the coordinate references for the outline camera image including the outline vanishing point.

**[0024]** FIG. 12 illustrates the coordinate references for the groove camera image including the groove vanishing point relating to the y-axis projection.

**[0025]** FIG. 13 illustrates the coordinate references for the groove camera image including the groove vanishing point relating to the x-axis projection.

**[0026]** FIG. 14 illustrates an angular coordinate system for a master key.

#### DETAILED DESCRIPTION OF THE INVENTION

**[0027]** Reference will now be made in detail to exemplary embodiments of the present invention, examples of which are illustrated in the accompanying drawings. It is to be understood that other embodiments may be utilized and structural and functional changes may be made without departing from the respective scope of the present invention.

**[0028]** A system and method for identifying a key blank are provided. The system (“key ID system”) analyzes a master key to be duplicated, such as a house key, car key or other key, and determines the appropriate key blank to be used in duplicating the master key. The system and method described herein may be used independently to determine a proper key blank, or may be used in conjunction with other systems to narrow the field of prospective key blanks. Moreover, it will be understood that existing key identification systems may be modified or retrofitted to implement some or all features described herein.

**[0029]** The key ID system may scan a master key to determine traits and characteristics of the master key. Based on these characteristics, the key ID system may then determine the proper key

blank to be used to duplicate the master key. The key ID system may include any means known in the art for determining the traits and characteristics of the master key geometry. For example, the key ID system may include an imaging system, such as a camera, laser, or any other imaging system known in the art. The imaging system may scan the master key to determine characteristics of the master key, specifically characteristics that may be unique to a specific key blank. While the key ID system is described herein as including an imaging system, it will be appreciated that other known methods or devices, such as electrical or mechanical sensors, may be used in place of or in conjunction with the imaging system to determine the traits and characteristics of the master key geometry.

**[0030]** With reference to FIG. 1, a master key 10 is depicted. The master key 10 may include standard key features such as a head 16 connected to a blade 18 and a groove 11. The groove 11 may comprise a channel, opening, geometric shape, or other indentation formed in the blade 18. A master key 10 may include a single groove 11 on one side of the blade 18, a single groove 11 on each side of the blade 18, multiple grooves 11 on either side of the blade 18, or any other configuration of grooves 11 with respect to the blade 18. Further, it will be appreciated, that the master key 10 may be any key and is not limited to keys having a head 16, blade 18 or groove 11.

**[0031]** The key ID system may include a key holder to hold the master key. The key holder may be any device capable of holding or supporting a master key. For example, as shown in FIGS. 2a and 2b, the key holder 13 may comprise a lower support 15 and an upper door 12 to close onto the key. The key holder may alternatively comprise a clamp, gripper, platform, suspension, or any other device configured to hold the master key 10.



**[0032]** In an embodiment, the key ID system includes a camera system. The camera system includes one or more cameras configured to record images, such as digital images, of the master key. The camera system may further include other components to assist in recording images of the master key, such as lights and mirrors. The lights may be positioned to enhance the clarity and quality of the image recorded by the camera. The mirrors may be positioned to allow a camera in a first position to record an image of the key from a second position. The mirrors may further allow a single camera to record multiple images of the master key from different angles, thereby increasing the amount of information related to the master key recorded by a single camera.

**[0033]** The key ID system may include a logic to analyze images captured by the imaging system. As used herein, the term “logic” includes but is not limited to a software, a firmware, an executable program, a hardware or hard-wired circuit, or combinations thereof. For example, based on a desired application or needs, a logic may include a software controlled microprocessor, discrete logic like an application specific integrated circuit (ASIC), an analog circuit, a digital circuit, a programmed logic device, a memory device containing instructions, or the like. Logic may include one or more gates, combinations of gates, or other circuit components. Logic may also be fully embodied as software. Where multiple logical logics are described, it may be possible to incorporate the multiple logical logics into one physical logic. Similarly, where a single logical logic is described, it may be possible to distribute that single logical logic between multiple physical logics.

**[0034]** The logic may be configured to determine a correlation or likelihood of a match between a known key blank and the master key. For example, the logic may include a database to store key related information (“key data”). The key data may include characteristics of known

key blanks, such as length, shape, biting information, size, shape and location of key grooves, and other geometric and physical characteristics of known key blanks. The database may be integral with the logic, in communication with the logic, or remotely accessible to the logic. The database may associate key data with specific key blanks or with types or groups of key blanks. For example, the database may associate key data with specific key manufacturers or different types of keys such as house keys or car keys. The key ID system may access the database to compare scanned characteristics of the master key with the stored key data in the database. Key blanks that do not have characteristics consistent with those of the master key may be then ruled out as possible matches for the key blank. The key ID system may scan the master key 10 one or more angles and compare the scanned data with stored key data.

**[0035]** The key ID system may scan a master key 10 to determine information related to the groove 11. Keys and key blanks commonly include a groove 11 or grooves 11 in the blade 18 of the key. Characteristics of the grooves 11 may be unique to a given key blank or group of key blanks. For example, the size, location, angle, and other geometric parameters of a given groove may be unique to a key blank or blanks. Further, the location of a groove 11 on a first side of the key blade (“top groove”) may be unique with respect to the location of a groove 11 on the second side of a key blade (“bottom groove”).

**[0036]** The key ID system may analyze various aspects of the groove 11 of a master key 10. For example, the imaging system may capture an image of the groove 11 from a position perpendicular to the key blade 18, as illustrated by the overhead camera 20 in FIG. 2a. This camera angle provides a top view of the blade 18 and allows the overhead camera to scan the length of the groove 11. The imaging system may also capture an image of the groove 11 from the end of the tip 14 at an angle parallel to the blade 18. This angle provides a view of the groove

11 cross-section. However, neither overhead scanning of the groove 11 nor parallel scanning of the groove 11 provide sufficient contrast between the groove 11 and the rest of the key 10 to effectively determine certain parameters of the groove 11.

**[0037]** In many keys, a groove 11 extends from the shoulder 16 through the tip 14 of the key 10. Therefore, the shape and contours of the tip geometry reflect characteristics of the groove 11. Accordingly, unique characteristics of a master key may be determined by scanning the tip 14 from an angle designed to capture the top groove or bottom groove characteristics. This may be best accomplished by scanning the tip 14 at an angle other than perpendicular or parallel to the blade 18. For example, as shown in FIG. 2a, the key ID system may include a camera 22 facing the tip 14, and positioned at an angle slightly above parallel to the blade. In an embodiment, the camera is positioned facing the tip of the key 10, between 5 and 15 degrees from parallel to the blade of the key 10. This positioning allows the camera 22 to capture the contours of the tip 14 formed by the bottom groove 11. Alternatively, it will be appreciated that the camera may be positioned similarly underneath the key to capture the contours of the tip 14 formed by the top groove 11. As illustrated in FIG. 3, the camera 22 may capture a silhouette of the bottom groove. This silhouette may be unique to a key blank or group of key blanks, thereby narrowing the field of prospective key blanks.

**[0038]** It will be appreciated that configurations other than the camera configuration shown in FIG. 2a may be used to capture the tip-groove geometry. For example, the key ID system may include only a groove camera 22 without any overhead camera 20. Further, the key ID system may include a plurality of mirrors to allow a single camera at a remote position to capture multiple angles of the master key, including angles of the tip 14. In an embodiment, as shown in FIG. 4, a first mirror 30 may be positioned to provide a top view of the tip 14 from behind the

key 10. A mirror may be similarly positioned below and behind the key 10 to capture an image of the bottom groove 11. This view allows the camera to capture the contours of the tip 14 formed by the top groove 11. A second mirror 32 may also be positioned to provide a top view of the tip 14 from in front of the key 10. This view allows the camera to capture the contours of the tip 14 formed by the bottom groove 11. It will be appreciated that the key ID system may include any number of cameras, mirrors, and other imaging devices to capture the desired views of the contours of the tip 14.

**[0039]** In an embodiment, the key ID system scans the master key 10 to capture the silhouette of the blade 18, as shown in FIG. 5. This silhouette is used to determine the outline shape of the tip 14 in order to isolate groove geometry from the tip geometry. The key ID system may also scan the tip 14 from an angled position to capture the contours of the tip 14 formed by the groove 11.

**[0040]** As shown in FIG. 6, a trigonometric projection of the tip 14 may be used to identify the portion of the tip contour that is due to the groove shape. Specifically, contour data related to contours of the groove 11 may be determined by calculating a set of scalar variables based on image information and machine constants. As described herein, points in the image taken by the overhead camera 20 are mapped to their corresponding points from the image taken from the groove camera 22.

**[0041]** The contour image may be compiled from data obtained by the overhead or outline camera 20. Once the outline or contour data has been generated, the outline image is rescanned to generate a set of data points, as shown in FIGS. 7-9. For example, data points may be generated every .005 inches along the tip of the key. The data point interval of the rescanned or resampled image may be adjusted based on the required accuracy for groove identification and

the optical characteristics of the outline and groove cameras. For example, the data point interval may be 0.002 in order to obtain a better defined sample.

**[0042]** The groove contour may be compared to contours of known key blanks stored in the database to determine a matching key blank. Tolerance and/or correlation values may be set to determine if the comparison yields a match. FIG. 8 illustrates a comparison between a scanned key tip contour and stored key data of a known key blank. The statistical correlation value between the data sets is approximately .985, indicating a match between the master key and compared key blank. FIG. 9 illustrates another comparison between a scanned key tip contour and stored key data of a known key blank. The statistical correlation value between the data sets here is approximately .879, indicating that the master key and compared key blank do not match.

**[0043]** Referring to FIG. 2a, the plane of the overhead camera 20 image intersects the groove camera 22 image at the lower edge of the door opening 12. The overhead camera 20 observes the profile of the key 10 while the groove camera 22 is focused on the tip of the key 10. With reference to FIGS. 10-13, the line at which these two images intersect, referred to as the door axis 52, is a primary axis for purposes of determining contour data. The primary reference or origin point of the door axis is located at the center of the door 12. The plane of the door also passes through this intersection and is by definition perpendicular to the overhead camera 20 image plane.

**[0044]** A silhouette image of the key 10 may be captured by the groove camera 22. To capture the silhouette image, the key ID system may utilize elements such as a light source 24 and a diffuse reflector element 26, as shown in FIGS. 2a and 2b. The light source 24 may be shielded with a light shield 28 to illuminate the reflector element 26 while avoiding the tip of the key 10.

In an embodiment, the directional light from the light source 24 is angled to direct the light substantially on the diffuse reflector element 26, but not on the tip of the key 10.

[0045] The light source 24 may be any light source known in the art. For example, the light source 24 may be a series of discrete LED lights substantially oriented in a row. It will be appreciated, however, that the light source 24 may be any lights arranged in any configuration. The diffuse reflector element 26 may be affixed to the interior surface of the door, such that when the light from the light source 24 strikes the diffuse reflector element 26, the diffuse reflector element 26 provides a backlit area. In other words, this arrangement provides a backlit area behind the key 10 with respect to the groove camera 22 while minimizing the amount of light that is directed toward the key 10. Thus, the groove camera 22 may view the key 10 tip as a substantially dark or black feature, similar to that shown in Fig. 3. It will be appreciated, however, that the key ID system may include any additional lights, such as backlights, positioned throughout the system.

[0046] With reference to Fig. 2b, an alternative configuration for the key ID system is shown. The groove camera 22 may be mounted in a vertical camera box 23. The vertical camera box 23 mounts the groove camera 22 at the bottom directed upward toward a mirror 25 mounted at the other end of the vertical camera box 23. The mirror 25 is directed toward the key 10 tip, such that the angle of incidence is nominally about 15 degrees. However, it will be appreciated that the angle of incidence upon the key 10 of the image may be any angle, preferably between approximately 5 degrees and approximately 45 degrees.

[0047] The key 10 is not constrained to a particular orientation or position when held within the key holder 13. With reference to FIG. 14, the key may be tilted or yawed in a plane perpendicular to the orientation of the outline camera 20; tipped up or down relative to the plane

defined perpendicular to the door opening 12; and rotated around the axis of the key blank it self (rolled) or combinations of any of the preceding as well as variations caused by the overall length of the key blade 10 that would position the tip of the key at various focus positions relative to the groove camera 22. Thus it is necessary to correct for the optical distortions and transform the images obtained from the two different cameras to obtain an effective image of the tip 14.

**[0048]** The concept of a vanishing point is used to handle the foreshortening of the key 10 when viewed by the groove camera 22. The effects of this foreshortening vary greatly as the end of the key 10 is tipped up or down slightly by the clamping action of the door 12. The distance from the door to the vanishing point may be substantially affected by this tipping action.

**[0049]** To compensate for the angle between the groove camera 22 and the key 10, the distance from the tip of the key to the door axis is readily determined for both the overhead camera 20 image and groove camera 22 image. The ratio of these distances (hereinafter “GrooveLR”) is dependent both on the angle between the groove camera 22 angle and the key tipping angle. The actual values of these angles may be ignored because only the ratio is required for the calculations to compensate for the key location.

**[0050]** In an embodiment, a groove image vanishing point may be determined by multiplying the distance to the outline image vanishing point by the ratio GrooveLR. The outline image vanishing point may first be empirically determined. For example, previous test indicate a sample outline image vanishing point to be 20 inches from the origin of the door axis. The outline image vanishing point depends on the configuration of the key ID system and the characteristics of the cameras. Vanishing points may be assumed to be on the door centerline

axis. However, in other embodiments vanishing points may be offset from the door centerline axis with additional compensation.

**[0051]** FIGS. 10-13 illustrate a crop box 50 used for limiting the image of the key 10. An example of an outline crop box 50 is shown in FIG. 5, where the outline crop box 50 defines the outer periphery of the image. The outline crop box functions to limit the image that is actually processed by the system, even though the actual image captured by the camera is larger than the outline crop box 50. The outline vanishing point is far to the left of the outline crop box 50 along its X axis shown as point 52. The groove vanishing point is above the groove crop box 60, shown in FIG. 6, along its Y axis at point 62. The groove crop box 60, serves a similar function to the outline crop box 50, namely it reduces the overall image processed by the system to a subset of the actual image captured, in this case by the groove camera 22. This outline image vanishing point distance is combined with  $vOutX$  to calculate the x axis distance from the vanishing point to the starting point. While a specific method determining the vanishing points and associated distances is described, it will be appreciated that other methods may be used.

**[0052]** FIG. 10 shows the position of the starting location relative to the door axis and the Outline Camera image.  $vOutX$  and  $vOutY$  are the x and y coordinates of a point at the tip of a key image that is to be mapped to the groove image. These points correspond to the set of data points that define the tip of the key. The units of the outline camera 20 are in pixels. Thus a series of  $vOutX$  and  $vOutY$  points are created to define the tip of the key.

**[0053]** FIG. 11 shows the starting point translation to distances from the outline view vanishing point. This distance is multiplied by  $GrooveLR$  to yield the outline VPY shown on Fig. 11 and referred to as GVPY (groove image vanishing point distance).



**[0054]** FIG. 12 shows the construction of the projected tip point y axis coordinate. This projection is made on the Groove Camera image plane. The y axis projection is simply the difference between GVPY and GrooveVP.

**[0055]** The x axis projection calculation uses the GVPY to GrooveVP ratio as shown in FIG. 13. The Groove Door X distance may be determined from the outline image. The Groove Door X distance may be scaled by the GVPY to GrooveVP ratio and added to the Groove Crop Box Center distance to find  $gsx$  which is the x axis coordinate. A trim value may be added to enable small physical offsets to be adjusted during machine calibration.

**[0056]** Once each point on the outline camera 20 image has been mapped to the groove camera 22 image, the groove contour data may be determined. FIG. 6 shows a typical groove image with two rows of points drawn at its tip. The row that is touching the tip may be calculated using the method described here. The lower row may be extrapolated from the same data points.

**[0057]** The groove contour is found by measuring the distance from a point that is eight pixels below the mapped point to the actual white to black edge in the groove image. Giving the edge detection software the extra pixels allows it to readily find a transition and allows for small errors if the mapped points are slightly above the actual transition. The set of these distances forms the groove contour.

**[0058]** Various tip shapes and bittings near the tip of the key may affect the image of the grooves as seen by the groove camera 22. Therefore, it may be helpful to manipulate the groove data in an attempt to compute how the grooves would appear if the key blade was cut off square. To accommodate this manipulation, a scan of the outline data (from the outline camera 20 image) along the tip of the key may be performed with respect to a series of lines that are parallel with the axis of the key. This yields a series of measurements that determine the distance from

the edges of the tip of the key to some arbitrary squarely cut edge. These measurements may then be translated to the groove camera 22 image using a process described below. These translated key tip points 62 in the groove image 60 represent the tip of the key as if there were no grooves in the key. Differences between these points and the observed edge of the tip of the key in the groove image 60 represent the actual shape of the grooves as if the key blade was cut off square.

**[0059]** The final task of blank identification is to match the measured contour with the stored characteristics. The type of key 10 may be used to help match the contour with the appropriate data set. For symmetrical double sided keys the direction of the key insertion into the key identification system is irrelevant because the grooves and other features are symmetrical so a single characteristic reference image is stored for those symmetric keys. For most single sided keys, both sides of the key (referred to as left and right) are distinctive. In those cases, the characteristic reference images for each key includes a left and right view. When performing comparisons, right cuts are only matched to data for single cut blanks and only right cut data for those blanks. The data is also aligned so the key reference sides (e.g. in the case of a single sided key, the flat of the blank) are near each other. Often cut key data has many fewer data points so it is assumed data points opposite the reference side is where the metal (and data) have been removed. Double cut keys are matched based on the centerlines.

**[0060]** A series of comparisons may performed between the characteristic reference image that is stored in the database and the actual captured image to compensate for small registration errors. The comparison may be performed via a 2-D correlation analysis described in greater detail below. Specifically, the data may be moved a few data points in each direction. These points may then be compared and analyzed with the best result being chosen as the correct data point.

[0061] Small errors in image registration and performing the transpositions between the images can cause the contour data to be sloped up or down. This is called “roll” and is similar to an airplane roll where the wings are not level. Some level of roll is presumed to be dependent on unique machine set up details. To compensate for this roll, each key ID system may have a roll constant that is used to adjust its measured values. This insures that biases are not a factor when compared to stored data sets that were generated on other machines.

[0062] There also may be roll based on individual key scans. A second roll test may be used to insure the best possible match after the machine roll has been accounted for, and the best horizontal sliding position has been determined. Each comparison is done for as many as 40 different roll values to determine the best match. These calculations assure the comparison is done as accurately as possible. In other embodiments, larger numbers of roll values may be used to handle greater variation in the image captured by the groove camera 22.

[0063] Mathematical correlation may also be as the basis of contour comparison. The correlation may be done based on a standard formula. However, if a data point in the newly collected data or stored data is potentially in error it may be excluded from the correlation calculation. The actual data may have values larger than one as we begin the scan for groove edge data 8 pixels below the first expected transition point. Alternatively, different pixel offsets may be used based on the likelihood of erroneous data. If this data is set to -1 that point is excluded from the calculation. Some stored data is manually set to -1 to compensate for scan errors and to de-emphasize some features of the contours. Errors in edge detection can cause -1 values in the newly scanned data.

[0064] Other methods may be employed to compare the tip image to the reference contours. One method is to fit the contour inside an envelope based on the stored contours. Other

techniques taking advantage of various basis functions are also suitable for performing the comparisons between the characteristic reference images and the captured image in order to obtain a match as well.

**[0065]** A secondary test may be added to the standard correlation calculation. Some key blanks have the same overall pattern of grooves, but the groove depths are exaggerated on some blanks more than others. Since correlation may be insensitive to scale, these blanks may be found to match even where there are large differences in actual groove depths. A second factor based on the standard deviation of the two contour data sets is used to aid in this differentiation. The factor is calculated by taking the difference between the two standard deviations and dividing it by the sum of the two values. This value is then subtracted from the correlation coefficient and a secondary test is performed. The resulting correlation results are used to provide an estimate as to which type of key is inserted into the key ID system. In an embodiment, the correlation results are used in conjunction with the key outline characterization to further narrow and reduce the type of key identified.

**[0066]** Both the standard correlation value and the adjusted correlation value are unitless and non-scaled numbers between 0 and 1. In order to provide more meaning to the values, each is rescaled to a scoring system of 0 to 100% where 0 is considered to be an impossible match and 100 is a perfect match. In an embodiment, standard correlations of 0.60 to 1.0 are rescaled to a score of 0 to 100% and adjusted correlations of 0.50 to 1.0 are rescaled to a score of 0 to 100%. Any correlations of less than the 0.60 and/or 0.50, respectively, are considered to be impossible matches. The total groove scanning score or correlation score may be a weighted average of these two individual scores.

**[0067]** The key ID system as described may be used in conjunction with other known key identification systems. For example, the key ID system may be used in conjunction with user interface identification systems, such as the object identification system disclosed in U.S. Publication No. 2004/0095380 and the key duplication system disclosed in U.S. Publication No. 2007/0224008, each of which are hereby incorporated by reference in their entirety.

**[0068]** The invention has been described above and, obviously, modifications and alternations will occur to others upon a reading and understanding of this specification. The claims as follows are intended to include all modifications and alterations insofar as they come within the scope of the claims or the equivalent thereof.

## CLAIMS

Having thus described the invention, we claim:

1. A key identification system comprising:  
  
an imaging system configured to capture an image of the tip of a master key at an angle between perpendicular and parallel to the blade of said master key, wherein said captured image of said tip includes a contour of a groove in said master key; and  
  
a logic configured to analyze said captured image to determine characteristics of said groove based on said contour and further to compare said characteristics of said groove with groove characteristics of known key blanks to determine the likelihood of a match between said master key and a known key blank.
2. The key identification system of claim 1, wherein said logic includes a database containing data related to characteristics of grooves of known key blanks.
3. The key identification system of claim 1, wherein said imaging system includes a camera.
4. The key identification system of claim 1, wherein said imaging system includes a reflecting device.
5. The key identification system of claim 1, wherein said imaging system includes a light.
6. The key identification system of claim 5, wherein said light is directed toward said reflecting device.
7. The key identification system of claim 5, wherein said light includes a shield to direct light away from said master key.
8. The key identification system of claim 1, wherein said captured image is a digital image.

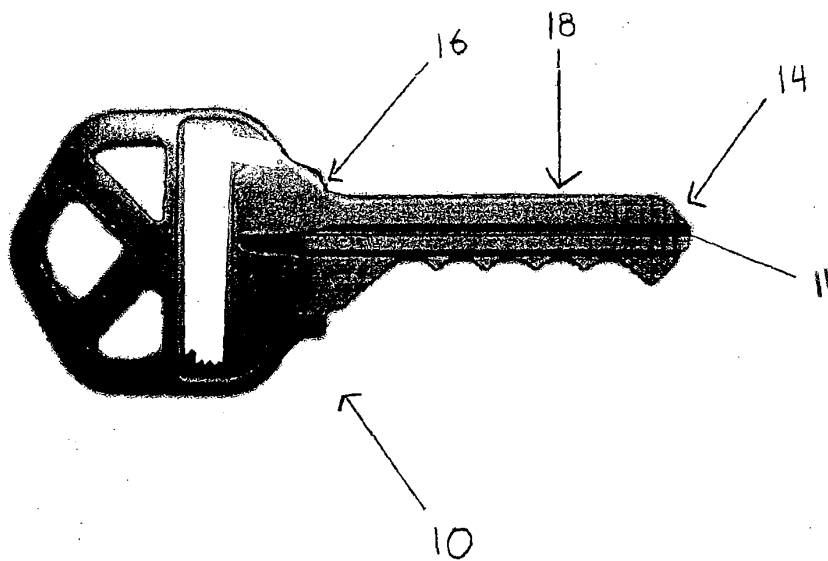
9. The key identification system of claim 1, wherein said captured image comprises a silhouette of said tip of said master key.
10. The key identification system of claim 1, wherein said characteristics of said groove include the geometric shape of said groove.
11. The key identification system of claim 1, wherein said logic accounts for rolling of said master key with respect to said imaging system to determine characteristics of said groove.
12. The key identification system of claim 1, wherein said logic accounts for tilting of said master key with respect to said imaging system to determine characteristics of said groove.
13. The key identification system of claim 1, wherein said logic accounts for tipping of said master key with respect to said imaging system to determine characteristics of said groove.
14. The key identification system of claim 3 further comprising a mirror positioned to reflect an image of said master key to be captured by said camera.
15. The key identification system of claim 1 further comprising an overhead camera positioned above and approximately perpendicular to said master key.
16. The key identification system of claim 15, wherein said groove characteristics are determined based on image data from both said imaging system and said overhead camera.
17. The key identification system of claim 16, wherein said logic calculates the geometry of the groove contour as seen from a view of the tip parallel to the blade based on data from both said imaging system and said overhead camera.
18. The key identification system of claim 16, wherein said logic calculates the geometry of the groove contour as though the tip were squarely cut based on data from both said imaging system and said overhead camera.

19. The key identification system of claim 1 further comprising a key holder configured to hold said master key.
20. The key identification system of claim 19, wherein said key holder includes a lower support.
21. The key identification system of claim 20, wherein said key holder includes an upper door.
22. The key identification system of claim 19, wherein said key holder includes a clamp.
23. The key identification system of claim 3, wherein said camera is positioned above the blade of said key and configured to capture an image of a groove in the bottom of said blade.



## ABSTRACT

A key identification system is provided. The key identification system comprises an imaging system to capture an image of a master key, and a logic to analyze the captured image. The imaging system may be capture an image of a groove in the master key from an angle between perpendicular and parallel to the blade of said master key. The logic analyzes the captured image to compare characteristics of the groove with groove characteristics of known key blanks to determine the likelihood of a match between the master key and a known key blank. The key identification system may further compensate for displacement or orientation of the master key with respect to the imaging system when analyzing characteristics of the groove.



**FIG. 1**

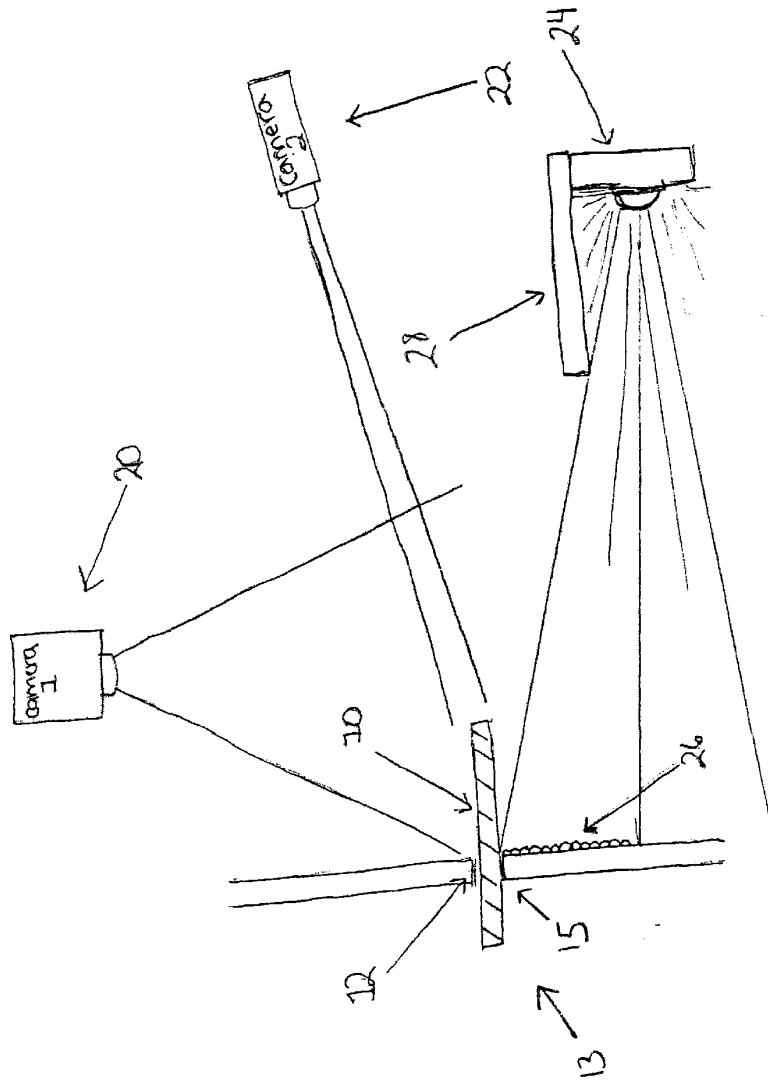


FIG. 2a

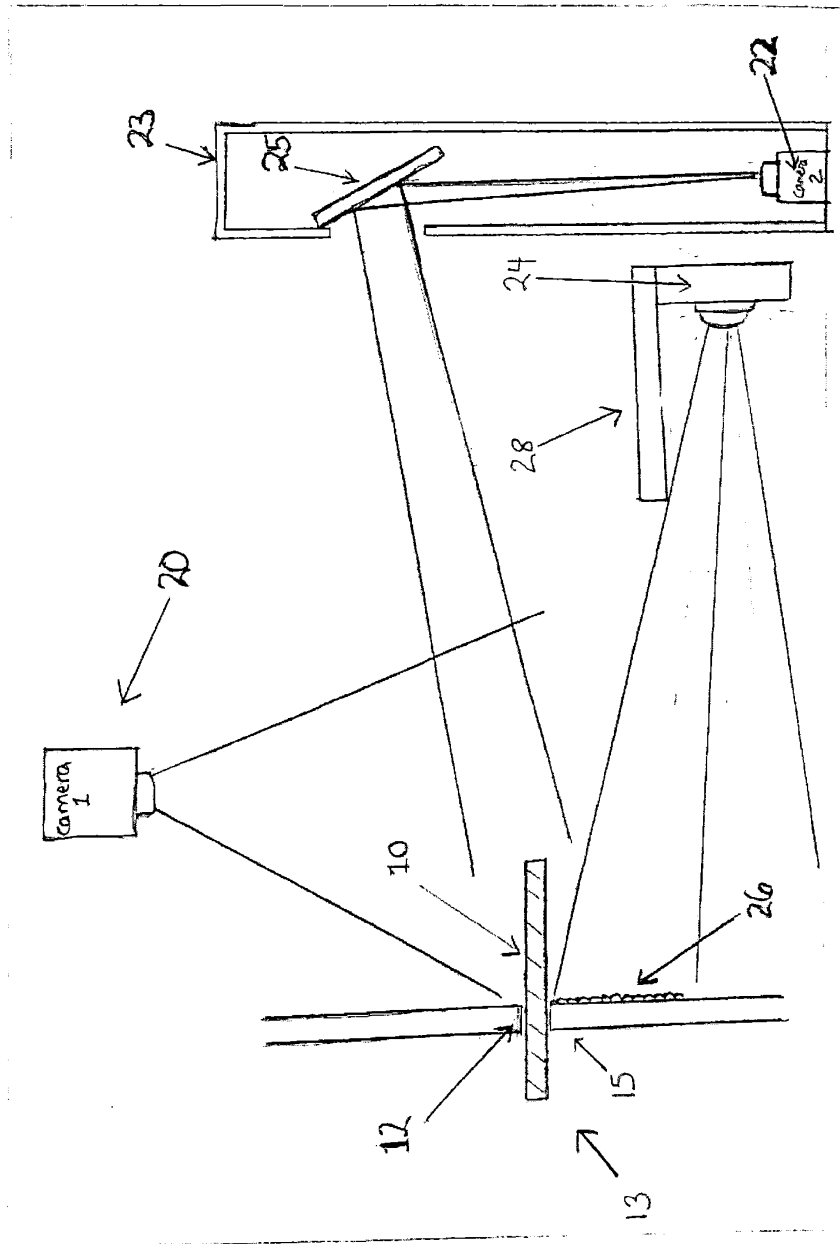
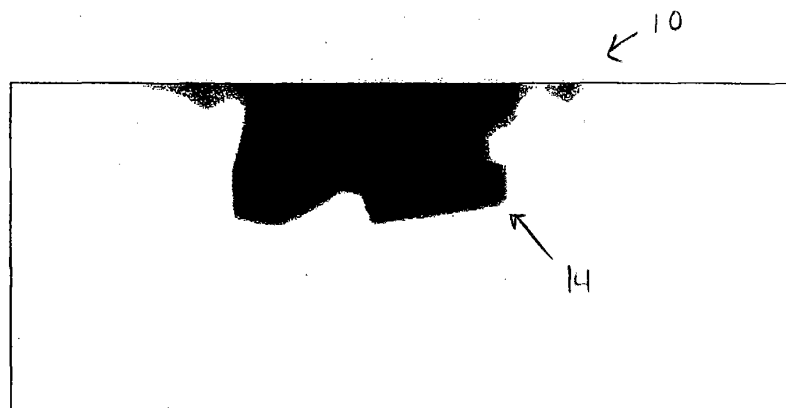
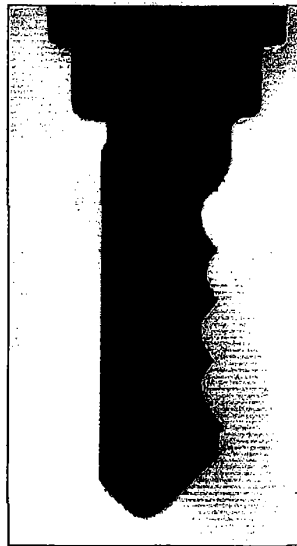
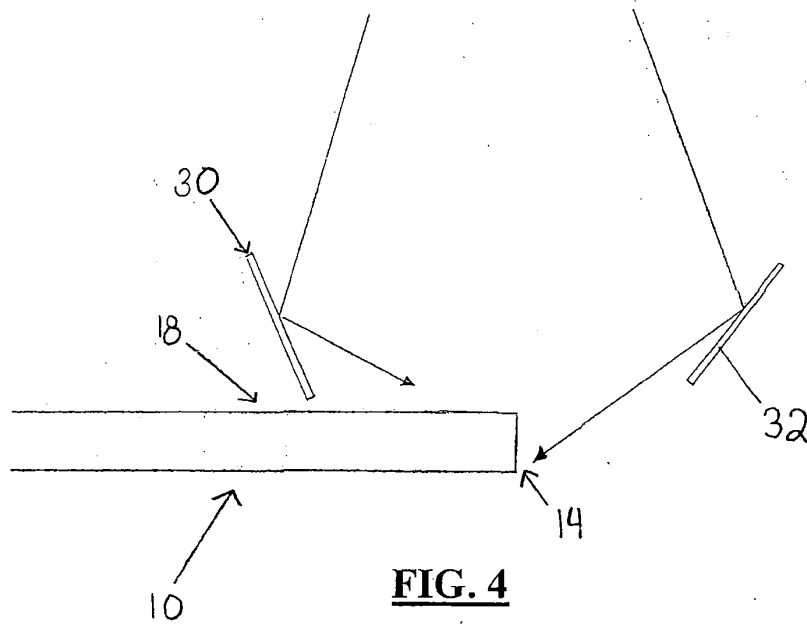
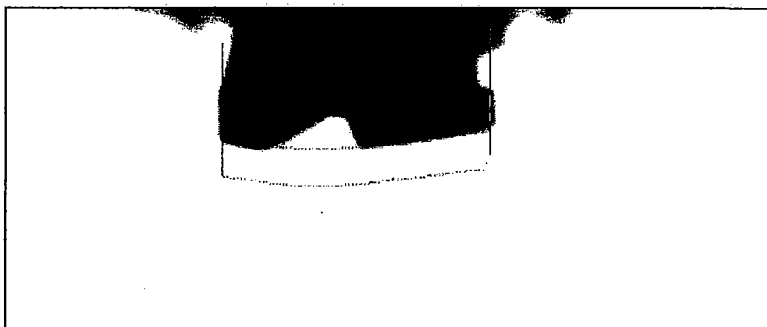


FIG. 2b

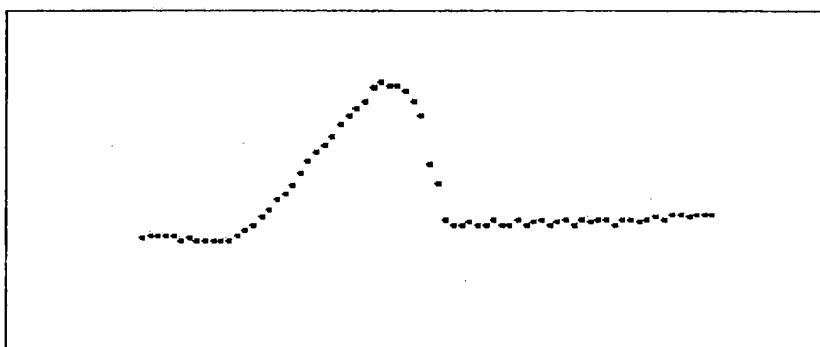


**FIG. 3**

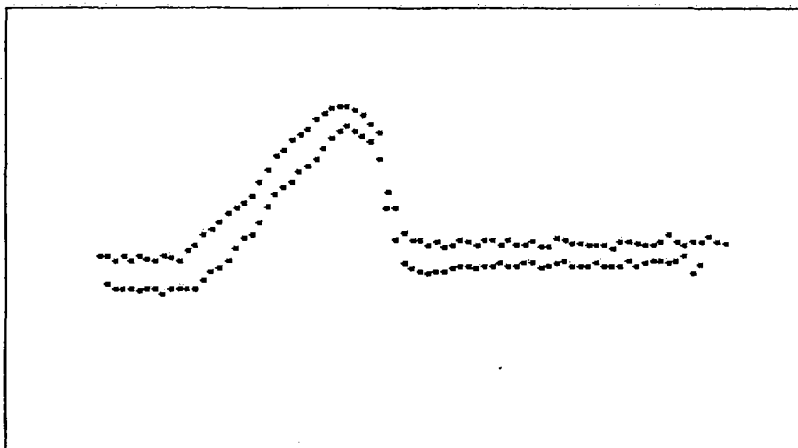




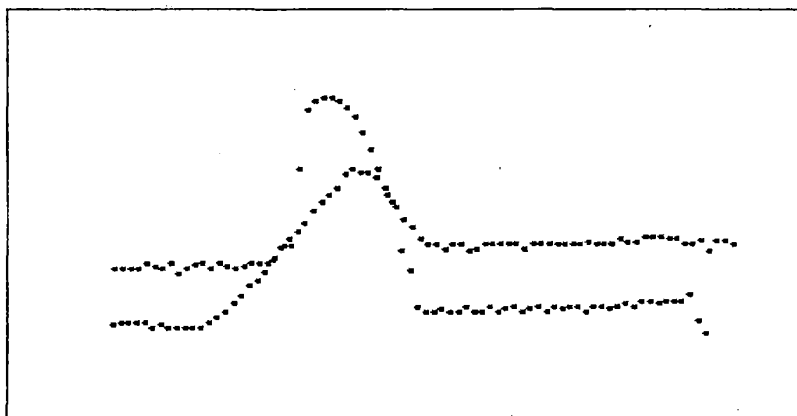
**FIG. 6**



**FIG. 7**

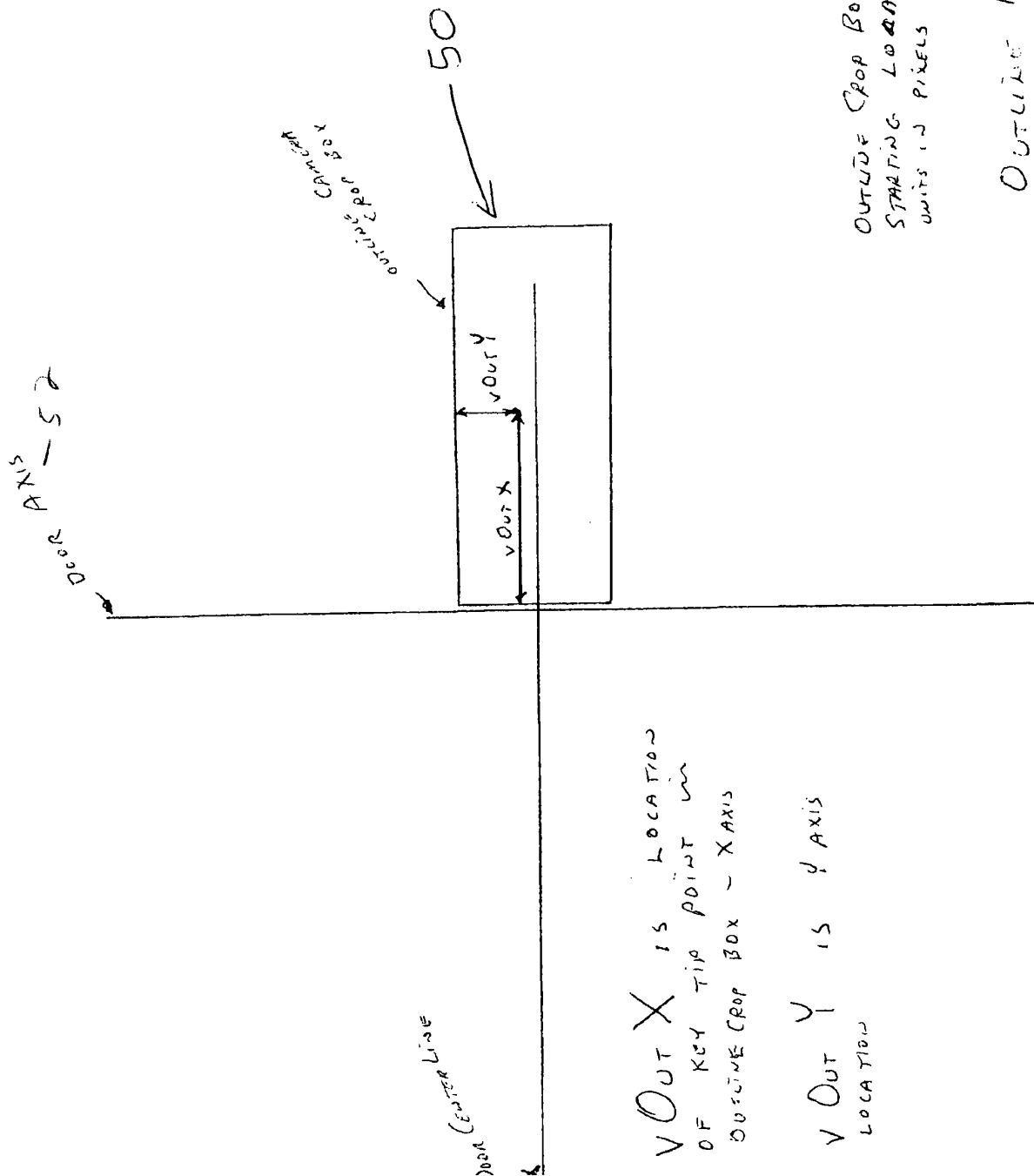


**FIG. 8**



**FIG. 9**





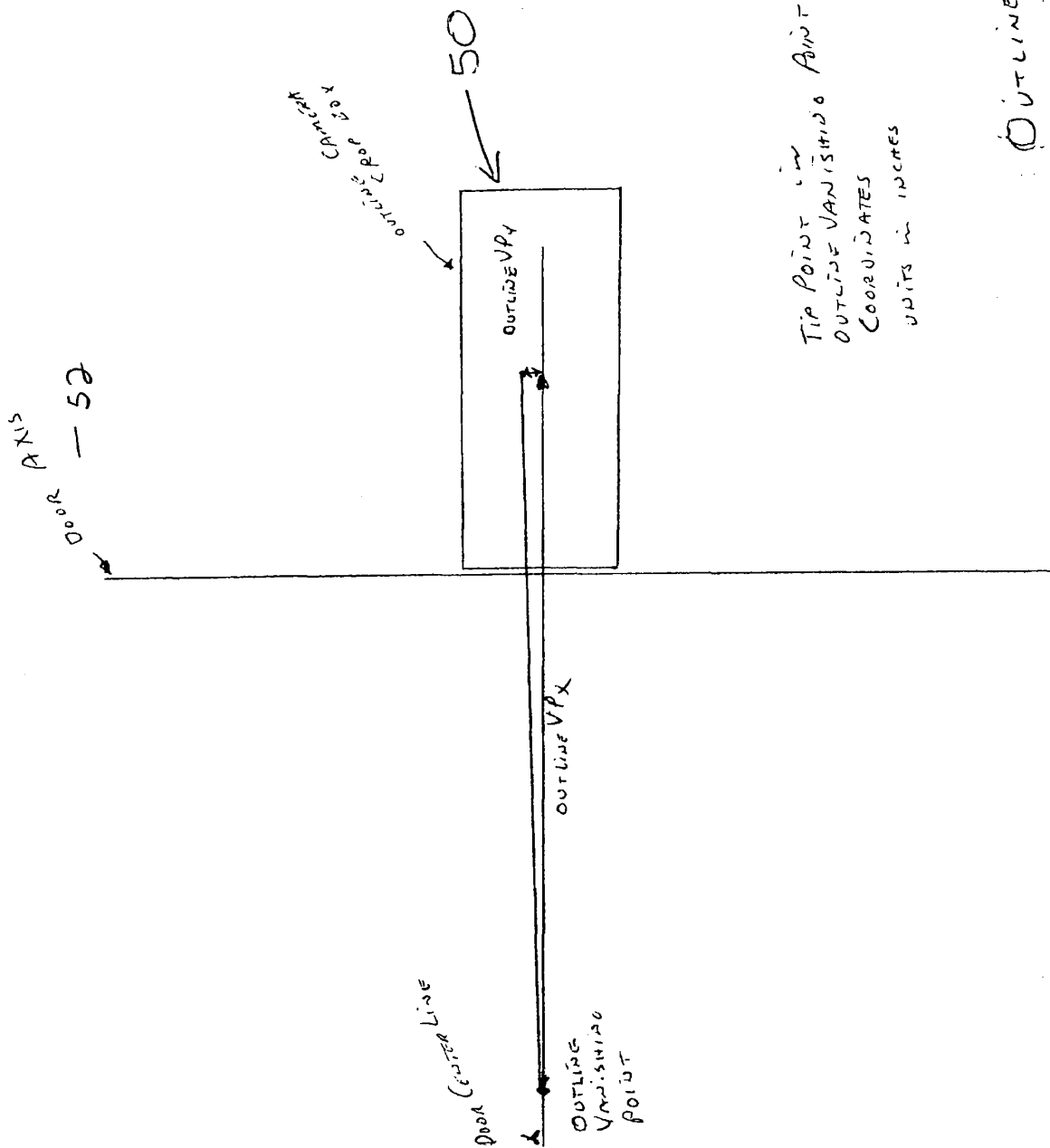
$V_{OUT X}$  IS LOCATION  
OF KEY TIP POINT IN  
OUTLINE CROP BOX - X AXIS

$V_{OUT Y}$  IS Y AXIS  
LOCATION

OUTLINE CROP BOX  
STARTING LOCATION  
UNITS IN PIXELS

OUTLINE IMAGE  
PLAN VIEW  
CHESTER O.D. THOMPSON  
AUGUST 28, 2009

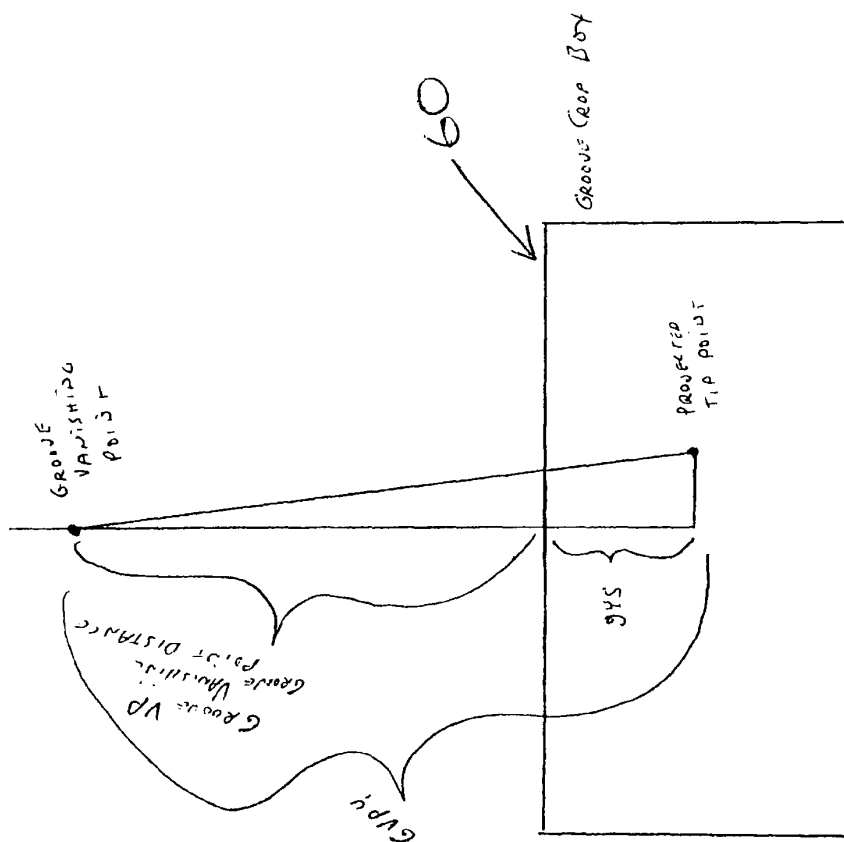
FIG. 10



TIP POINT IN  
OUTLINE VANISHING  
COORDINATES  
UNITS IN INCHES

OUTLINE IMAGE  
PLAN VIEW  
CHESTER O. D. THOMPSON  
AUGUST 28, 2009

FIG. 11



GROOVE IMAGE  
Y AXIS PROJECTION

CHESTER D.D. THOMAS  
8/29/09

FIG. 12



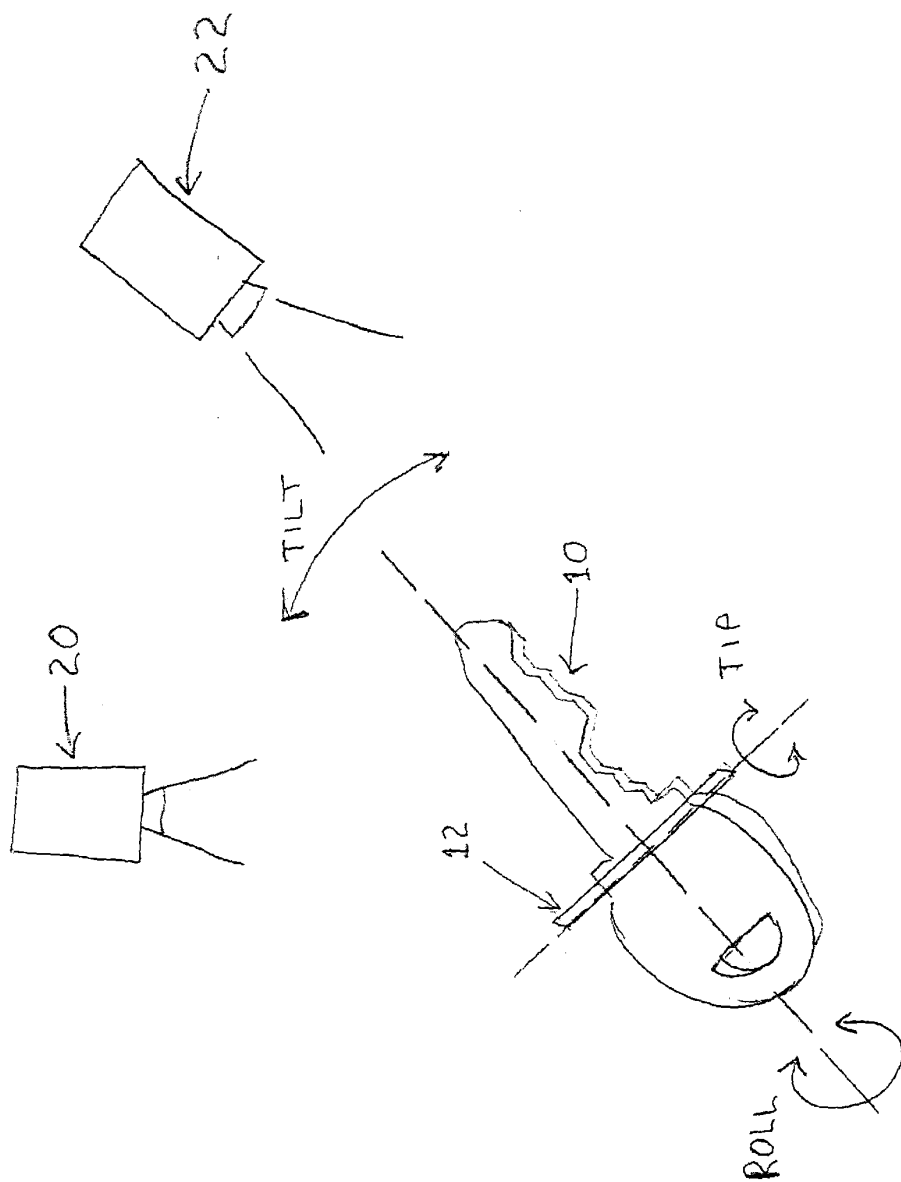


FIG. 14

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING		
First Named Inventor/Applicant Name:		Chester O.D. Thompson		
Filer:		David Bogdan Cupar/Jackie Boziak		
Attorney Docket Number:		16223-00151		
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	82	82
Utility Search Fee	2111	1	270	270
Utility Examination Fee	2311	1	110	110
Pages:				
Claims:				
Claims in excess of 20	2202	3	26	78
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>540</b>

Electronic Acknowledgement Receipt	
<b>EFS ID:</b>	7539718
<b>Application Number:</b>	12772709
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4443
<b>Title of Invention:</b>	KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING
<b>First Named Inventor/Applicant Name:</b>	Chester O.D. Thompson
<b>Customer Number:</b>	33772
<b>Filer:</b>	David Bogdan Cupar/Jackie Boziak
<b>Filer Authorized By:</b>	David Bogdan Cupar
<b>Attorney Docket Number:</b>	16223-00151
<b>Receipt Date:</b>	03-MAY-2010
<b>Filing Date:</b>	
<b>Time Stamp:</b>	17:10:46
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 540
RAM confirmation Number	4068
Deposit Account	130265
Authorized User	
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal of New Application	Transmittal.pdf	278011	no	2
			5dbd8aefcf6e98f3dbbec1dffadbb20a55b50e2		
Warnings:					
Information:					
2		Application.pdf	122457	yes	23
			2dfca93e8776b433872632447b2fed5ea86db6d7		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	19	
	Claims		20	22	
	Abstract		23	23	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	Drawings.pdf	123160	no	12
			b27cee689a6d310135036103a959f25687579777		
Warnings:					
Information:					
4	Fee Worksheet (PTO-875)	fee-info.pdf	36978	no	2
			427098081e787a98e29ef76175aca350528ba256		
Warnings:					
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Total Files Size (in bytes):			560606		

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

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If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Acknowledgement Receipt	
<b>EFS ID:</b>	7539718
<b>Application Number:</b>	12772709
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4443
<b>Title of Invention:</b>	KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING
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<b>Customer Number:</b>	33772
<b>Filer:</b>	David Bogdan Cupar/Jackie Boziak
<b>Filer Authorized By:</b>	David Bogdan Cupar
<b>Attorney Docket Number:</b>	16223-00151
<b>Receipt Date:</b>	03-MAY-2010
<b>Filing Date:</b>	
<b>Time Stamp:</b>	17:10:46
<b>Application Type:</b>	Utility under 35 USC 111(a)

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Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 540
RAM confirmation Number	4068
Deposit Account	130265
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File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal of New Application	Transmittal.pdf	278011	no	2
			5dbd8aefcf8e98f3dbbec1dffadbb20a55b50e2		
Warnings:					
Information:					
2		Application.pdf	122457	yes	23
			2dfca93e8776b433872632447b2fed5ea86db6d7		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	19	
	Claims		20	22	
	Abstract		23	23	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	Drawings.pdf	123160	no	12
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Information:					
4	Fee Worksheet (PTO-875)	fee-info.pdf	36978	no	2
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Information:					
Total Files Size (in bytes):			560606		

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Date: 05/03/2010

PTO/SB/06 (12-04)  
Approved for use through 7/31/2006. OMB 0651-0032  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number <b>12/772,709</b>	
<b>APPLICATION AS FILED – PART I</b>					
(Column 1)		(Column 2)		SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OTHER THAN SMALL ENTITY
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	<b>82</b>	N/A
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	<b>270</b>	N/A
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	<b>110</b>	N/A
TOTAL CLAIMS (37 CFR 1.16(i))	<b>23</b>	*	X 26=	<b>78</b>	X 52=
INDEPENDENT CLAIMS (37 CFR 1.16(h))	<b>1</b>	*	X 110=		X 220=
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$270 (\$135 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR				
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			N/A		N/A
			TOTAL	<b>540</b>	TOTAL
* If the difference in column 1 is less than zero, enter "0" in column 2.					
<b>APPLICATION AS AMENDED – PART II</b>					
(Column 1)		(Column 2)		SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
Total (37 CFR 1.16(i))	*	Minus **	=	X =	
Independent (37 CFR 1.16(h))	*	Minus ***	=	X =	
Application Size Fee (37 CFR 1.16(s))				N/A	
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))				TOTAL ADD'T FEE	
(Column 1)		(Column 2)		SMALL ENTITY	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
Total (37 CFR 1.16(i))	*	Minus **	=	X =	
Independent (37 CFR 1.16(h))	*	Minus ***	=	X =	
Application Size Fee (37 CFR 1.16(s))				N/A	
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))				TOTAL ADD'T FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.					

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/772,709	05/03/2010	Chester O.D. Thompson	16223-00151

**CONFIRMATION NO. 4443**

**FORMALITIES LETTER**



33772  
MCDONALD HOPKINS LLC  
600 Superior Avenue, East  
Suite 2100  
CLEVELAND, OH 44114-2653

Date Mailed: 05/12/2010

**NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION**

**FILED UNDER 37 CFR 1.53(b)**

***Filing Date Granted***

**Items Required To Avoid Abandonment:**

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The oath or declaration is missing.

*A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.*

*Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.*

The application is informal since it does not comply with the regulations for the reason(s) indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
  - The drawings have a line quality that is too light to be reproduced (weight of all lines and letters must be heavy enough to permit adequate reproduction) or text that is illegible (reference characters, sheet numbers, and view numbers must be plain and legible) see 37 CFR 1.84(l) and (p)(1)); See Figure(s) 2A, 2B.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of **\$65** for a small entity in compliance with 37 CFR 1.27, must be submitted with the missing items identified in this notice.

**SUMMARY OF FEES DUE:**

Total additional fee(s) required for this application is **\$65** for a small entity

- **\$65** Surcharge.

Replies should be mailed to:

Mail Stop Missing Parts  
Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.

<https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at <http://www.uspto.gov/ebc>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/hteffer/

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Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101





UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
12/772,709	05/03/2010	3673	540	16223-00151	23	1

CONFIRMATION NO. 4443

33772  
MCDONALD HOPKINS LLC  
600 Superior Avenue, East  
Suite 2100  
CLEVELAND, OH 44114-2653

FILING RECEIPT



OC000000041555294

Date Mailed: 05/12/2010

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Chester O.D. Thompson, Residence Not Provided;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 61/215,152 05/01/2009  
and claims benefit of 61/275,654 09/01/2009

Foreign Applications

If Required, Foreign Filing License Granted: 05/10/2010

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/772,709**

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

**\*\* SMALL ENTITY \*\***

**Title**

KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING

**Preliminary Class**

070

**PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

**LICENSE FOR FOREIGN FILING UNDER**

**Title 35, United States Code, Section 184**

**Title 37, Code of Federal Regulations, 5.11 & 5.15**

**GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

page 2 of 3

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

#### **NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor: Chester O.D. Thompson      Group Art Unit: 3673  
Serial No. 12/772,709      Examiner: Not Yet Assigned  
Filing Date: May 3, 2010      Docket No.: 16223-00151  
Title: KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**RESPONSE TO NOTICE TO FILE MISSING  
PARTS OF NONPROVISIONAL APPLICATION**

Dear Sirs:

In reference to the Notice to File Missing Parts mailed May 12, 2010, for the above-identified Nonprovisional Application, enclosed please find a copy of an executed Declaration and Power of Attorney. Additionally, Applicant submits twelve (12) pages of replacement drawings. The foregoing submission is believed to meet the requirements of the Notice to File Missing Parts. Applicant is filing this Response electronically and paying the \$65 fee through the deposit account. Applicant believes these are the only fees due at this time. The Commissioner is authorized to charge any additional fees or credit any overpayments to our deposit account no. 13-0265.

Date July 12, 2010

/David B. Cupar/  
David B. Cupar, Reg. No. 47,510  
McDONALD HOPKINS LLC  
600 Superior Avenue, E., Suite 2100  
Cleveland, OH 44114-2653  
(216) 348-5400 – Telephone  
(216) 348-5474 – Facsimile

{2220670;}

**DECLARATION AND POWER OF ATTORNEY**

As a below named inventor, I/We hereby declare that:

My/Our residence, post office address, and citizenship are as stated below next to my/our name.

I/We believe I/We am/are the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter that is claimed and for which a patent is sought on the invention entitled:

**KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING**

the specification of which (check one)

\_\_\_\_\_ is attached hereto

OR

  X   was filed on May 3, 2010 as United States Application Number 12/772,709 and was amended on \_\_\_\_\_(if applicable).

I/We hereby state that I/We have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment specifically referred to above.

I/We acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR §1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation application.

I/We hereby claim foreign priority benefits under 35 U.S.C. Section 119(a)-(d) or (f), or Section 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or Section 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT

{2161004:}

international application having a filing date before that of the application on which priority is claimed:

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I/We hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

<u>61/215,152</u>	<u>May 1, 2009</u>
(Application Serial No.)	(Filing Date)

<u>61/275,654</u>	<u>September 1, 2009</u>
(Application Serial No.)	(Filing Date)

I/We hereby claim the benefit under 35 U.S.C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I/We acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C.F.R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Application Serial No.)	(Filing Date)	(Status)(patented, pending, abandoned)
--------------------------	---------------	--

{2161004:}

I/We hereby declare that all statements made herein of my/our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

We hereby appoint the following attorney(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected with:

The Attorneys Associated with Customer No 33772

I/We request that correspondence in connection with this application be directed to:

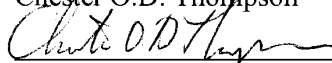
Customer No. 33772

David B. Cupar  
McDonald Hopkins LLC  
600 Superior Avenue, East  
Suite 2100  
Cleveland, OH 44114-2653  
(216) 348-5400

Inventor's Full Name:

Chester O.D. Thompson

Inventor's Signature:



Citizenship:

USA

Post Office Address:

7377 Amanda Place

Painesville, OH 44077 United States

Place of Residence:

7377 Amanda Place

Painesville, OH 44077 United States

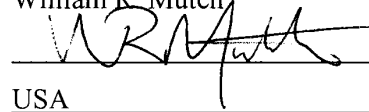
{2161004:}

In re: Thompson et al.  
Attorney Docket No.: 16223-00151

Inventor's Full Name:

William R. Mutch

Inventor's Signature:



Citizenship:

USA

Post Office Address:

35284 Nikki Avenue

North Ridgeville, OH 44039 United States

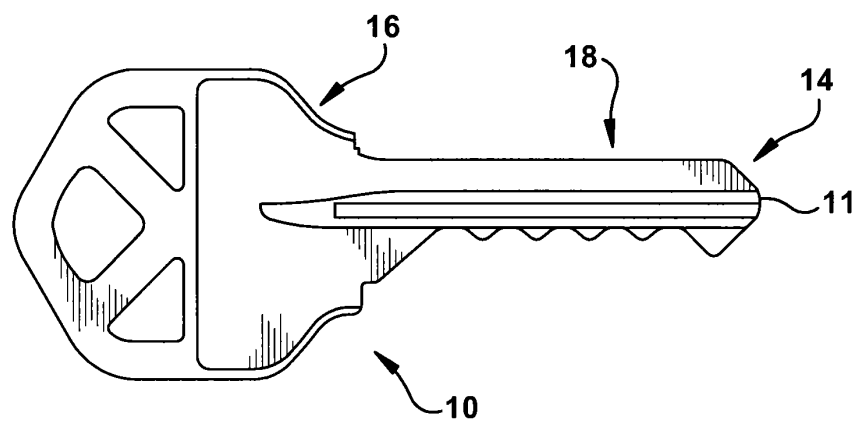
Place of Residence:

35284 Nikki Avenue

North Ridgeville, OH 44039 United States

{2161004:}





**FIG. 1**

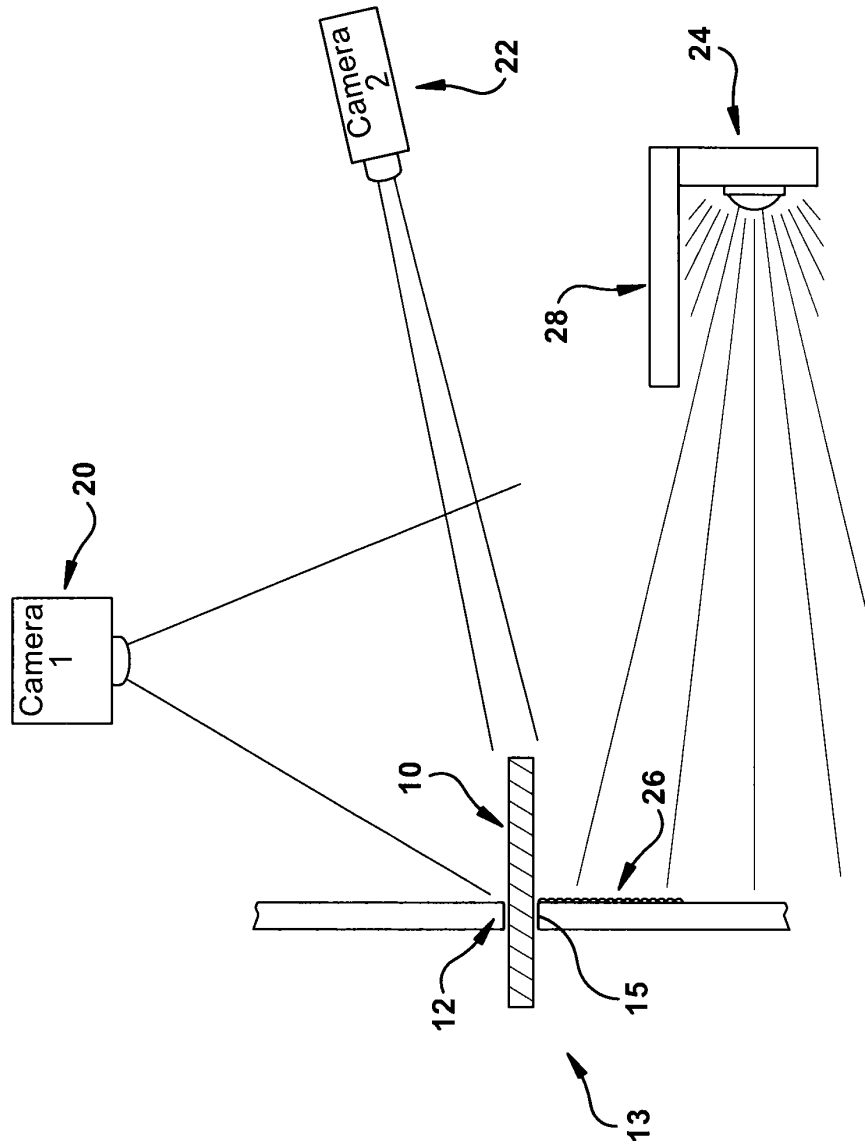


FIG. 2a

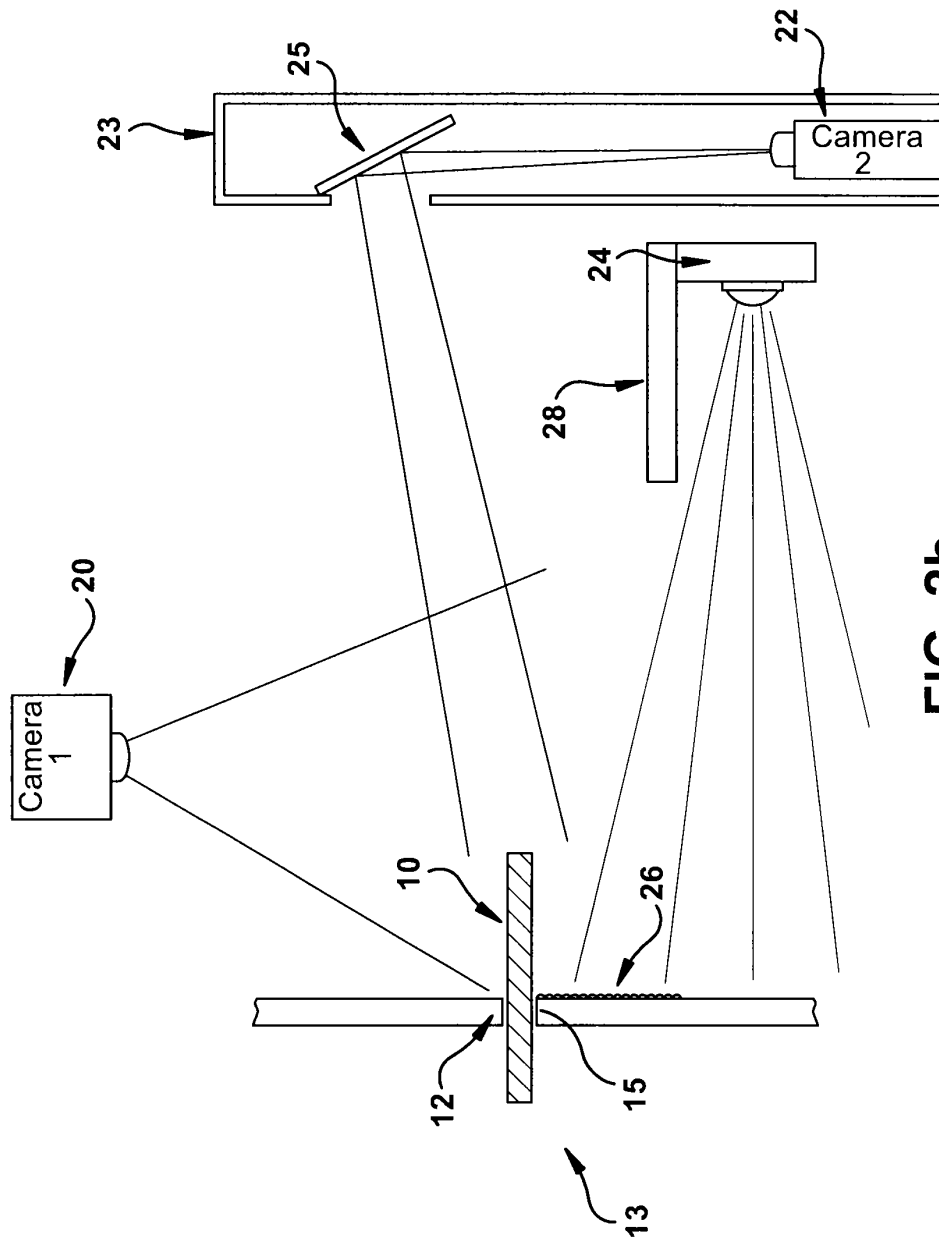
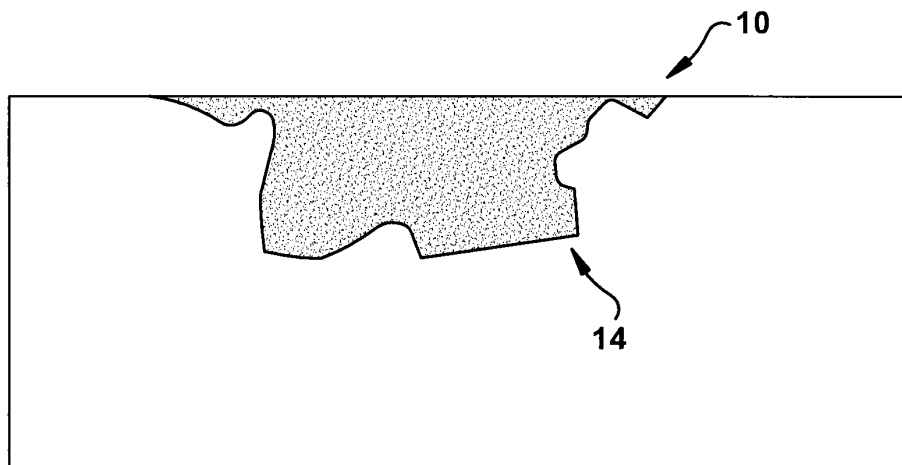
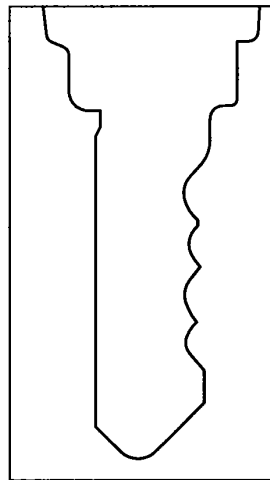
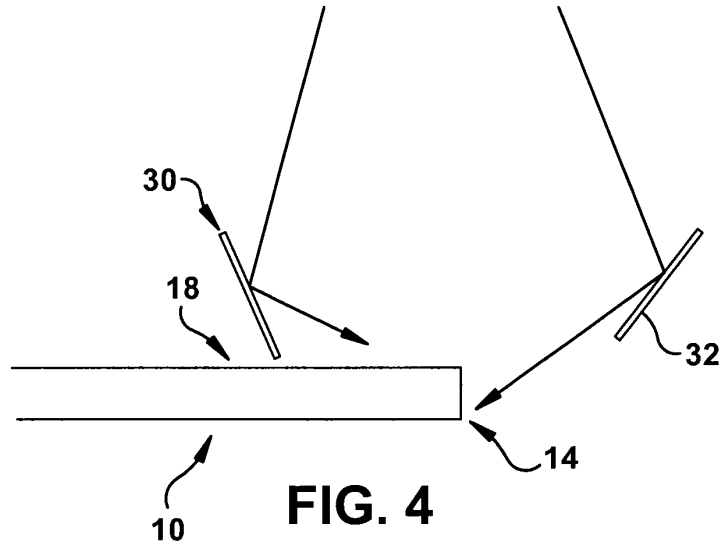
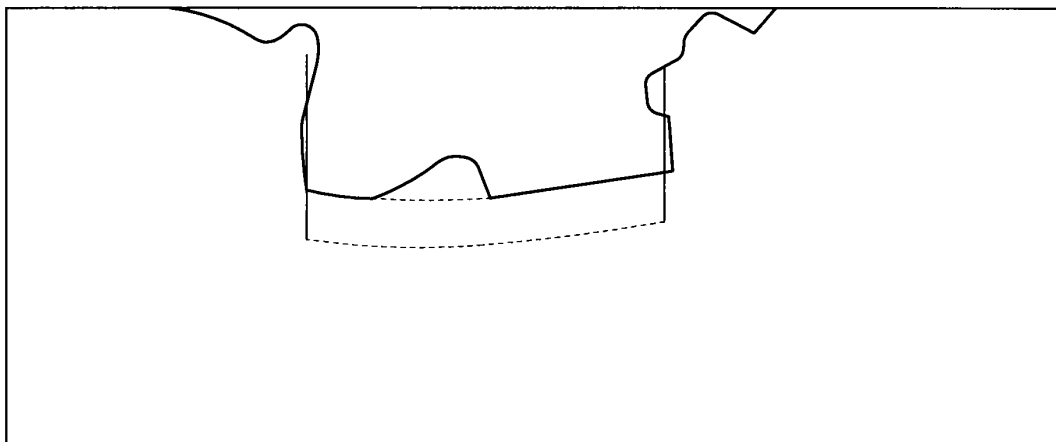


FIG. 2b

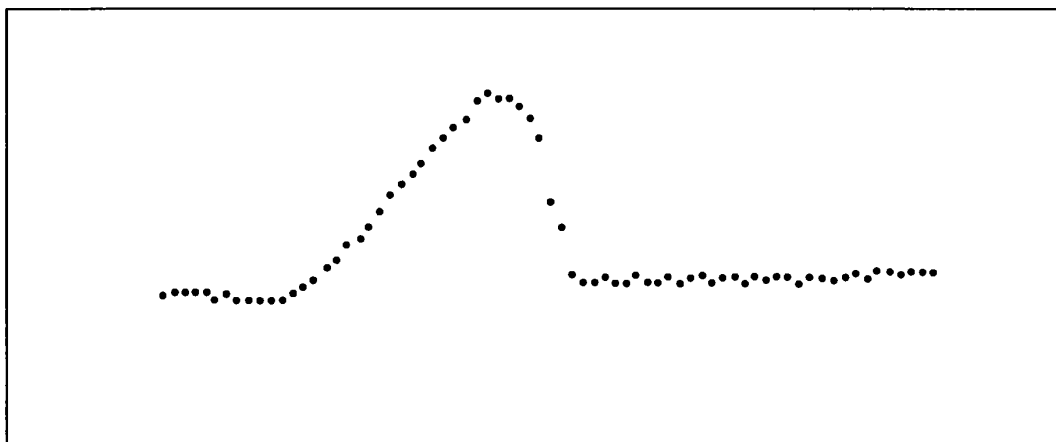


**FIG. 3**

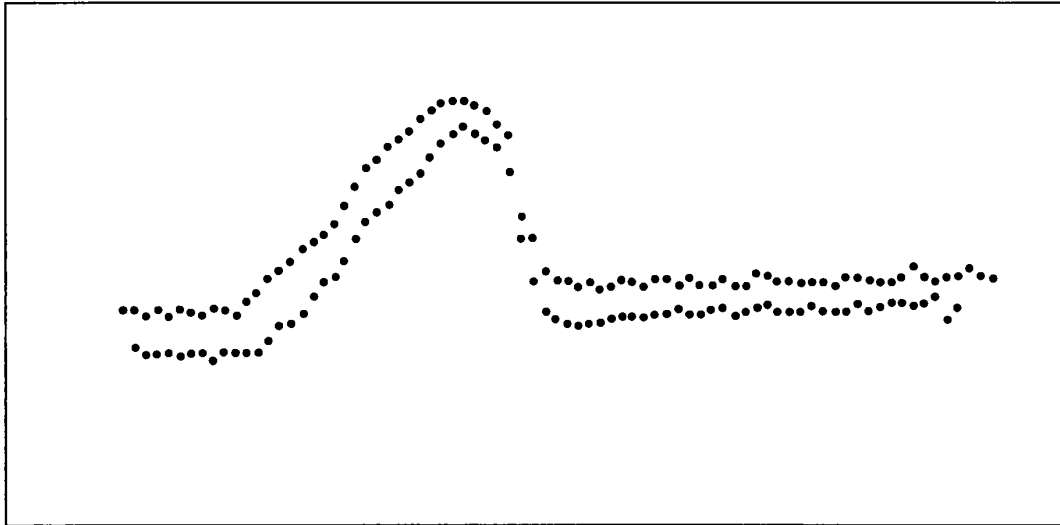




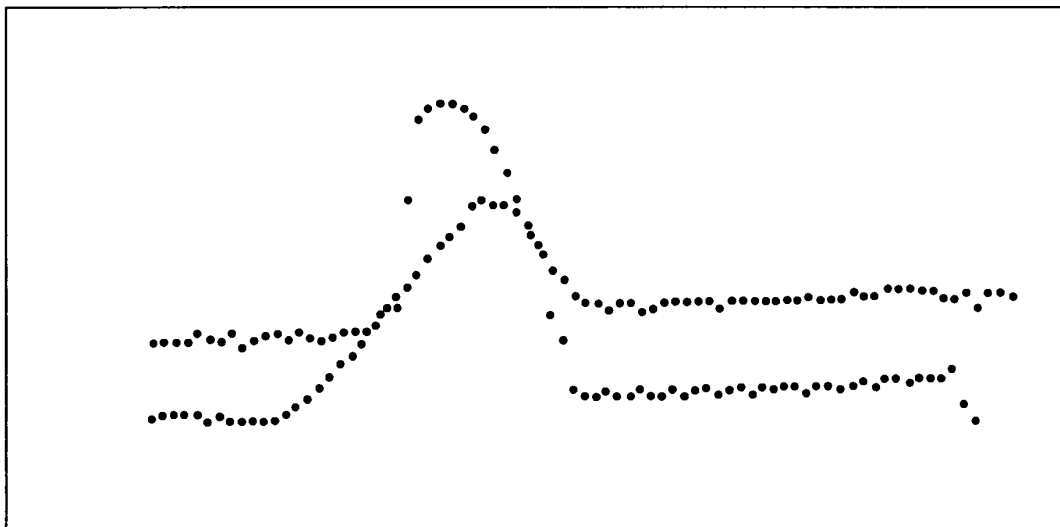
**FIG. 6**



**FIG. 7**



**FIG. 8**



**FIG. 9**

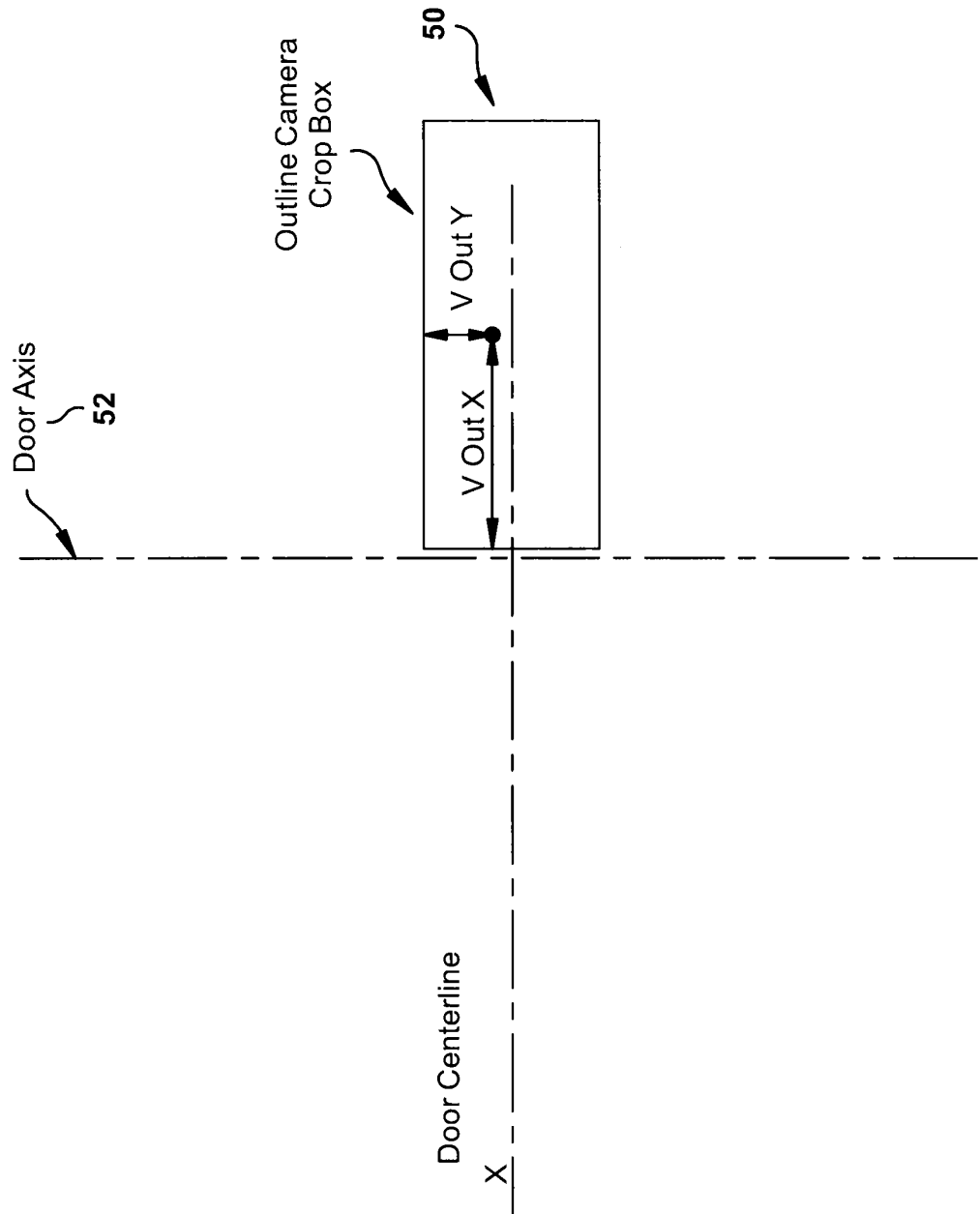


FIG. 10



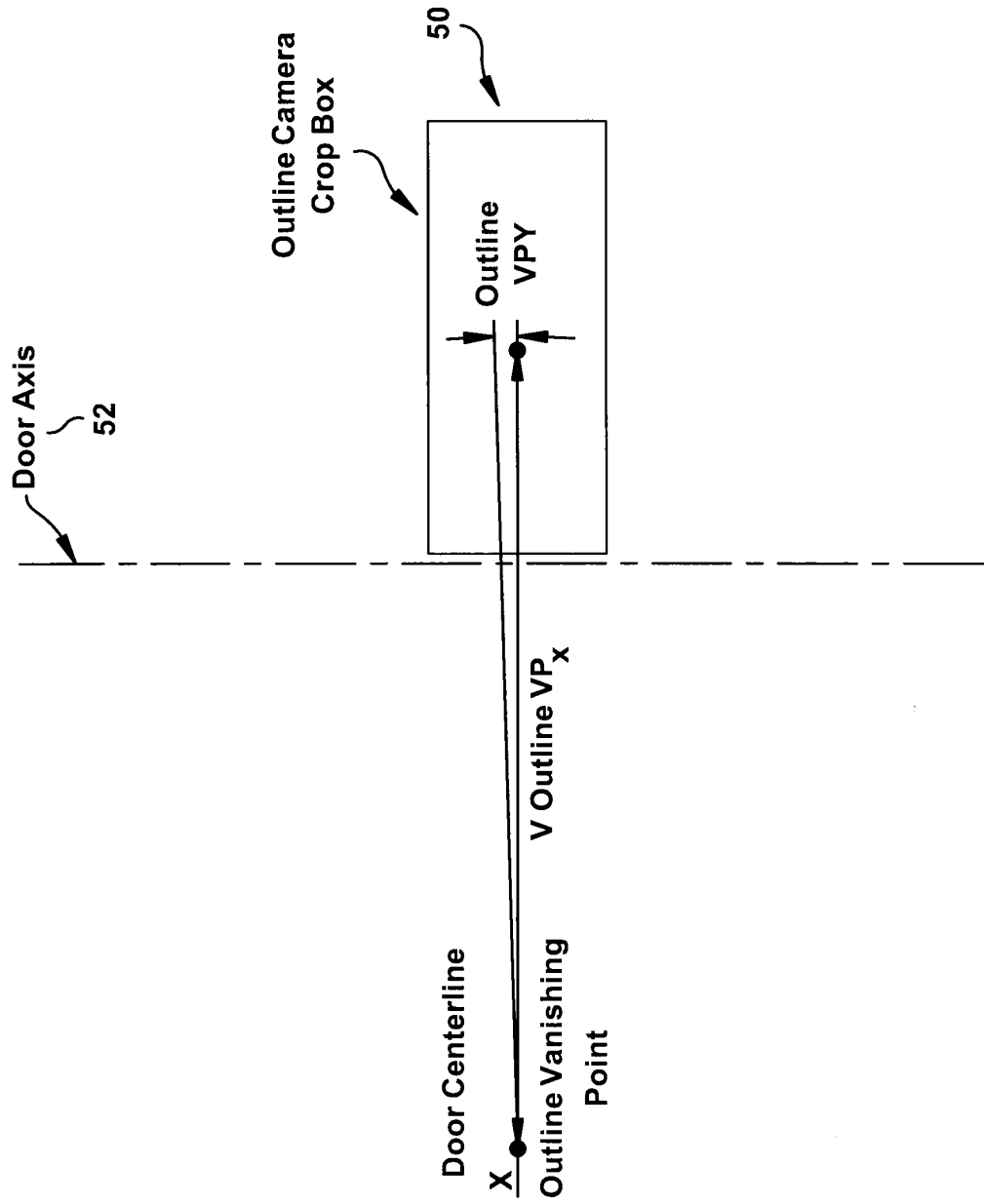
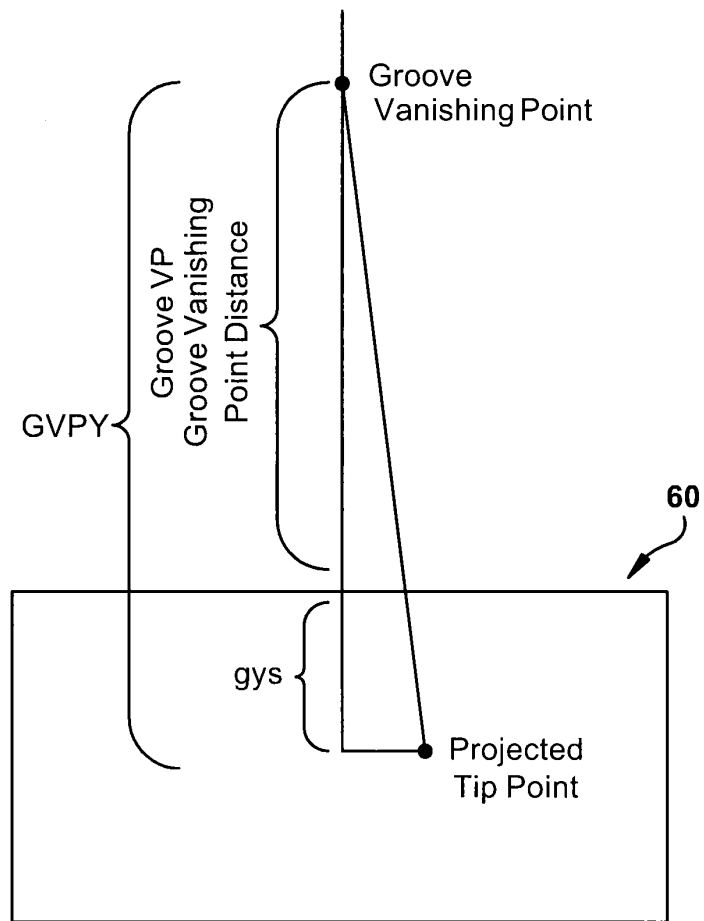
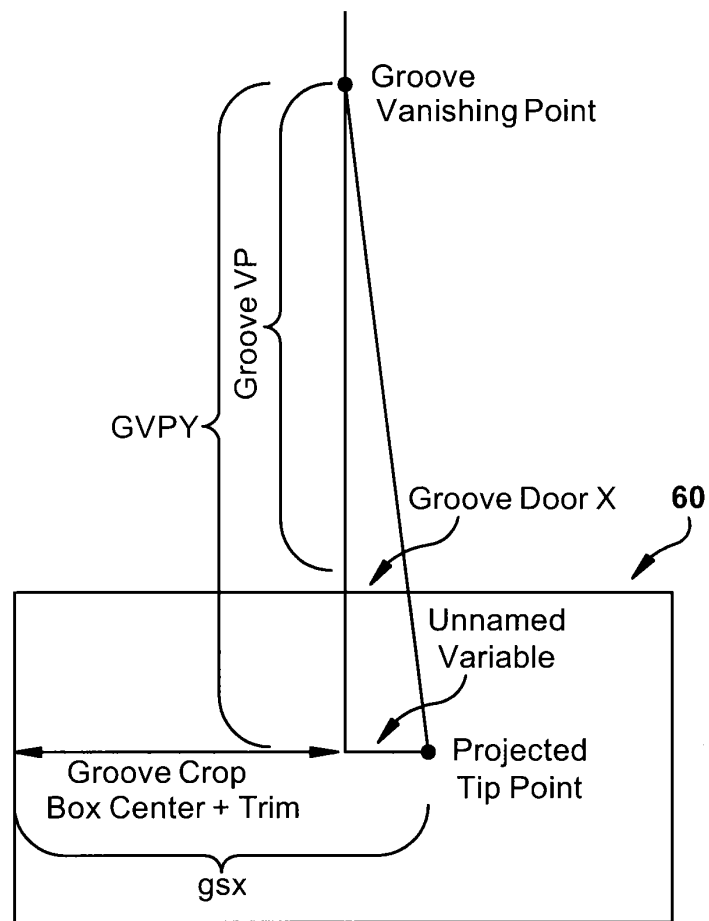


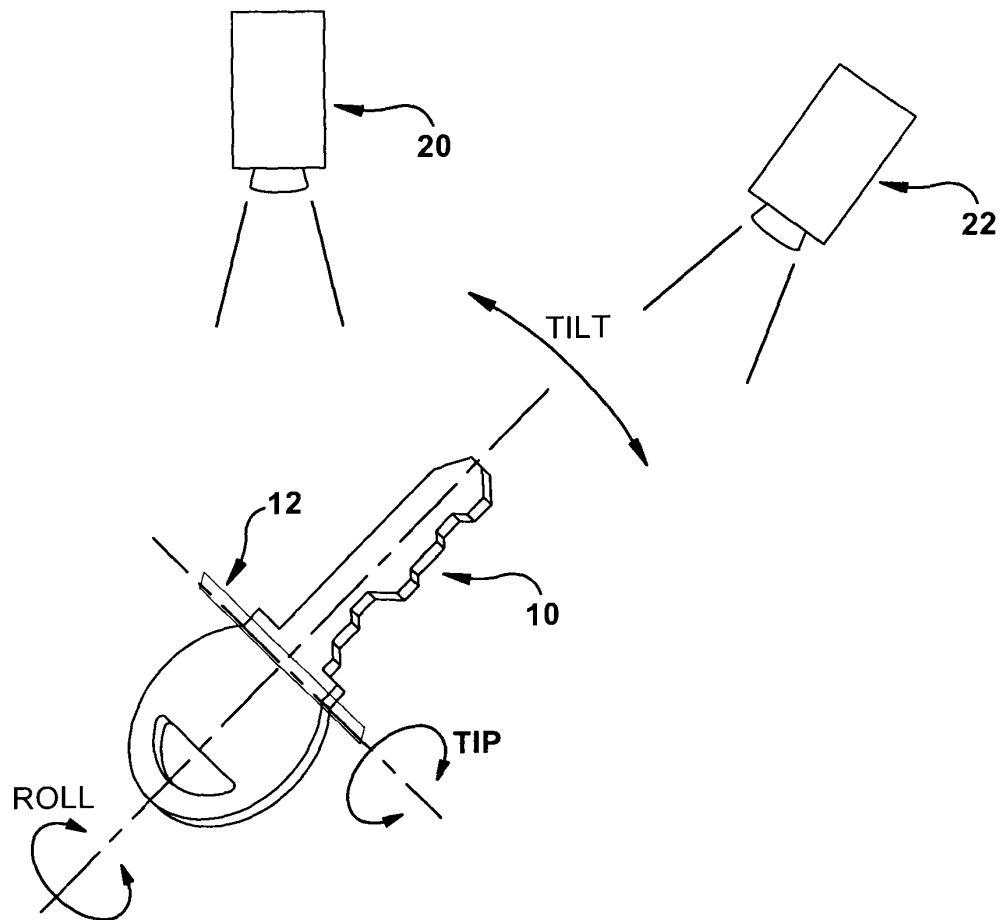
FIG. 11



**FIG. 12**



**FIG. 13**



**FIG. 14**

Electronic Patent Application Fee Transmittal				
<b>Application Number:</b>		12772709		
<b>Filing Date:</b>		03-May-2010		
<b>Title of Invention:</b>		KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING		
<b>First Named Inventor/Applicant Name:</b>		Chester O.D. Thompson		
<b>Filer:</b>		David Bogdan Cupar/Amanda Baiers		
<b>Attorney Docket Number:</b>		16223-00151		
Filed as Small Entity				
<b>Utility under 35 USC 111(a) Filing Fees</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
Late filing fee for oath or declaration	2051	1	65	65
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				65

Electronic Acknowledgement Receipt	
<b>EFS ID:</b>	7992408
<b>Application Number:</b>	12772709
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4443
<b>Title of Invention:</b>	KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING
<b>First Named Inventor/Applicant Name:</b>	Chester O.D. Thompson
<b>Customer Number:</b>	33772
<b>Filer:</b>	David Bogdan Cupar/Amanda Baiers
<b>Filer Authorized By:</b>	David Bogdan Cupar
<b>Attorney Docket Number:</b>	16223-00151
<b>Receipt Date:</b>	12-JUL-2010
<b>Filing Date:</b>	03-MAY-2010
<b>Time Stamp:</b>	12:32:30
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$65
RAM confirmation Number	8332
Deposit Account	130265
Authorized User	
<p>The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:</p> <p>Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)</p> <p>Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)</p>	

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	responsetomissingparts7122010.pdf	55003 95cdc83fb38cb954249c26a01d16b699844d7d4e	no	1
<b>Warnings:</b>					
<b>Information:</b>					
2	Oath or Declaration filed	oathanddeclaration.pdf	114203 5794ed92b5c844e217a307ebdaf58fe54140bee	no	4
<b>Warnings:</b>					
<b>Information:</b>					
3	Drawings-only black and white line drawings	formaldrawings.pdf	85367 99eca3539af80dbd08cb8b46984011c5c3e91ad1	no	12
<b>Warnings:</b>					
<b>Information:</b>					
4	Fee Worksheet (PTO-875)	fee-info.pdf	30287 3300df20b2af7f7c25af322d4e75a259849ec325	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			284860		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.





# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
12/772,709	05/03/2010	3673	605	16223-00151	23	1

**CONFIRMATION NO. 4443**

## UPDATED FILING RECEIPT



OC000000042611114

33772  
MCDONALD HOPKINS LLC  
600 Superior Avenue, East  
Suite 2100  
CLEVELAND, OH 44114-2653

Date Mailed: 07/19/2010

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

### Applicant(s)

Chester O.D. Thompson, Painesville, OH;  
William R. Mutch, North Ridgeville, OH;

**Power of Attorney:** The patent practitioners associated with Customer Number 33772

### Domestic Priority data as claimed by applicant

This appln claims benefit of 61/215,152 05/01/2009  
and claims benefit of 61/275,654 09/01/2009

### Foreign Applications

**If Required, Foreign Filing License Granted:** 05/10/2010

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/772,709**

**Projected Publication Date:** 11/04/2010

**Non-Publication Request:** No

**Early Publication Request:** No

**\*\* SMALL ENTITY \*\***

**Title**

KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING

**Preliminary Class**

070

**PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

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Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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page 2 of 3

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/772,709	05/03/2010	Chester O.D. Thompson	16223-00151

**CONFIRMATION NO. 4443**

## PUBLICATION NOTICE

33772

MCDONALD HOPKINS LLC  
600 Superior Avenue, East  
Suite 2100  
CLEVELAND, OH 44114-2653



\*OC000000044347246\*

**Title:**KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING

**Publication No.**US-2010-0278437-A1

**Publication Date:**11/04/2010

## NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at [www.uspto.gov](http://www.uspto.gov). The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/772,709	05/03/2010	Chester O.D. Thompson	16223-00151	4443

33772 7590 12/05/2012  
MCDONALD HOPKINS LLC  
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EXAMINER
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ENTEZARI, MICHELLE M

ART UNIT	PAPER NUMBER
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2665

MAIL DATE	DELIVERY MODE
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12/05/2012

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 12/772,709		<b>Applicant(s)</b> THOMPSON ET AL.	
	<b>Examiner</b> MICHELLE ENTEZARI		<b>Art Unit</b> 2665	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) ☒ Responsive to communication(s) filed on 03 May 2010.

2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.

3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.

4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

5) ☒ Claim(s) 1-23 is/are pending in the application.

5a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.

6) ☐ Claim(s) \_\_\_\_ is/are allowed.

7) ☒ Claim(s) 1-23 is/are rejected.

8) ☐ Claim(s) \_\_\_\_ is/are objected to.

9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

10) ☐ The specification is objected to by the Examiner.

11) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All    b) ☐ Some \* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.

3) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.

4) ☐ Other: \_\_\_\_.

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1-6, 8-10, 12-17, 19-21, and 23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Almblad et al. (US 6065911 A) in view of Wills et al. (US 20010033781 A1).

**Regarding claim 1**, Almblad et al. disclose a key identification system (abstract) comprising: an imaging system configured to capture an image of the tip of a master key at an angle between perpendicular and parallel to the blade of said master key (see Fig. 1 for geometric relationship between key and camera, described in col. 5, lines 25-30, col. 11, lines 25-35, col. 10, line 65 – col. 11, line 10; means for receiving image comprising a camera, col. 15, lines 20-45), wherein said captured image of said tip includes a contour of a groove in said master key (extract three-dimensional grooves, col. 2, lines 30-35, identify curved grooves, col. 4, lines 35-40; extract laterally protected attributes such as groove characteristics using light stripe, col. 11, lines 5-25); and a logic configured to analyze said captured image to determine characteristics of said

groove based on said contour and further to compare said characteristics of said groove with groove characteristics of known key blanks to determine the likelihood of a match between said master key and a known key blank (compare grooves to determine key blank, col. 1, lines 35-45; key cut codes include groove characteristics, col. 1, lines 55-65; extract attributes including three-dimensional grooves, col. 2, lines 25-35; attribute information is extracted by the instant apparatus automatically reading an object key and comparing the attributes of the object key with a master pattern memory of known manufacturers' keys, selects the proper matching key blank and cuts it to the original key cut codes established by the manufacturer, col. 2, lines 45-60; groove characteristics identified, col. 11, lines 10-20; compare the code signals from the pattern recognition means with a corresponding master code signal and to produce an identifying signal, which defines a corresponding key blank with a predetermined master pattern having master code signals that match code signals from the result of the recognition of the pixel pattern of the object key. This process allows a corresponding key blank matching attributes of a known manufacturer's key to be determined, col. 12, lines 10-25; compare the code signals from the pattern recognition means with a corresponding master code signal and to produce an identifying signal, which defines a corresponding key blank with a predetermined master pattern having master code signals that match code signals from the result of the recognition of the pixel pattern of the object key. This process allows a corresponding key blank matching attributes of a known manufacturer's key to be determined, col. 12, lines 25-35).



Almblad et al. disclose comparing the key attributes (such as groove characteristics (col. 11, lines 1-15)) of the key to be copied to known blanks (col. 12, lines 1-35), and discuss rejecting if there are no matches (col. 12, lines 50-65), however, Almblad et al. does not explicitly disclose finding a likelihood of a match, or a score. While this is implicit in the match/no match process, a second reference is provided herein to further support the concept of finding a likelihood or score for the comparison.

Wills et al. teach, "For example, as one skilled in the art will appreciate, the elimination of reference keys may be performed by computing an overall score for the length comparison, head shape comparison and surface information comparison. The reference keys are then sorted in order of overall score and keys with a score significantly higher than the best overall score are disqualified." ([0132])

Almblad et al. and Wills et al. are in the same art of key blank identification (Almblad et al., abstract, Wills et al., [0078]). The combination of Wills et al. with Almblad et al. allows the best blank to be identified via a score. It would have been obvious at the time of the invention to one of ordinary skill in the art to combine the score of Wills et al., with the device of Almblad et al., as these scoring techniques were well known at the time of the invention, incorporating the algorithm would have predictable results, and as Wills et al. indicate, "The result of the identification process is then conveyed to the operator who verifies the results of the analysis. If the operator does not agree with the determination, the present invention also presents the other likely matches, in order of

likelihood of matching. Therefore, instead of trying to narrow down the type of key blank to use to duplicate a master key from over three hundred choices, the operator is presented with the most likely match. The present invention, accordingly, saves man-hours and improves accuracy.” ([0008]).

**Regarding claim 2**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. also disclose said logic includes a database containing data related to characteristics of grooves of known key blanks (Almblad et al., col. 16, lines 20-30; Wills et al., [0007], [0009], [0076], [0085]-[0098], [0131]).

**Regarding claim 3**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. also disclose said imaging system includes a camera (Almblad et al., col. 5, lines 40-45, col. 8, lines 15-25, col. 11, lines 1-10; Wills et al., [0085]-[0092]).

**Regarding claim 4**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. also disclose said imaging system includes a reflecting device (Almblad et al., reflected light stripe, col. 14, lines 5-20; Wills et al., mirror, [0085], [0119]).

**Regarding claim 5**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. also disclose said imaging system

includes a light (Almblad et al., col. 15, lines 20-45; Wills et al., [0028], [0081]).

**Regarding claim 6**, Almblad et al. and Wills et al. disclose the key identification system of claim 5. Almblad et al. and Wills et al. also disclose said light is directed toward said reflecting device (Almblad et al., light stripe generator, reflected light stripe, col. 14, lines 5-20; Wills et al., mirror and light beam, [0030], light beam reflected, [0119]).

**Regarding claim 8**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Wills et al. also teach said captured image is a digital image ([0088], [0090]).

**Regarding claim 9**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. also disclose said captured image comprises a silhouette of said tip of said master key (Almblad et al., col. 11, lines 5-25; Wills et al., [0087]).

**Regarding claim 10**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. also disclose said characteristics of said groove include the geometric shape of said groove (Almblad et al., groove characteristics, col. 1, lines 55-65, three-dimensional grooves, col. 2, lines 25-35, identify curved grooves, col. 4, lines 35-40; Wills et al., biting information of the master key, [0094]).

**Regarding claim 12**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. also disclose said logic accounts for tilting of said master key with respect to said imaging system to determine characteristics of said groove (Almblad et al., accommodates for key tilted/not lying flat due to bulky handle, fig. 3, col. 8, lines 35-45).

**Regarding claim 13**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. also disclose said logic accounts for tipping of said master key with respect to said imaging system to determine characteristics of said groove (Almblad et al., accommodates for key tilted/not lying flat due to bulky handle, fig. 3, col. 8, lines 35-45).

**Regarding claim 14**, Almblad et al. and Wills et al. disclose the key identification system of claim 3. Wills et al. further teach a mirror positioned to reflect an image of said master key to be captured by said camera (Wills et al., [0085]).

**Regarding claim 15**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Wills et al. further teach an overhead camera positioned above and approximately perpendicular to said master key (Fig. 8, [0085]).

**Regarding claim 16**, Almblad et al. and Wills et al. disclose the key identification system of claim 15. Almblad et al. and Wills et al. also indicate said groove characteristics are determined based on image data from both said imaging system and said overhead camera (Almblad et al., object image which may include groove characteristics, silhouette passed to ROM to identify a matching key, col. 11, lines 1-25, lines 35-60; Wills et al., backlit profile and light beam interface images digitized and extracted information compared to reference keys, [0078], [0085]).

**Regarding claim 17**, Almblad et al. and Wills et al. disclose the key identification system of claim 16. Almblad et al. and Wills et al. also indicate said logic calculates the geometry of the groove contour as seen from a view of the tip parallel to the blade based on data from both said imaging system and said overhead camera (Almblad et al., object image which may include groove characteristics, silhouette passed to ROM to identify a matching key, col. 11, lines 1-25, lines 35-60, to see positioning, fig. 1; Wills et al., backlit profile and light beam interface images digitized and extracted information compared to reference keys, [0078], [0085], to see positioning, [0084], fig. 4, fig. 6, fig. 8).

**Regarding claim 19**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. also indicate a key holder configured to hold said master key (Almblad et al., col. 5, lines 10-15, Wills et al., key placed in drawer, [0085]).

**Regarding claim 20**, Almblad et al. and Wills et al. disclose the key identification system of claim 19. Almblad et al. and Wills et al. also indicate said key holder includes a lower support (Almblad et al., pedestal, col. 8, lines 35-45, Wills et al., key placed in drawer, [0085]).

**Regarding claim 21**, Almblad et al. and Wills et al. disclose the key identification system of claim 20. Almblad et al. also indicate said key holder includes an upper door (Almblad et al., through an access door, col. 10, lines 50-60 [would have to be above platform for user to be able to put key through it onto pedestal]).

**Regarding claim 23**, Almblad et al. and Wills et al. disclose the key identification system of claim 3. Almblad et al. also indicate said camera is positioned above the blade of said key and configured to capture an image of a groove in the bottom of said blade (Fig. 1, col. 11, lines 1-15).

3. **Claims 7 and 22 are** rejected under 35 U.S.C. 103(a) as being unpatentable over Almblad et al. (US 6065911 A) and Wills et al. (US 20010033781 A1) as applied to claims 5 and 19 above, further in view of Campbell et al. (US 20020191849 A1).

**Regarding claim 7**, Almblad et al. and Wills et al. disclose the key identification system of claim 5. Almblad et al. and Wills et al. do not explicitly disclose said light includes a shield to direct light away from said master key.

Campbell et al. teach, "The first and second sources of uniform light may be, for example, a luminous surface, a single light bulb with a diffuser or lens, or a series of light bulbs with a diffuser or lens. The combination of the diffuser or lens with the light bulb will create an even distribution of light on the surface of the master key, thereby preventing hot spots or glare on the surface of the master key." ([0039]) This indicates the lens prevents any direct light, thereby performing as a shield.

Almblad et al. and Wills et al. and Campbell et al. are in the same art of key blank identification (Almblad et al., abstract, Wills et al., [0078], Campbell et al., abstract). The combination of Campbell et al. with Almblad et al. and Wills et al. allows the partial shielding of a key. It would have been obvious at the time of the invention to one of ordinary skill in the art to combine the shielding of Campbell et al., with the device of Almblad et al. and Wills et al., as these lenses were well known at the time of the invention, incorporating the lens would have predictable results, and as Campbell et al. indicate this allows for a more even lighting ([0039]).

**Regarding claim 22**, Almblad et al. and Wills et al. disclose the key identification system of claim 19. Almblad et al. and Wills et al. do not explicitly disclose said key holder includes a clamp.

Campbell et al. indicate a key copying apparatus that may clamp the master key ([0003], [0004]).

Almblad et al. and Wills et al. and Campbell et al. are in the same art of key blank identification (Almblad et al., abstract, Wills et al., [0078], Campbell et al., abstract). The combination of Campbell et al. with Almblad et al. and Wills et al. allows the key clamping. It would have been obvious at the time of the invention to one of ordinary skill in the art to combine the clamping of Campbell et al., with the device of Almblad et al. and Wills et al., as these clamps were well known at the time of the invention, incorporating the clamp would have predictable results, and as Campbell et al. indicate this is part of the known prior art ([0003], [0004]).

4. **Claim 11** is rejected under 35 U.S.C. 103(a) as being unpatentable over Almblad et al. (US 6065911 A) and Wills et al. (US 20010033781 A1) as applied to claim 1 above, further in view of Miller et al. (US 7643685 B2).

**Regarding claim 11**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. do not disclose said logic accounts for



rolling of said master key with respect to said imaging system to determine characteristics of said groove.

Miller et al. teach a computation that accounts for roll of the object imaged (col. 3, lines 1-10, col. 3, lines 65-68, col. 11, lines 10-15).

Almblad et al. and Wills et al. and Miller et al. are in the same art of key or object matching (Almblad et al., abstract, Wills et al., [0078], Miller et al., abstract). The combination of Miller et al. with Almblad et al. and Wills et al. allows for key rolling. It would have been obvious at the time of the invention to one of ordinary skill in the art to combine the object identification even in the case of rolling of Miller et al., with the device of Almblad et al. and Wills et al., as these identification techniques were well known at the time of the invention, incorporating the identification would have predictable results, and as the key placed on the platform may not always lie entirely flat.

5. **Claim 18** is rejected under 35 U.S.C. 103(a) as being unpatentable over Almblad et al. (US 6065911 A) and Wills et al. (US 20010033781 A1) as applied to claim 16 above, further in view of Agius (US 3884121 A).

**Regarding claim 18**, Almblad et al. and Wills et al. disclose the key identification system of claim 16. Almblad et al. and Wills et al. do not explicitly disclose said logic

calculates the geometry of the groove contour as though the tip were squarely cut based on data from both said imaging system and said overhead camera.

Agius indicates the key may be cut square (col. 7, lines 20-30).

Almblad et al. and Wills et al. and Agius are in the same art of copying keys (Almblad et al., abstract, Wills et al., [0078], Agius, abstract). The combination of Agius with Almblad et al. and Wills et al. allows for a square cut key. It would have been obvious at the time of the invention to one of ordinary skill in the art to combine square cut of Agius, with the device of Almblad et al. and Wills et al., as this cut was well known at the time of the invention, incorporating the cut would have predictable results, and as one of a limited number of types of cuts to look for, would be obvious to try, and a design choice.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHELLE ENTEZARI whose telephone number is (571)270-5084. The examiner can normally be reached on M-Th, 7:30am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen R. Koziol can be reached on (571)270-1844. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michelle Entezari/  
Primary Examiner, Art Unit 2665

<b>Notice of References Cited</b>	Application/Control No. 12/772,709	Applicant(s)/Patent Under Reexamination THOMPSON ET AL.	
	Examiner MICHELLE ENTEZARI	Art Unit 2665	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,065,911	05-2000	Almblad et al.	409/83
*	B	US-2001/0033781	10-2001	WILLS et al.	409/81
*	C	US-2002/0191849	12-2002	Campbell et al.	382/181
*	D	US-7,643,685	01-2010	Miller, Michael	382/209
*	E	US-3,884,121	05-1975	Agius, Frank P.	409/82
	F	US-			
	G	US-			
	H	US-			
	I	US-			
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	K	US-			
	L	US-			
	M	US-			


**FOREIGN PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<b><i>Search Notes</i></b>  	<b>Application/Control No.</b>  12772709	<b>Applicant(s)/Patent Under Reexamination</b>  THOMPSON ET AL.
	<b>Examiner</b>  MICHELLE ENTEZARI	<b>Art Unit</b>  2665

SEARCHED			
Class	Subclass	Date	Examiner
382	205, 209, 110, 141	11/6/12	Entezari
409	81-83	11/6/12	Entezari
76	110	11/6/12	Entezari

SEARCH NOTES		
Search Notes	Date	Examiner
See EAST search, includes INV	11/6/12-12/3/12	Entezari

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

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## UNITED STATES PATENT AND TRADEMARK OFFICE

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## BIB DATA SHEET

CONFIRMATION NO. 4443

<b>SERIAL NUMBER</b> 12/772,709	<b>FILING or 371(c) DATE</b> 05/03/2010 <b>RULE</b>	<b>CLASS</b> 382	<b>GROUP ART UNIT</b> 2665	<b>ATTORNEY DOCKET NO.</b> 16223-00151		
<b>APPLICANTS</b> Chester O.D. Thompson, Painesville, OH; William R. Mutch, North Ridgeville, OH; <b>** CONTINUING DATA *****</b> This appln claims benefit of 61/215,152 05/01/2009 and claims benefit of 61/275,654 09/01/2009 <b>** FOREIGN APPLICATIONS *****</b> <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** ** SMALL ENTITY **</b> 05/10/2010						
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Verified and /MICHELLE M Acknowledged ENTEZARI/ Examiner's Signature		<input type="checkbox"/> Met after Allowance Initials	<b>STATE OR COUNTRY</b> OH	<b>SHEETS DRAWINGS</b> 12	<b>TOTAL CLAIMS</b> 23	<b>INDEPENDENT CLAIMS</b> 1
<b>ADDRESS</b> MCDONALD HOPKINS LLC 600 Superior Avenue, East Suite 2100 CLEVELAND, OH 44114-2653 UNITED STATES						
<b>TITLE</b> KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING						
<b>FILING FEE RECEIVED</b> 605	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

**EAST Search History****EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	50	THOMPSON near2 CHESTER.inv. or MUTCH near2 WILLIAM.inv.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/11/06 21:16
S2	484	382/205.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/11/06 21:17
S4	1965	382/209.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/11/06 21:18
S6	2492	382/141.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/11/06 21:19
S5	386	382/110.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/11/06 21:19
S7	9	S1 and match\$3.clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/11/06 21:20
S8	1	S1 and match\$3.clm. and angle.clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/11/06 21:22
S10	243	76/110.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/11/06 21:27
S9	448	409/81-83.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/11/06 21:27
S11	2	"6065911".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/12/02 12:09
S19	2	"20010033781".pn. and database	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/12/03 01:11
S35	10	light with master key with (shield\$4 or deflect\$3 or prevent\$3 or block\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/12/03 01:40

S36	8	S35 and @ad<"20090501"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/12/03 01:41
S53	13	S52 and @ad<"20090501"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/12/03 02:17
S52	29	master key with (roll\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/12/03 02:17
L9	98	(L3 or L4 or L5 or L6 or L7 or L8) and roll\$3.clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/12/03 10:28
L8	243	76/110.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/12/03 10:28
L7	448	409/81-83.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/12/03 10:28
L6	2501	382/141.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/12/03 10:28
L5	393	382/110.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/12/03 10:28
L4	1977	382/209.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/12/03 10:28
L3	487	382/205.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/12/03 10:28
L18	2	17 and @ad<"20090501"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/12/03 10:59
L17	6	key blank and square\$3 cut	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/12/03 10:59
L28	105	master key with clamp\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/12/03 11:17
L31	6	30 and image with key	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/12/03 11:18
L30	12	29 and copy\$3 key	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	NEAR	ON	2012/12/03 11:18



# EAST Search History


			IBM_TDB			
L29	70	28 and @ad<"20090501"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/12/03 11:18

## EAST Search History (Interference)

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**12/ 3/ 2012 11:41:29 AM**

**C:\ Users\ mentezari\ Documents\ EAST\ Workspaces\ 12\_772\_709.wsp**

<b><i>Index of Claims</i></b> 	<b>Application/Control No.</b> 12772709	<b>Applicant(s)/Patent Under Reexamination</b> THOMPSON ET AL.
	<b>Examiner</b> MICHELLE ENTEZARI	<b>Art Unit</b> 2665

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

☐ Claims renumbered in the same order as presented by applicant
 ☐ CPA
 ☐ T.D.
 ☐ R.1.47

CLAIM		DATE									
Final	Original	12/03/2012									
	1	✓									
	2	✓									
	3	✓									
	4	✓									
	5	✓									
	6	✓									
	7	✓									
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	17	✓									
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	21	✓									
	22	✓									
	23	✓									

PATENT APPLICATION  
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application: Chester O.D. Thompson et al.                      Art Unit: 2665  
Serial No.: 12/772,709    Examiner: Entezari, Michelle M.  
Filing Date: May 3, 2010    Docket No.: 16223-00151  
Title: KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

**RESPONSE TO OFFICE ACTION**

Applicants acknowledge receipt of the December 5, 2012 Office Action. As this response is electronically filed on March 5, 2013, Applicants believe no additional fees are due. However, if any additional fees are required for this Response, please charge such fees to our Deposit Account No. 13-0265.

## **CLAIMS**

What is claimed is:

1. (Original) A key identification system comprising:  
  
an imaging system configured to capture an image of the tip of a master key at an angle between perpendicular and parallel to the blade of said master key, wherein said captured image of said tip includes a contour of a groove in said master key; and  
  
a logic configured to analyze said captured image to determine characteristics of said groove based on said contour and further to compare said characteristics of said groove with groove characteristics of known key blanks to determine the likelihood of a match between said master key and a known key blank.
2. (Original) The key identification system of claim 1, wherein said logic includes a database containing data related to characteristics of grooves of known key blanks.
3. (Original) The key identification system of claim 1, wherein said imaging system includes a camera.
4. (Original) The key identification system of claim 1, wherein said imaging system includes a reflecting device.
5. (Original) The key identification system of claim 1, wherein said imaging system includes a light.
6. (Original) The key identification system of claim 5, wherein said light is directed toward said reflecting device.
7. (Original) The key identification system of claim 5, wherein said light includes a shield to direct light away from said master key.

8. (Original) The key identification system of claim 1, wherein said captured image is a digital image.
9. (Original) The key identification system of claim 1, wherein said captured image comprises a silhouette of said tip of said master key.
10. (Original) The key identification system of claim 1, wherein said characteristics of said groove include the geometric shape of said groove.
11. (Original) The key identification system of claim 1, wherein said logic accounts for rolling of said master key with respect to said imaging system to determine characteristics of said groove.
12. (Original) The key identification system of claim 1, wherein said logic accounts for tilting of said master key with respect to said imaging system to determine characteristics of said groove.
13. (Original) The key identification system of claim 1, wherein said logic accounts for tipping of said master key with respect to said imaging system to determine characteristics of said groove.
14. (Original) The key identification system of claim 3 further comprising a mirror positioned to reflect an image of said master key to be captured by said camera.
15. (Original) The key identification system of claim 1 further comprising an overhead camera positioned above and approximately perpendicular to said master key.
16. (Original) The key identification system of claim 15, wherein said groove characteristics are determined based on image data from both said imaging system and said overhead camera.

17. (Original) The key identification system of claim 16, wherein said logic calculates the geometry of the groove contour as seen from a view of the tip parallel to the blade based on data from both said imaging system and said overhead camera.
18. (Original) The key identification system of claim 16, wherein said logic calculates the geometry of the groove contour as though the tip were squarely cut based on data from both said imaging system and said overhead camera.
19. (Original) The key identification system of claim 1 further comprising a key holder configured to hold said master key.
20. (Original) The key identification system of claim 19, wherein said key holder includes a lower support.
21. (Original) The key identification system of claim 20, wherein said key holder includes an upper door.
22. (Original) The key identification system of claim 19, wherein said key holder includes a clamp.
23. (Original) The key identification system of claim 3, wherein said camera is positioned above the blade of said key and configured to capture an image of a groove in the bottom of said blade.

### **REMARKS**

In the December 5, 2012 Office Action, claims 1-6, 8-10, 12-17, 19-21 and 23 stand rejected under 35 U.S.C. 103 as unpatentable over U.S. Patent 6,065,911 to Almblad (“Almblad”) in view of U.S. Publication No. 20010033781 to Wills et al (“Wills”). Claims 7 and 22 stand rejected under 35 U.S.C. 103 as unpatentable over Almblad, Wills and in view of U.S. Publication No. 20020191849 to Campbell et al. (“Campbell”). Claim 11 stands rejected under 35 U.S.C. 103 as unpatentable over Almblad, Wills and in view of U.S. Patent No. 7,643,685 to Miller et al. (“Miller”). Claim 18 stands rejected under 35 U.S.C. 103 as unpatentable over Almblad, Wills and in view of U.S. Patent No. 3,884,121 to Agius (“Agius”). The following remarks address each of these issues and place the present application in condition for allowance.

#### **The Pending Claims Are Patentable**

Claim 1 recites “an imaging system configured to capture an image of the tip of a master key at an angle between perpendicular and parallel to the blade of said master key.” The office action alleges that Almblad teaches this feature, however, Almblad does not teach or disclose an imaging system at an angle between perpendicular and parallel to the blade of the master key.

Almblad disclose a key making machine that includes a pedestal 28 for supporting a key, a camera 2 for capturing an image of a key, and a light stripe generator 12 for emitting a light line, such as a laser light, along the key.

The office action references FIG. 1 of Almblad, as well as col. 5 lines 25-30, col. 22, lines 25-35, and col 10 line 65 – col. 11 line 10 as teaching “the geometric relationship between key and camera.” (Office Action at 2.) The written passages of Almblad, however, do not provide any description regarding the geometric relationship between the key and camera.

Instead, these passages merely recite that a camera 2 is used to capture an image of the key, but do not provide any description of the positioning or angle of the camera2.

Further, FIG. 1 specifically illustrates a camera that is not positioned “at an angle between perpendicular and parallel to the blade of said master key,” as recited in claim 1. Instead, camera 2 illustrated in FIG. 1 is positioned perpendicular to the blade of the key. This does not meet the limitation of claim 1.

Moreover, the only reference in the specification related to the position of the camera states that “A suitable camera 2 is positioned to receive the image... as a means for identifying the laterally exposed attributes of the object key.” In other words, the camera 2 is arranged to view the features of the blade. This is best done in the view perpendicular to the key blade, as shown in the figures. Therefore, Almblad not only fails to teach or disclose a camera positioned “at an angle between perpendicular and parallel to the blade of said master key,” it teaches positioning the camera perpendicular to the key blade. For at least this reason, Almblad does not teach this feature and the rejection based on Almblad is deficient.

Applicant further notes that the light stripe generator 12 is not a camera and does not capture an image but instead emits a light. Therefore, the light stripe generator 12 cannot satisfy the limitations discussed above.

For at least these reasons, Almblad fails to teach “an imaging system configured to capture an image of the tip of a master key at an angle between perpendicular and parallel to the blade of said master key.” The remaining cited references do not cure this deficiency. Accordingly, Applicant respectfully requests that the rejection of claim 1, and all claims depending therefrom, be withdrawn.



### **CONCLUSION**

In light of the foregoing, Applicants submit that the application is now in condition for allowance. If the Examiner has any questions pertaining to the above, then the undersigned attorney would welcome a phone call to provide any further clarification or a formal interview.

Respectfully submitted,

Date: March 5, 2013

/Charles F. Gray/  
Charles F. Gray  
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McDonald Hopkins LLC  
600 Superior Avenue, E.  
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Cleveland, OH 44114-2653  
248-220-1334

Electronic Acknowledgement Receipt	
<b>EFS ID:</b>	15122157
<b>Application Number:</b>	12772709
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4443
<b>Title of Invention:</b>	KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING
<b>First Named Inventor/Applicant Name:</b>	Chester O.D. Thompson
<b>Customer Number:</b>	33772
<b>Filer:</b>	David Bogdan Cupar/Jackie Boziak
<b>Filer Authorized By:</b>	David Bogdan Cupar
<b>Attorney Docket Number:</b>	16223-00151
<b>Receipt Date:</b>	05-MAR-2013
<b>Filing Date:</b>	03-MAY-2010
<b>Time Stamp:</b>	15:34:35
<b>Application Type:</b>	Utility under 35 USC 111(a)

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Submitted with Payment		no			
<b>File Listing:</b>					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Response.pdf	73077	yes	7
			8039b03136ed25a55cc1f75f5e4471d701be9628		

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	4
	Applicant Arguments/Remarks Made in an Amendment	5	7
<b>Warnings:</b>			
<b>Information:</b>			
<b>Total Files Size (in bytes):</b>		73077	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>			

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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875					Application or Docket Number <b>12/772,709</b>		Filing Date <b>05/03/2010</b>		<input type="checkbox"/> To be Mailed	
<b>APPLICATION AS FILED – PART I</b>										
(Column 1)			(Column 2)			SMALL ENTITY <input checked="" type="checkbox"/> OR		OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =		OR	X \$ =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =			X \$ =				
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.										
<b>APPLICATION AS AMENDED – PART II</b>										
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	03/05/2013	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
Total (37 CFR 1.16(i))	* 23	Minus	** 23	= 0	X \$31 =	0	OR	X \$ =		
Independent (37 CFR 1.16(h))	* 1	Minus	*** 3	= 0	X \$125 =	0	OR	X \$ =		
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE	0	OR	TOTAL ADD'L FEE		
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =		OR	X \$ =		
Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =		OR	X \$ =		
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE		
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.										

 Legal Instrument Examiner:  
 /KELLY HARRIS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/772,709	05/03/2010	Chester O.D. Thompson	16223-00151	4443
33772 7590 05/09/2013 MCDONALD HOPKINS LLC 600 Superior Avenue, East Suite 2100 CLEVELAND, OH 44114-2653			EXAMINER ENTEZARI, MICHELLE M	
			ART UNIT 2665	PAPER NUMBER
			MAIL DATE 05/09/2013	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 12/772,709	<b>Applicant(s)</b> THOMPSON ET AL.	
	<b>Examiner</b> MICHELLE ENTEZARI	<b>Art Unit</b> 2665	<b>AIA (First Inventor to File) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 5 March 2013.  
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 5) ☒ Claim(s) 1-23 is/are pending in the application.  
5a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 6) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 7) ☒ Claim(s) 1-23 is/are rejected.
- 8) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a) ☐ All    b) ☐ Some \*    c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Interim copies:**

- a) ☐ All    b) ☐ Some    c) ☐ None of the: Interim copies of the priority documents have been received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)            | 3) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | Paper No(s)/Mail Date. ____.                            |
| Paper No(s)/Mail Date ____.   | 4) <input type="checkbox"/> Other: ____.                |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed March 5, 2013 have been fully considered but they are not persuasive.
2. Applicant argues that Almblad does not disclose, "an imaging system configured to capture an image of the tip of a master key at an angle between perpendicular and parallel to the blade of the master key", as applicant asserts Almblad discloses a perpendicular. First, examiner notes that the angle between perpendicular and parallel would include perpendicular, therefore, the setup of Almblad meets the requirements of the claim language. Further, it would have been obvious to one having ordinary skill in the art at the time the invention was made to operate at any angle in this range, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1-6, 8-10, 12-17, 19-21, and 23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Almblad et al. (US 6065911 A) in view of Wills et al. (US 20010033781 A1).

**Regarding claim 1**, Almblad et al. disclose a key identification system (abstract) comprising: an imaging system configured to capture an image of the tip of a master key at an angle between perpendicular and parallel to the blade of said master key (see Fig. 1 for geometric relationship between key and camera, described in col. 5, lines 25-30, col. 11, lines 25-35, col. 10, line 65 – col. 11, line 10; means for receiving image comprising a camera, col. 15, lines 20-45), wherein said captured image of said tip includes a contour of a groove in said master key (extract three-dimensional grooves, col. 2, lines 30-35, identify curved grooves, col. 4, lines 35-40; extract laterally protected attributes such as groove characteristics using light stripe, col. 11, lines 5-25); and a logic configured to analyze said captured image to determine characteristics of said groove based on said contour and further to compare said characteristics of said groove with groove characteristics of known key blanks to determine the likelihood of a match between said master key and a known key blank (compare grooves to determine key blank, col. 1, lines 35-45; key cut codes include groove characteristics, col. 1, lines 55-65; extract attributes including three-dimensional grooves, col. 2, lines 25-35; attribute information is extracted by the instant apparatus automatically reading an object key and comparing the attributes of the object key with a master pattern memory of known manufacturers' keys, selects the proper matching key blank and cuts it to the original



key cut codes established by the manufacturer, col. 2, lines 45-60; groove characteristics identified, col. 11, lines 10-20; compare the code signals from the pattern recognition means with a corresponding master code signal and to produce an identifying signal, which defines a corresponding key blank with a predetermined master pattern having master code signals that match code signals from the result of the recognition of the pixel pattern of the object key. This process allows a corresponding key blank matching attributes of a known manufacturer's key to be determined, col. 12, lines 10-25; compare the code signals from the pattern recognition means with a corresponding master code signal and to produce an identifying signal, which defines a corresponding key blank with a predetermined master pattern having master code signals that match code signals from the result of the recognition of the pixel pattern of the object key. This process allows a corresponding key blank matching attributes of a known manufacturer's key to be determined, col. 12, lines 25-35).

Almblad et al. disclose comparing the key attributes (such as groove characteristics (col. 11, lines 1-15)) of the key to be copied to known blanks (col. 12, lines 1-35), and discuss rejecting if there are no matches (col. 12, lines 50-65), however, Almblad et al. does not explicitly disclose finding a likelihood of a match, or a score. While this is implicit in the match/no match process, a second reference is provided herein to further support the concept of finding a likelihood or score for the comparison.

Wills et al. teach, "For example, as one skilled in the art will appreciate, the elimination of reference keys may be performed by computing an overall score for the length comparison, head shape comparison and surface information comparison. The reference keys are then sorted in order of overall score and keys with a score significantly higher than the best overall score are disqualified." ([0132])

Almblad et al. and Wills et al. are in the same art of key blank identification (Almblad et al., abstract, Wills et al., [0078]). The combination of Wills et al. with Almblad et al. allows the best blank to be identified via a score. It would have been obvious at the time of the invention to one of ordinary skill in the art to combine the score of Wills et al., with the device of Almblad et al., as these scoring techniques were well known at the time of the invention, incorporating the algorithm would have predictable results, and as Wills et al. indicate, "The result of the identification process is then conveyed to the operator who verifies the results of the analysis. If the operator does not agree with the determination, the present invention also presents the other likely matches, in order of likelihood of matching. Therefore, instead of trying to narrow down the type of key blank to use to duplicate a master key from over three hundred choices, the operator is presented with the most likely match. The present invention, accordingly, saves man-hours and improves accuracy." ([0008]).

**Regarding claim 2,** Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. also disclose said logic includes a database

containing data related to characteristics of grooves of known key blanks (Almblad et al., col. 16, lines 20-30; Wills et al., [0007], [0009], [0076], [0085]-[0098], [0131]).

**Regarding claim 3**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. also disclose said imaging system includes a camera (Almblad et al., col. 5, lines 40-45, col. 8, lines 15-25, col. 11, lines 1-10; Wills et al., [0085]-[0092]).

**Regarding claim 4**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. also disclose said imaging system includes a reflecting device (Almblad et al., reflected light stripe, col. 14, lines 5-20; Wills et al., mirror, [0085], [0119]).

**Regarding claim 5**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. also disclose said imaging system includes a light (Almblad et al., col. 15, lines 20-45; Wills et al., [0028], [0081]).

**Regarding claim 6**, Almblad et al. and Wills et al. disclose the key identification system of claim 5. Almblad et al. and Wills et al. also disclose said light is directed toward said reflecting device (Almblad et al., light stripe generator, reflected light stripe, col. 14, lines 5-20; Wills et al., mirror and light beam, [0030], light beam reflected, [0119]).

**Regarding claim 8**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Wills et al. also teach said captured image is a digital image ([0088], [0090]).

**Regarding claim 9**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. also disclose said captured image comprises a silhouette of said tip of said master key (Almblad et al., col. 11, lines 5-25; Wills et al., [0087]).

**Regarding claim 10**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. also disclose said characteristics of said groove include the geometric shape of said groove (Almblad et al., groove characteristics, col. 1, lines 55-65, three-dimensional grooves, col. 2, lines 25-35, identify curved grooves, col. 4, lines 35-40; Wills et al., bitting information of the master key, [0094]).

**Regarding claim 12**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. also disclose said logic accounts for tilting of said master key with respect to said imaging system to determine characteristics of said groove (Almblad et al., accommodates for key tilted/not lying flat due to bulky handle, fig. 3, col. 8, lines 35-45).

**Regarding claim 13**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. also disclose said logic accounts for tipping of said master key with respect to said imaging system to determine characteristics of said groove (Almblad et al., accommodates for key tilted/not lying flat due to bulky handle, fig. 3, col. 8, lines 35-45).

**Regarding claim 14**, Almblad et al. and Wills et al. disclose the key identification system of claim 3. Wills et al. further teach a mirror positioned to reflect an image of said master key to be captured by said camera (Wills et al., [0085]).

**Regarding claim 15**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Wills et al. further teach an overhead camera positioned above and approximately perpendicular to said master key (Fig. 8, [0085]).

**Regarding claim 16**, Almblad et al. and Wills et al. disclose the key identification system of claim 15. Almblad et al. and Wills et al. also indicate said groove characteristics are determined based on image data from both said imaging system and said overhead camera (Almblad et al., object image which may include groove characteristics, silhouette passed to ROM to identify a matching key, col. 11, lines 1-25, lines 35-60; Wills et al., backlit profile and light beam interface images digitized and extracted information compared to reference keys, [0078], [0085]).

**Regarding claim 17**, Almblad et al. and Wills et al. disclose the key identification system of claim 16. Almblad et al. and Wills et al. also indicate said logic calculates the geometry of the groove contour as seen from a view of the tip parallel to the blade based on data from both said imaging system and said overhead camera (Almblad et al., object image which may include groove characteristics, silhouette passed to ROM to identify a matching key, col. 11, lines 1-25, lines 35-60, to see positioning, fig. 1; Wills et al., backlit profile and light beam interface images digitized and extracted information compared to reference keys, [0078], [0085], to see positioning, [0084], fig. 4, fig. 6, fig. 8).

**Regarding claim 19**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. also indicate a key holder configured to hold said master key (Almblad et al., col. 5, lines 10-15, Wills et al., key placed in drawer, [0085]).

**Regarding claim 20**, Almblad et al. and Wills et al. disclose the key identification system of claim 19. Almblad et al. and Wills et al. also indicate said key holder includes a lower support (Almblad et al., pedestal, col. 8, lines 35-45, Wills et al., key placed in drawer, [0085]).

**Regarding claim 21**, Almblad et al. and Wills et al. disclose the key identification system of claim 20. Almblad et al. also indicate said key holder includes an upper door

(Almblad et al., through an access door, col. 10, lines 50-60 [would have to be above platform for user to be able to put key through it onto pedestal]).

**Regarding claim 23**, Almblad et al. and Wills et al. disclose the key identification system of claim 3. Almblad et al. also indicate said camera is positioned above the blade of said key and configured to capture an image of a groove in the bottom of said blade (Fig. 1, col. 11, lines 1-15).

5. **Claims 7 and 22 are** rejected under 35 U.S.C. 103(a) as being unpatentable over Almblad et al. (US 6065911 A) and Wills et al. (US 20010033781 A1) as applied to claims 5 and 19 above, further in view of Campbell et al. (US 20020191849 A1).

**Regarding claim 7**, Almblad et al. and Wills et al. disclose the key identification system of claim 5. Almblad et al. and Wills et al. do not explicitly disclose said light includes a shield to direct light away from said master key.

Campbell et al. teach, "The first and second sources of uniform light may be, for example, a luminous surface, a single light bulb with a diffuser or lens, or a series of light bulbs with a diffuser or lens. The combination of the diffuser or lens with the light bulb will create an even distribution of light on the surface of the master key, thereby preventing hot spots or glare on the surface of the master key." ([0039]) This indicates the lens prevents any direct light, thereby performing as a shield.

Almblad et al. and Wills et al. and Campbell et al. are in the same art of key blank identification (Almblad et al., abstract, Wills et al., [0078], Campbell et al., abstract). The combination of Campbell et al. with Almblad et al. and Wills et al. allows the partial shielding of a key. It would have been obvious at the time of the invention to one of ordinary skill in the art to combine the shielding of Campbell et al., with the device of Almblad et al. and Wills et al., as these lenses were well known at the time of the invention, incorporating the lens would have predictable results, and as Campbell et al. indicate this allows for a more even lighting ([0039]).

**Regarding claim 22,** Almblad et al. and Wills et al. disclose the key identification system of claim 19. Almblad et al. and Wills et al. do not explicitly disclose said key holder includes a clamp.

Campbell et al. indicate a key copying apparatus that may clamp the master key ([0003], [0004]).

Almblad et al. and Wills et al. and Campbell et al. are in the same art of key blank identification (Almblad et al., abstract, Wills et al., [0078], Campbell et al., abstract). The combination of Campbell et al. with Almblad et al. and Wills et al. allows the key clamping. It would have been obvious at the time of the invention to one of ordinary skill in the art to combine the clamping of Campbell et al., with the device of Almblad et al.



and Wills et al., as these clamps were well known at the time of the invention, incorporating the clamp would have predictable results, and as Campbell et al. indicate this is part of the known prior art ([0003], [0004]).

6. **Claim 11** is rejected under 35 U.S.C. 103(a) as being unpatentable over Almblad et al. (US 6065911 A) and Wills et al. (US 20010033781 A1) as applied to claim 1 above, further in view of Miller et al. (US 7643685 B2).

**Regarding claim 11**, Almblad et al. and Wills et al. disclose the key identification system of claim 1. Almblad et al. and Wills et al. do not disclose said logic accounts for rolling of said master key with respect to said imaging system to determine characteristics of said groove.

Miller et al. teach a computation that accounts for roll of the object imaged (col. 3, lines 1-10, col. 3, lines 65-68, col. 11, lines 10-15).

Almblad et al. and Wills et al. and Miller et al. are in the same art of key or object matching (Almblad et al., abstract, Wills et al., [0078], Miller et al., abstract). The combination of Miller et al. with Almblad et al. and Wills et al. allows for key rolling. It would have been obvious at the time of the invention to one of ordinary skill in the art to combine the object identification even in the case of rolling of Miller et al., with the device of Almblad et al. and Wills et al., as these identification techniques were well

known at the time of the invention, incorporating the identification would have predictable results, and as the key placed on the platform may not always lie entirely flat.

7. **Claim 18** is rejected under 35 U.S.C. 103(a) as being unpatentable over Almblad et al. (US 6065911 A) and Wills et al. (US 20010033781 A1) as applied to claim 16 above, further in view of Agius (US 3884121 A).

**Regarding claim 18**, Almblad et al. and Wills et al. disclose the key identification system of claim 16. Almblad et al. and Wills et al. do not explicitly disclose said logic calculates the geometry of the groove contour as though the tip were squarely cut based on data from both said imaging system and said overhead camera.

Agius indicates the key may be cut square (col. 7, lines 20-30).

Almblad et al. and Wills et al. and Agius are in the same art of copying keys (Almblad et al., abstract, Wills et al., [0078], Agius, abstract). The combination of Agius with Almblad et al. and Wills et al. allows for a square cut key. It would have been obvious at the time of the invention to one of ordinary skill in the art to combine square cut of Agius, with the device of Almblad et al. and Wills et al., as this cut was well known at the time of the invention, incorporating the cut would have predictable results, and as one of a limited number of types of cuts to look for, would be obvious to try, and a design choice.

***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHELLE ENTEZARI whose telephone number is (571)270-5084. The examiner can normally be reached on M-Th, 7:30am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen R. Koziol can be reached on (571)270-1844. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michelle Entezari/  
Primary Examiner, Art Unit 2665

<p><b><i>Index of Claims</i></b></p> 	<b>Application/Control No.</b> 12772709	<b>Applicant(s)/Patent Under Reexamination</b> THOMPSON ET AL.
	<b>Examiner</b> MICHELLE ENTEZARI	<b>Art Unit</b> 2665

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

☐ Claims renumbered in the same order as presented by applicant
☐ CPA
☐ T.D.
☐ R.1.47

CLAIM		DATE									
Final	Original	12/03/2012	05/07/2013								
	1	✓	✓								
	2	✓	✓								
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# UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/772,709	05/03/2010	Chester O.D. Thompson	16223-00151	4443
33772 7590 08/21/2013 MCDONALD HOPKINS LLC 600 Superior Avenue, East Suite 2100 CLEVELAND, OH 44114-2653			EXAMINER ENTEZARI, MICHELLE M	
			ART UNIT 2665	PAPER NUMBER
			MAIL DATE 08/21/2013	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b><i>Applicant-Initiated Interview Summary</i></b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	12/772,709		THOMPSON ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	MICHELLE ENTEZARI		2665	

All participants (applicant, applicant's representative, PTO personnel):

(1) MICHELLE ENTEZARI. (3) \_\_\_\_.

(2) CHARLIE GRAY (REG 67012). (4) \_\_\_\_.

Date of Interview: 19 June 2013.

Type: ☒ Telephonic ☐ Video Conference  
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☐ No.  
If Yes, brief description: \_\_\_\_.

Issues Discussed ☐101 ☐112 ☐102 ☒103 ☐Others  
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 1.

Identification of prior art discussed: CAMPBELL.

**Substance of Interview**  
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Agreement reached, attorney will clarify the angle does not include perpendicular or parallel and will explain the difference in the methods used and why it is not a simple range change in the arguments. Examiner agrees this will overcome Campbell, Without further search, cannot commit to how it compares to the prior art as a whole, but examiner believes as Campbell was the closest prior art that this change to the claims should make the claims allowable..

**Applicant recordation instructions:** The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

**Examiner recordation instructions:** Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/Michelle Entezari/ Primary Examiner, Art Unit 2665	
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## Summary of Record of Interview Requirements

### Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

### Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews

#### Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

#### 37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,  
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

### Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.



PATENT APPLICATION  
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application: Chester O.D. Thompson et al.                      Art Unit: 2665  
Serial No.: 12/772,709    Examiner: Entezari, Michelle M.  
Filing Date: May 3, 2010    Docket No.: 16223-00151  
Title: KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

**RESPONSE TO FINAL OFFICE ACTION**

Applicants acknowledge receipt of the May 9, 2013 Office Action. As this response is electronically filed on September 9, 2013, along with a request for a one-month extension and the appropriate fee, Applicants believe no additional fees are due. However, if any additional fees are required for this Response, please charge such fees to our Deposit Account No. 13-0265.

## **CLAIMS**

What is claimed is:

1. (Currently Amended) A key identification system comprising:  
  
an imaging system configured to capture an image of the tip of a master key at an angle between perpendicular and parallel to the blade of said master key and not including perpendicular or parallel to the blade of said master key, wherein said captured image of said tip includes a contour of a groove in said master key; and  
  
a logic configured to analyze said captured image to determine characteristics of said groove based on said contour and further to compare said characteristics of said groove with groove characteristics of known key blanks to determine the likelihood of a match between said master key and a known key blank.
2. (Original) The key identification system of claim 1, wherein said logic includes a database containing data related to characteristics of grooves of known key blanks.
3. (Original) The key identification system of claim 1, wherein said imaging system includes a camera.
4. (Original) The key identification system of claim 1, wherein said imaging system includes a reflecting device.
5. (Original) The key identification system of claim 1, wherein said imaging system includes a light.
6. (Original) The key identification system of claim 5, wherein said light is directed toward said reflecting device.
7. (Original) The key identification system of claim 5, wherein said light includes a shield to direct light away from said master key.

8. (Original) The key identification system of claim 1, wherein said captured image is a digital image.
9. (Original) The key identification system of claim 1, wherein said captured image comprises a silhouette of said tip of said master key.
10. (Original) The key identification system of claim 1, wherein said characteristics of said groove include the geometric shape of said groove.
11. (Original) The key identification system of claim 1, wherein said logic accounts for rolling of said master key with respect to said imaging system to determine characteristics of said groove.
12. (Original) The key identification system of claim 1, wherein said logic accounts for tilting of said master key with respect to said imaging system to determine characteristics of said groove.
13. (Original) The key identification system of claim 1, wherein said logic accounts for tipping of said master key with respect to said imaging system to determine characteristics of said groove.
14. (Original) The key identification system of claim 3 further comprising a mirror positioned to reflect an image of said master key to be captured by said camera.
15. (Original) The key identification system of claim 1 further comprising an overhead camera positioned above and approximately perpendicular to said master key.
16. (Original) The key identification system of claim 15, wherein said groove characteristics are determined based on image data from both said imaging system and said overhead camera.

17. (Original) The key identification system of claim 16, wherein said logic calculates the geometry of the groove contour as seen from a view of the tip parallel to the blade based on data from both said imaging system and said overhead camera.
18. (Original) The key identification system of claim 16, wherein said logic calculates the geometry of the groove contour as though the tip were squarely cut based on data from both said imaging system and said overhead camera.
19. (Original) The key identification system of claim 1 further comprising a key holder configured to hold said master key.
20. (Original) The key identification system of claim 19, wherein said key holder includes a lower support.
21. (Original) The key identification system of claim 20, wherein said key holder includes an upper door.
22. (Original) The key identification system of claim 19, wherein said key holder includes a clamp.
23. (Original) The key identification system of claim 3, wherein said camera is positioned above the blade of said key and configured to capture an image of a groove in the bottom of said blade.

### **REMARKS**

In the May 9, 2013 Office Action, claims 1-6, 8-10, 12-17, 19-21 and 23 stand rejected under 35 U.S.C. 103 as unpatentable over U.S. Patent 6,065,911 to Almblad (“Almblad”) in view of U.S. Publication No. 20010033781 to Wills et al (“Wills”). Claims 7 and 22 stand rejected under 35 U.S.C. 103 as unpatentable over Almblad, Wills and in view of U.S. Publication No. 20020191849 to Campbell et al. (“Campbell”). Claim 11 stands rejected under 35 U.S.C. 103 as unpatentable over Almblad, Wills and in view of U.S. Patent No. 7,643,685 to Miller et al. (“Miller”). Claim 18 stands rejected under 35 U.S.C. 103 as unpatentable over Almblad, Wills and in view of U.S. Patent No. 3,884,121 to Agius (“Agius”). The following remarks address each of these issues and place the present application in condition for allowance.

### **The Pending Claims Are Patentable**

Applicant thanks the Examiner for taking the time to discuss the present application during the August 19, 2013 telephone interview.

During the interview, undersigned counsel and the Examiner discussed the Almblad reference and specifically, the claimed positioning of the imaging system. Specifically, Applicant and Examiner agreed that Almblad does not teach an imaging system configured to capture an image of the tip of a master key at an angle between perpendicular and parallel to the blade of the master key *and* not including perpendicular or parallel to the blade of the master key. Claim 1 is therefore currently amended to recite this feature. Further, neither Almblad nor any of the remaining cited references teach this feature. Instead, Almblad teaches a camera positioned perpendicular to the key blade.

The office action further alleges that the positioning of the imaging device is arbitrary, and therefore that the angle would be obvious. However, that is not the case, as the claimed

arrangement of the imaging device, between perpendicular and parallel to the key blade, provides a distinct advantage over the prior art.

The objective of the imaging device is to determine the geometry of the groove that is milled into the key blade. However, the geometry of the groove cannot be seen from perpendicular because the top view will merely show the groove as two parallel lines and therefore will fail to provide any information on the cross-sectional shape of the groove.

The parallel view of the groove would provide good information on the cross-sectional shape of the groove, however, there are lighting issues in this position. Specifically, the shoulders and head of the key are positioned directly behind the groove when viewed from parallel with the key blade. This eliminates lighting that would otherwise be behind the groove and makes it difficult to see the shape of the groove.

By contrast, viewing the groove from an angle between parallel and perpendicular will show the shape of the groove at the tip of the key blade. The true shape of the groove cross-section may then be extrapolated by knowing the viewing angle and adjusting the image accordingly, as described in the present application. Therefore, the claimed arrangement of an imaging system configured to capture an image of the tip of a master key at an angle between perpendicular and parallel to the blade of the master key and not including perpendicular or parallel to the blade of the master key is not an obvious variation of the prior art.

For at least this reason, claim 1 is patentable over the cited references. Accordingly, Applicant requests that the rejection of claim 1, and all claims depending therefrom, be withdrawn.

### **CONCLUSION**

In light of the foregoing, Applicants submit that the application is now in condition for allowance. If the Examiner has any questions pertaining to the above, then the undersigned attorney would welcome a phone call to provide any further clarification or a formal interview.

Respectfully submitted,

Date: September 9, 2013

/Charles F. Gray/  
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248-220-1334

Electronic Patent Application Fee Transmittal				
<b>Application Number:</b>		12772709		
<b>Filing Date:</b>		03-May-2010		
<b>Title of Invention:</b>		KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING		
<b>First Named Inventor/Applicant Name:</b>		Chester O.D. Thompson		
<b>Filer:</b>		David Bogdan Cupar/Charlie Gray		
<b>Attorney Docket Number:</b>		16223-00151		
Filed as Small Entity				
<b>Utility under 35 USC 111(a) Filing Fees</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				
Extension - 1 month with \$0 paid	2251	1	100	100



Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				100

Electronic Acknowledgement Receipt	
<b>EFS ID:</b>	16805650
<b>Application Number:</b>	12772709
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4443
<b>Title of Invention:</b>	KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING
<b>First Named Inventor/Applicant Name:</b>	Chester O.D. Thompson
<b>Customer Number:</b>	33772
<b>Filer:</b>	David Bogdan Cupar/Charlie Gray
<b>Filer Authorized By:</b>	David Bogdan Cupar
<b>Attorney Docket Number:</b>	16223-00151
<b>Receipt Date:</b>	09-SEP-2013
<b>Filing Date:</b>	03-MAY-2010
<b>Time Stamp:</b>	23:11:35
<b>Application Type:</b>	Utility under 35 USC 111(a)

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Payment was successfully received in RAM	\$100
RAM confirmation Number	8992
Deposit Account	130265
Authorized User	
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File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	After Final Consideration Program Request	AfterFinalForm.pdf	226796	no	2
			831cf5b2e97268ee0d3de8a8d53d579905458008		
Warnings:					
Information:					
2		ResponseAfterFinal.pdf	81054	yes	7
			ccc703b993759dec78fd443dfdf8d915d1c4c174		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Response After Final Action		1	1	
	Claims		2	4	
	Applicant Arguments/Remarks Made in an Amendment		5	7	
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30414	no	2
			20ca61bdb4e4975641cc3f0c3d8bb8b730ddb7a7		
Warnings:					
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<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

<b>CERTIFICATION AND REQUEST FOR CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0</b>		
Practitioner Docket No.: <b>16223-00151</b>	Application No.: <b>12/772709</b>	Filing Date: <b>May 03, 2010</b>
First Named Inventor: <b>Chester O.D. Thompson</b>	Title: <b>KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING</b>	
<p>APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0 (AFCP 2.0) OF THE ACCOMPANYING RESPONSE UNDER 37 CFR 1.116.</p> <ol style="list-style-type: none"> <li>1. The above-identified application is (i) an original utility, plant, or design nonprovisional application filed under 35 U.S.C. 111(a) [a continuing application (<i>e.g.</i>, a continuation or divisional application) is filed under 35 U.S.C. 111(a) and is eligible under (i)], or (ii) an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).</li> <li>2. The above-identified application contains an outstanding final rejection.</li> <li>3. Submitted herewith is a response under 37 CFR 1.116 to the outstanding final rejection. The response includes an amendment to at least one independent claim, and the amendment does not broaden the scope of the independent claim in any aspect.</li> <li>4. This certification and request for consideration under AFCP 2.0 is the only AFCP 2.0 certification and request filed in response to the outstanding final rejection.</li> <li>5. Applicant is willing and available to participate in any interview requested by the examiner concerning the present response.</li> <li>6. This certification and request is being filed electronically using the Office's electronic filing system (EFS-Web).</li> <li>7. Any fees that would be necessary consistent with current practice concerning responses after final rejection under 37 CFR 1.116, <i>e.g.</i>, extension of time fees, are being concurrently filed herewith. [There is no additional fee required to request consideration under AFCP 2.0.]</li> <li>8. By filing this certification and request, applicant acknowledges the following: <ul style="list-style-type: none"> <li>• Reissue applications and reexamination proceedings are not eligible to participate in AFCP 2.0.</li> <li>• The examiner will verify that the AFCP 2.0 submission is compliant, <i>i.e.</i>, that the requirements of the program have been met (see items 1 to 7 above). For compliant submissions: <ul style="list-style-type: none"> <li>○ The examiner will review the response under 37 CFR 1.116 to determine if additional search and/or consideration (i) is necessitated by the amendment and (ii) could be completed within the time allotted under AFCP 2.0. If additional search and/or consideration is required but cannot be completed within the allotted time, the examiner will process the submission consistent with current practice concerning responses after final rejection under 37 CFR 1.116, <i>e.g.</i>, by mailing an advisory action.</li> <li>○ If the examiner determines that the amendment does not necessitate additional search and/or consideration, or if the examiner determines that additional search and/or consideration is required and could be completed within the allotted time, then the examiner will consider whether the amendment places the application in condition for allowance (after completing the additional search and/or consideration, if required). If the examiner determines that the amendment does not place the application in condition for allowance, then the examiner will contact the applicant and request an interview. <ul style="list-style-type: none"> <li>▪ The interview will be conducted by the examiner, and if the examiner does not have negotiation authority, a primary examiner and/or supervisory patent examiner will also participate.</li> <li>▪ If the applicant declines the interview, or if the interview cannot be scheduled within ten (10) calendar days from the date that the examiner first contacts the applicant, then the examiner will proceed consistent with current practice concerning responses after final rejection under 37 CFR 1.116.</li> </ul> </li> </ul> </li> </ul> </li> </ol>		
Signature <b>/Charles F. Gray/</b>	Date <b>September 9, 2013</b>	
Name (Print/Typed) <b>Charles F. Gray</b>	Practitioner Registration No. <b>67,012</b>	
<p><b>Note:</b> This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.</p>		
<input type="checkbox"/> * Total of <u>1</u> forms are submitted.		

## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875				Application or Docket Number <b>12/772,709</b>		Filing Date <b>05/03/2010</b>		<input type="checkbox"/> To be Mailed	
ENTITY: <input type="checkbox"/> LARGE <input checked="" type="checkbox"/> SMALL <input type="checkbox"/> MICRO									
<b>APPLICATION AS FILED – PART I</b>									
		(Column 1)		(Column 2)					
FOR		NUMBER FILED		NUMBER EXTRA		RATE (\$)		FEE (\$)	
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A		N/A		N/A			
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))		N/A		N/A		N/A			
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A		N/A		N/A			
TOTAL CLAIMS (37 CFR 1.16(i))		minus 20 =		*		X \$ =			
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =		*		X \$ =			
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).							
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))									
* If the difference in column 1 is less than zero, enter "0" in column 2.						TOTAL			
<b>APPLICATION AS AMENDED – PART II</b>									
		(Column 1)		(Column 2)		(Column 3)			
AMENDMENT	<b>09/09/2013</b>		CLAIMS REMAINING AFTER AMENDMENT			HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		
	Total (37 CFR 1.16(i))		* 23		Minus	** 23	= 0		
	Independent (37 CFR 1.16(h))		* 1		Minus	*** 3	= 0		
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						RATE (\$)		ADDITIONAL FEE (\$)	
						X \$40 =		0	
						X \$210 =		0	
						TOTAL ADD'L FEE		<b>0</b>	
		(Column 1)		(Column 2)		(Column 3)			
AMENDMENT			CLAIMS REMAINING AFTER AMENDMENT			HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		
	Total (37 CFR 1.16(i))		*		Minus	**	=		
	Independent (37 CFR 1.16(h))		*		Minus	***	=		
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						RATE (\$)		ADDITIONAL FEE (\$)	
						X \$ =			
						X \$ =			
						TOTAL ADD'L FEE			
<p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.</p> <p>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".</p> <p>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".</p> <p>The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.</p>									

LIE  
/JOSEPHINE DOUGLAS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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## NOTICE OF ALLOWANCE AND FEE(S) DUE

33772 7590 09/23/2013  
MCDONALD HOPKINS LLC  
600 Superior Avenue, East  
Suite 2100  
CLEVELAND, OH 44114-2653

EXAMINER

ENTEZARI, MICHELLE M

ART UNIT

PAPER NUMBER

2665

DATE MAILED: 09/23/2013

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/772,709	05/03/2010	Chester O.D. Thompson	16223-00151	4443

TITLE OF INVENTION: KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$890	\$300	\$0	\$1190	12/23/2013

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

### HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**

## PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to:** **Mail** **Mail Stop ISSUE FEE**  
**Commissioner for Patents**  
**P.O. Box 1450**  
**Alexandria, Virginia 22313-1450**  
**or Fax (571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

33772 7590 09/23/2013  
**MCDONALD HOPKINS LLC**  
**600 Superior Avenue, East**  
**Suite 2100**  
**CLEVELAND, OH 44114-2653**

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

### Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/772,709	05/03/2010	Chester O.D. Thompson	16223-00151	4443

TITLE OF INVENTION: KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$890	\$300	\$0	\$1190	12/23/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
ENTEZARI, MICHELLE M	2665	382-209000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 \_\_\_\_\_
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 \_\_\_\_\_
- 3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).



5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

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Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Registration No. \_\_\_\_\_

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This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

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# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/772,709	05/03/2010	Chester O.D. Thompson	16223-00151	4443

33772	7590	09/23/2013
MCDONALD HOPKINS LLC		
600 Superior Avenue, East		
Suite 2100		
CLEVELAND, OH 44114-2653		

EXAMINER	
ENTEZARI, MICHELLE M	

ART UNIT	PAPER NUMBER
2665	

DATE MAILED: 09/23/2013

## Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 490 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 490 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

<b>Notice of Allowability</b>	<b>Application No.</b> 12/772,709	<b>Applicant(s)</b> THOMPSON ET AL.	
	<b>Examiner</b> MICHELLE ENTEZARI	<b>Art Unit</b> 2665	<b>AIA (First Inventor to File) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 9/9/13.  
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are 1-23. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
**Certified copies:**  
a) ☐ All    b) ☐ Some    \*c) ☐ None of the:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).  
\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.  
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	5. <input type="checkbox"/> Examiner's Amendment/Comment
2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____	6. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance
3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material	7. <input type="checkbox"/> Other _____
4. <input type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date _____	

/Michelle Entezari/ Primary Examiner, Art Unit 2665	
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## **DETAILED ACTION**

### ***Response to Amendment***

1. Claims 1-23 are pending. Claims 1-23 are amended directly or by dependency on an amended claim.

### ***Response to Arguments***

2. Applicant's arguments, see pages 5-6, filed September 9, 2013, with respect to the 35 USC 103 rejection of claim 1 have been fully considered and are persuasive. The 35 USC 103 rejection of claim 1 have been withdrawn. Arguments are persuasive that the angle is not just a preferred range but a critical aspect of the invention.

### ***Allowable Subject Matter***

3. **Claims 1-23** are allowed.
4. The following is an examiner's statement of reasons for allowance: As noted above, arguments are persuasive that the angle is not just a preferred range but a critical aspect of the invention. The following art is cited as relevant, but does not disclose, teach or fairly suggest "A key identification system comprising: an imaging system configured to capture an image of the tip of a master key and not including perpendicular or parallel to the blade of said master key at an angle between perpendicular and parallel to the blade of said master key, wherein said captured image of said tip includes a contour of a groove in said master key; and a logic configured to

analyze said captured image to determine characteristics of said groove based on said contour and further to compare said characteristics of said groove with groove characteristics of known key blanks to determine the likelihood of a match between said master key and a known key blank.”: US 7484446 B1, US 7163364 B2, US 5556240 A, US 4453432 A, US 4188163 A, US 6053677 A, US 5671523 A, US 4671711 A.

5. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHELLE ENTEZARI whose telephone number is (571)270-5084. The examiner can normally be reached on M-Th, 7:30am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Stephen R. Koziol can be reached on (571)270-1844. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michelle Entezari/  
Primary Examiner, Art Unit 2665

<b>Notice of References Cited</b>	Application/Control No. 12/772,709	Applicant(s)/Patent Under Reexamination THOMPSON ET AL.	
	Examiner MICHELLE ENTEZARI	Art Unit 2665	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,053,677 A	04-2000	Juchinewicz, Vincent	29/76.2
*	B	US-5,671,523 A	09-1997	Juchinewicz, Vincent	29/559
*	C	US-4,671,711 A	06-1987	Steinbach et al.	409/82
*	D	US-7,484,446 B1	02-2009	Gula, Theodore	83/414
*	E	US-7,163,364 B2	01-2007	Foscan et al.	409/81
*	F	US-5,556,240 A	09-1996	Almblad, Robert E.	409/81
*	G	US-4,453,432 A	06-1984	Widen, Bo G.	76/110
*	H	US-4,188,163 A	02-1980	Juskevic, John	409/82
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

**FOREIGN PATENT DOCUMENTS**


*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.




<b>Issue Classification</b> 	<b>Application/Control No.</b> 12772709	<b>Applicant(s)/Patent Under Reexamination</b> THOMPSON ET AL.	
	<b>Examiner</b> MICHELLE ENTEZARI	<b>Art Unit</b> 2665	

CPC						
Symbol					Type	Version


CPC Combination Sets					
Symbol		Type	Set	Ranking	Version

NONE		<b>Total Claims Allowed:</b>	
(Assistant Examiner)	(Date)	23	
/MICHELLE ENTEZARI/ Primary Examiner.Art Unit 2665	09/20/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2B

<b>Issue Classification</b> 	<b>Application/Control No.</b> 12772709	<b>Applicant(s)/Patent Under Reexamination</b> THOMPSON ET AL.
	<b>Examiner</b> MICHELLE ENTEZARI	<b>Art Unit</b> 2665

US ORIGINAL CLASSIFICATION						INTERNATIONAL CLASSIFICATION									
CLASS			SUBCLASS			CLAIMED					NON-CLAIMED				
382			209			G	0	6	K	9 / 62 (2006.01.01)					
CROSS REFERENCE(S)						G	0	6	K	9 / 00 (2006.01.01)					
						B	2	3	C	1 / 16 (2006.01.01)					
						B	2	3	C	1 / 18 (2006.01.01)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)														
382	141														
409	81	82	83												

NONE		<b>Total Claims Allowed:</b>	
		23	
(Assistant Examiner)	(Date)		
/MICHELLE ENTEZARI/ Primary Examiner.Art Unit 2665	09/20/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2B

<b>Issue Classification</b> 	<b>Application/Control No.</b> 12772709	<b>Applicant(s)/Patent Under Reexamination</b> THOMPSON ET AL.
	<b>Examiner</b> MICHELLE ENTEZARI	<b>Art Unit</b> 2665

<input type="checkbox"/> <b>Claims renumbered in the same order as presented by applicant</b> <input type="checkbox"/> <b>CPA</b> <input type="checkbox"/> <b>T.D.</b> <input type="checkbox"/> <b>R.1.47</b>															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	17	17												
2	2	18	18												
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16	16														

NONE  (Assistant Examiner) _____ (Date) _____		<b>Total Claims Allowed:</b> 23	
/MICHELLE ENTEZARI/ Primary Examiner. Art Unit 2665  (Primary Examiner) _____ (Date) _____		O.G. Print Claim(s) 1	O.G. Print Figure 2B

**EAST Search History****EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S73	11	(S67 or S68 or S69 or S70 or S71 or S72) and (perpendicular or parallel) with blade.clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2013/09/19 14:21
S72	245	76/110.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2013/09/19 14:21
S71	462	409/81-83.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2013/09/19 14:21
S70	2882	382/141.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2013/09/19 14:21
S69	498	382/110.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2013/09/19 14:21
S68	2311	382/209.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2013/09/19 14:21
S67	543	382/205.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2013/09/19 14:21

**EAST Search History (Interference)**


Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S79	160	76/110.ccls.	USPAT; UPAD	NEAR	OFF	2013/09/19 14:22
S78	265	409/81-83.ccls.	USPAT; UPAD	NEAR	OFF	2013/09/19 14:22
S77	1456	382/141.ccls.	USPAT; UPAD	NEAR	OFF	2013/09/19 14:22
S76	253	382/110.ccls.	USPAT; UPAD	NEAR	OFF	2013/09/19 14:22
S75	1267	382/209.ccls.	USPAT; UPAD	NEAR	OFF	2013/09/19 14:22
S74	439	382/205.ccls.	USPAT; UPAD	NEAR	OFF	2013/09/19 14:22
S80	9	(S74 or S75 or S76 or S77 or S78 or S79) and (perpendicular or parallel) with blade.clm.	USPAT; UPAD	NEAR	ON	2013/09/19 14:26

## EAST Search History

L14	7	(L8 or L9 or L10 or L11 or L12 or L13) and (degree or angle) with blade.clm.	USPAT; UPAD	NEAR	ON	2013/09/19 23:21
L13	160	76/110.ccls.	USPAT; UPAD	NEAR	OFF	2013/09/19 23:21
L12	265	409/81-83.ccls.	USPAT; UPAD	NEAR	OFF	2013/09/19 23:21
L11	1456	382/141.ccls.	USPAT; UPAD	NEAR	OFF	2013/09/19 23:21
L10	253	382/110.ccls.	USPAT; UPAD	NEAR	OFF	2013/09/19 23:21
L9	1267	382/209.ccls.	USPAT; UPAD	NEAR	OFF	2013/09/19 23:21
L8	439	382/205.ccls.	USPAT; UPAD	NEAR	OFF	2013/09/19 23:21

9/ 20/ 2013 12:46:37 AM

C:\Users\mentezari\Documents\EAST\Workspaces\12\_772\_709.wsp

<b>Search Notes</b>  	<b>Application/Control No.</b>  12772709	<b>Applicant(s)/Patent Under Reexamination</b>  THOMPSON ET AL.
	<b>Examiner</b>  MICHELLE ENTEZARI	<b>Art Unit</b>  2665

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
382	205, 209, 110, 141	11/6/12 and 9/20/13	Entezari
409	81-83	11/6/12 and 9/20/13	Entezari
76	110	11/6/12 and 9/20/13	Entezari

SEARCH NOTES		
Search Notes	Date	Examiner
See EAST search, includes INV	11/6/12-12/3/12	Entezari
see updated EAST search	9/20/13	Entezari

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
382	205, 209, 110, 141	9/20/13	Entezari
409	81-83	9/20/13	Entezari
76	110	9/20/13	Entezari

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# **PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
or Fax (571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

33772 7590 09/23/2013  
MCDONALD HOPKINS LLC  
600 Superior Avenue, East  
Suite 2100  
CLEVELAND, OH 44114-2653

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

## **Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
EFS (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/772,709	05/03/2010	Chester O.D. Thompson	16223-00151	4443

TITLE OF INVENTION: KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$890	\$300	\$0	\$1190	12/23/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
ENTEZARI, MICHELLE M	2665	382-209000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 McDonald Hopkins LLC

2 \_\_\_\_\_

3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

HY-KO PRODUCTS COMPANY

NORTHFIELD, OHIO

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☒ Issue Fee
- ☒ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 130265 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

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Authorized Signature /Charles F. Gray/

Date December 23, 2013

Typed or printed name Charles F. Gray

Registration No. 67,012

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This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

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Electronic Patent Application Fee Transmittal				
Application Number:		12772709		
Filing Date:		03-May-2010		
Title of Invention:		KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING		
First Named Inventor/Applicant Name:		Chester O.D. Thompson		
Filer:		David Bogdan Cupar/Kathleen Barres		
Attorney Docket Number:		16223-00151		
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	2501	1	890	890
Publ. Fee- Early, Voluntary, or Normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1190

<b>Electronic Acknowledgement Receipt</b>	
<b>EFS ID:</b>	17742746
<b>Application Number:</b>	12772709
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4443
<b>Title of Invention:</b>	KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING
<b>First Named Inventor/Applicant Name:</b>	Chester O.D. Thompson
<b>Customer Number:</b>	33772
<b>Filer:</b>	David Bogdan Cupar/Kathleen Barres
<b>Filer Authorized By:</b>	David Bogdan Cupar
<b>Attorney Docket Number:</b>	16223-00151
<b>Receipt Date:</b>	23-DEC-2013
<b>Filing Date:</b>	03-MAY-2010
<b>Time Stamp:</b>	14:55:38
<b>Application Type:</b>	Utility under 35 USC 111(a)

### **Payment information:**

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$1190
RAM confirmation Number	1585
Deposit Account	130265
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	IF.pdf	107308	no	2
			f1dc9e49efe008526388b1bfe320f5449eb28451		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32169	no	2
			07f83a16c5c12237b5f17f93485982ad4773386f		
Warnings:					
Information:					
Total Files Size (in bytes):			139477		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>            If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>            If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>            If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/772,709	02/04/2014	8644619	16223-00151	4443

33772 7590 01/15/2014  
MCDONALD HOPKINS LLC  
600 Superior Avenue, East  
Suite 2100  
CLEVELAND, OH 44114-2653

### ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

#### **Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)** (application filed on or after May 29, 2000)

The Patent Term Adjustment is 767 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Chester O.D. Thompson, Painesville, OH;  
William R. Mutch, North Ridgeville, OH;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit [SelectUSA.gov](http://SelectUSA.gov).

## UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

Page 1 of 1

PATENT NO. : 8,644,619

APPLICATION NO.: 12/772,709

ISSUE DATE : February 4, 2014

INVENTOR(S) : Chester O.D. Thompson and William R. Mutch

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 10, line 32, delete "black" and insert "blade"

**MAILING ADDRESS OF SENDER (Please do not use customer number below):**

Charles F. Gray/McDonald Hopkins LLC  
600 Superior Avenue, Suite 2100  
Cleveland, OH 44114

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt	
EFS ID:	19578822
Application Number:	12772709
International Application Number:	
Confirmation Number:	4443
Title of Invention:	KEY BLANK IDENTIFICATION SYSTEM WITH GROOVE SCANNING
First Named Inventor/Applicant Name:	Chester O.D. Thompson
Customer Number:	33772
Filer:	Todd A. Benni/Leah Foster
Filer Authorized By:	Todd A. Benni
Attorney Docket Number:	16223-00151
Receipt Date:	15-JUL-2014
Filing Date:	03-MAY-2010
Time Stamp:	09:34:40
Application Type:	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
------------------------	----

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Certificate of Correction	CertofCorrection.pdf	164192 8a57c59875a1a5cc540f2e93ac04a4b4009b0392	no	2

### Warnings:

### Information:



This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE  
**CERTIFICATE OF CORRECTION**

PATENT NO. : 8,644,619 B2  
APPLICATION NO. : 12/772709  
DATED : February 4, 2014  
INVENTOR(S) : Chester O. D. Thompson et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims

Column 10, line 32, delete "black" and insert --blade--

Signed and Sealed this  
Ninth Day of September, 2014



Michelle K. Lee  
*Deputy Director of the United States Patent and Trademark Office*