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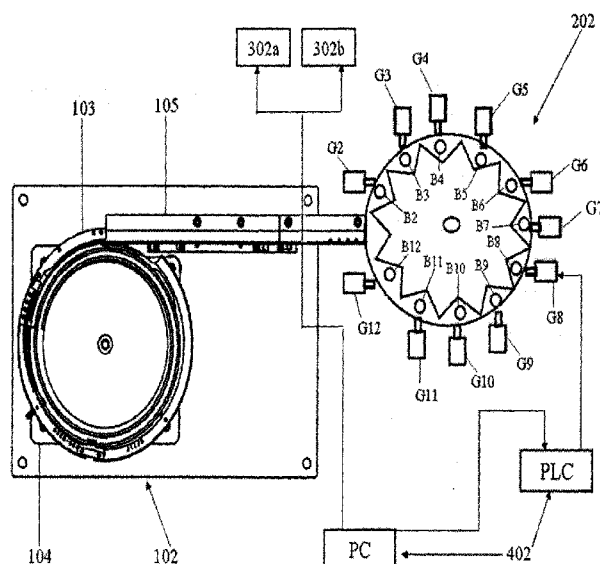
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(54) **Title:** SYSTEM AND METHOD FOR SEGREGATING DIAMONDS



(57) **Abstract:** A system (100) for segregating diamonds includes a feeder assembly (102), a camera (302a), a lighting system (302b) and a rotary and binning mechanism (202). The feeder assembly (102) has a vibratory bowl (103). The vibratory bowl (103) is connected to a vibrator mechanism (not shown). The vibrator mechanism is adapted to vibrate the bowl (103). The vibratory bowl (103) is essentially a container adapted to receive diamonds therein. The feeder assembly (102) has a linear feeder (105) which connects the vibratory bowl (103) and the rotary and binning mechanism (202). A camera (302a) and a lighting system (302b) are provided near the second end (105b) of the linear feeder (105). A process for segregating the diamonds by using the system (100) include obtaining the user requirement and electronically storing the user requirement in a guide card which is fed into a computer (402) connected to system (100) for segregation.



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“SYSTEM AND METHOD FOR SEGREGATING DIAMONDS”**FIELD OF INVENTION**

[001] The embodiments herein relate to jewelry manufacturing and, more particularly but not exclusively to a system and a method for segregating diamonds in the field of jewelry manufacturing.

BACKGROUND OF INVENTION

[002] The jewelry industry at present is on the rise all over the world. Increase in demand for jewelry requires the jewelry manufacturing industries to optimize the methods of manufacturing jewelry to produce more jewels in minimum duration thereby meeting the expectations of the customers. Further, as the precious stones used in jewelry, such as diamonds, are expensive in nature, the process of manufacturing jewels should obviate any errors, such as categorizing the stones based on luster and color or bagging of such precious stones etc., which may occur during the course of manufacturing of the jewelry.

[003] Generally, in diamond jewelry manufacturing, the diamonds are categorized based on color, luster, clarity, cut etc. Currently, this categorization of diamonds is being done by using GIA (Gemological Institute of America) International Diamond Grading System. For example, GIA's

proprietary color scale is used to categorize the diamonds based on its color. The color scale begins with the highest rating of D for colorless, and goes up to the alphabet Z for light colored diamonds. Similarly, GIA International Diamond Grading System has a GIA's Clarity scale and a GIA's cut scale which is used to categorize the diamonds based on clarity and cut, respectively. Further, the segregation of diamonds is done in order to categorize the diamonds to meet the requirement of the product. At present, segregation of diamonds based on its properties such as color, luster, cut etc is done manually.

[004] The segregation process involves providing a skilled person with the diamonds of approximately the same size. Thereafter, the person segregates the diamonds based on the diamond's color and luster according to the GIA's scale. In the aforementioned manual process, although the GIA's scale is used, the segregation of the diamonds is largely based on the person's opinion. Therefore, the segregation of diamonds may not be free from human errors.

[005] Further, segregation of the diamonds that are sized below 2.8mm may not be possible as the size of the diamond would pose difficulty for the person to identify the luster. Also, the manual process of segregating the diamonds as discussed above demands proper training to provide the persons involved with necessary skill sets.

[006] Therefore, there is a need for system to appropriately and automatically segregate the diamonds. Further, there is a need for a system and a method for obviating above mentioned drawbacks in the process of segregating diamonds.

OBJECT OF INVENTION

[007] The principal object of the invention is to provide a system and a method for segregating the diamonds automatically based on color and luster.

[008] Another object of the invention is to provide a system to categorize and segregate diamonds of all sizes based on color and luster.

[009] Another object of the invention is to provide a reliable system to categorize and segregate the diamonds based on color and luster, by eliminating the human error.

[0010] Yet another object of the invention is to provide a system for categorizing and segregating the diamonds that can be operated by people of ordinary skills.

BRIEF DESCRIPTION OF FIGURES

[0011] This invention is illustrated in the accompanying drawings, throughout which like reference letters indicate corresponding parts in the

various figures. The embodiments herein will be better understood from the following description with reference to the drawings, in which:

[0012] FIG. 1 shows a system for segregating diamonds according to an embodiment of the present invention;

[0013] FIG. 2 is a flow chart depicting a method of segregating diamonds according to an embodiment of the present invention; and

[0014] FIG. 3 is a flow chart describing a method of segregating diamonds according to another embodiment of the present invention.

DETAILED DESCRIPTION OF INVENTION

[0015] The embodiments herein and the various features and advantageous details thereof are explained more fully with reference to the non-limiting embodiments that are illustrated in the accompanying drawings and detailed in the following description. Descriptions of well-known components and processing techniques are omitted so as to not unnecessarily obscure the embodiments herein. The examples used herein are intended merely to facilitate an understanding of ways in which the embodiments herein may be practiced and to further enable those of skill in the art to practice the embodiments herein. For example, it should be noted that while some embodiments are explained with respect to segregating diamonds for the ease of describing, other components could also be segregated using the system with little or no modifications. Accordingly, the examples should not be construed as limiting the scope of the embodiments herein.

[0016] The embodiments herein provide a system and a method for segregating diamonds. Further, the embodiments herein provide an electric tractor that could enable multi speed transmissions. Furthermore, the embodiments herein provide a system to categorize and segregate diamonds of all sizes based on color and luster. Referring now to the drawings, and more

particularly to FIGS. 1 through 3, where similar reference characters denote corresponding features consistently throughout the figures, there are shown embodiments.

[0017] Fig. 1 shows a system 100 for segregating diamonds according to an embodiment of the present invention. The system 100 includes a feeder assembly 102, a camera 302a, a lighting system 302b and a rotary and binning mechanism 202. The feeder assembly 102 includes a vibratory bowl 103. The vibratory bowl 103 is mounted onto a supporting plate 104. The vibratory bowl 103 is connected to a vibrator mechanism (not shown) such that the vibrator mechanism is adapted to vibrate the bowl 103. The vibrator mechanism could be selected from any conventional mechanism that could be used for vibrating the vibratory bowl 103. The vibratory bowl 103 is essentially a cup shaped container adapted to receive diamonds therein. It should be noted that the vibratory bowl 103 may have different shapes or structure without otherwise deterring the intended function of the system 100 as will be apparent from the description of the embodiments of the invention. Such vibratory bowl 103 having different shape is also within the scope of this invention.

[0018] The feeder assembly 102 includes a linear feeder 105 having a first end 105a and a second end 105b. Further, the linear feeder 105 is

configured to connect the vibratory bowl 103 and the rotary and binning mechanism 202. In an embodiment, a first end 105a of linear feeder 105 is positioned near the vibratory bowl 103 and a second end 105b of linear feeder 105 is positioned near the rotary and binning mechanism 202. The camera 302a and a lighting system 302b are provided near the second end 105b of the linear feeder 105.

[0019] Further, the rotary and binning mechanism 202 has a rotor R. The rotary and binning mechanism 202 further includes plurality of gates G2-G12 with corresponding bins B2-B12.

[0020] In one embodiment, gate G2-G12 and camera 302a may be provided near the first end 105a of the linear feeder 105. The system 100 further includes a computer and a controller 402. In an embodiment, the controller is selected for a programmable logic controller. However, it is also within the scope of the invention that the controller 402 may include any other hardware devices or combination of hardware devices or combination of hardware or software devices that could achieve one or more process discussed below. The controller 402 is configured to regulate functioning of all electromechanical components of the system 100. Further, the camera 302a is selected from any conventional devices that could be configured to capture color and luster of the diamonds. In an embodiment, plurality of camera 302a

could be used to capture the color and luster of the diamonds. In an embodiment, the color and luster of diamonds could be obtained by camera 302a using image processing techniques. In image processing technique, the image of diamonds could be obtained and transferred to the controller 402. Further, the controller 402 is provided with the information regarding images of diamonds having various color and luster. Furthermore, the controller 402 could be configured to compare the image of diamonds having various color and luster with the image of diamonds obtained from camera 302a.

[0021] The lighting system 302b is selected from any conventional system that could provide necessary lighting and assist camera 302a for capturing color and luster.

[0022] A method for segregating the diamonds by using the system 100 according to an embodiment of the present invention is explained hereafter. FIG. 2 is a flow chart describing a method of segregating the diamonds according to an embodiment of the present invention. The method includes obtaining the user or the end product requirement and electronically storing the user or end product requirement in a guide card or similar means. The guide card is fed into a computer 402 like oracle system. Diamonds of same size having different color and luster which are to be segregated are placed in the vibrator bowl 103 of the system 100 (step 501a). Further, when the system 100

is switched on, the vibrator bowl starts vibrating thereby creating a path for the diamonds (step 502a) placed in the vibratory bowl 103. The diamonds follow the path created by the vibration of the vibratory bowl 103 and reach the first end 105a of the linear feeder 105. Further, if the diamonds are of conical shape the diamonds reach the linear feeder in an inverted orientation because of the larger surface area of the diamonds at the base than at the top (step 503a). Further, the linear feeder 105a defines a grooves path therein which is configured to traverse the diamonds from vibrator bowl 103 to the second end 105b of the linear feeder 105. Further, the path and the structure defined by the linear feeder 105 may vary depending on the shape of the diamond. Such construction of the linear feeder 105 with varied path structure is also within the scope of this invention.

[0023] The camera 302a and lighting system 302b that are positioned near to the second end 105b of the linear feeder 105 capture the color and luster of the diamonds (step 505a) when the diamond reaches the second end 105b of the linear feeder 105. Further, the camera 302a and the lighting system 302b sends the captured data such as color and luster of the diamonds to the computer 402. Further, the computer 402 compares the data obtained from the camera 302a and lighting system 302b to the user's requirement (step 507a) which was fed in to the computer 402 through the guide card or similar means

and assigns specific identification code for the diamonds (step 506a). Furthermore, the computer passes the data such as identification code for specific category of the diamonds to the controller 402. Further, controller 402 instructs the rotor R to assign specific gates from G2 – G12 for diamonds that belong to a specific category (step 508a). The gates from G2-G12 are assigned with specific bins from B2-B12 where the diamonds can be stored (step 509a). This process of segregating continues till all the diamonds in the vibratory bowl 103 are segregated.

[0024] FIG. 3 is a flow chart describing a process of segregating the diamonds according to another embodiment of the present invention. The process includes obtaining the user or the end product requirement and electronically storing the end product requirement in a guide card or similar means. The guide card is fed into a computer 402 like oracle system. Diamonds of same size having different color and luster which are to be segregated are placed in the vibrator bowl 103 of the system 100 (step 501b). Further, when the system 100 is switched on, the vibrator bowl 103 starts vibrating thereby creating a path for the diamonds (step 502b) placed in the vibratory bowl 103. The diamonds follow the path created by the vibration of the vibratory bowl 103 and reach the first end 105a of the linear feeder 105. Further, if the diamonds are of conical shape the diamonds reach the Gate 1

(not shown) placed near the first end 105a of the linear feeder 105 in an inverted orientation because of the larger surface area of the diamonds at the base than at the top (step 503b).

[0025] The camera 302a and lighting system 302b that are placed near the Gate 1 captures the color of the diamonds (step 504b) that reach the Gate 1 and sends the captured data to the computer 402. Further, the linear feeder 105 defines a grooved path therein which is configured to traverse the diamonds from vibrator bowl 103 to the second end 105b of the linear feeder 105. Further, the camera 302a and the lighting system 302b placed near the second end 105b of the linear feeder 105 captures the luster reading (step 506b) of the diamonds that reach the second end 105b of the linear feeder 105 and sends the captured data to the computer 402. Further, the computer 402 compares 508b the data obtained from both the camera 302a and the lighting system 302b that are placed near the first end 105a of the linear feeder 105 and the second end 105b of the linear feeder 105 respectively to the user's requirement 507a which was fed in to the computer 402 through the guide card or similar means and assigns specific identification code 507b for the diamonds 506a. Furthermore, the computer passes the data such as identification code for specific category of the diamonds to the PLC 402. Further, the PLC 402 instructs the rotor R to assign specific gates from G2 – G12 for diamonds (step 509b) that belong to

the specific category 508a. The gates from G2-G12 are assigned with specific bins from B2-B12 where the diamonds can be stored (step 510b). This process of segregating continues till all the diamonds in the vibratory bowl 103 are segregated.

[0026] It should be noted that the aforementioned methods for segregating diamonds using system 100 is provided for the ease of understanding of the embodiments of the invention. However, various actions in methods as explained in figs. 2 and 3 may be performed in the order presented, in a different order or simultaneously. Further, in some embodiments, some actions listed in figs. 2 and 3 may be omitted. Therefore, such embodiments and any modification that is apparent from this description and drawings are also within the scope of this invention.

[0027] The foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of

limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the spirit and scope of the embodiments as described herein.

CLAIMS**We claim:**

1. A system for segregating diamonds, wherein said system comprising:
 - a feeder assembly having a vibratory bowl adapted to receive plurality of diamonds and a linear feeder;
 - a rotary and binning mechanism having plurality of bin;
 - at least one camera that is configured to capture at least one of color and luster of diamonds; and
 - a controller configured to regulate functioning of at least one of said feeder assembly, said rotary and binning mechanism and said camera,wherein
 - said linear feeder is configured to provide a pathway between said vibratory bowl and said rotary binning mechanism;
 - said controller is configured to segregate said plurality of diamonds into various categories based on said at least one of color and luster of diamonds; and

said controller is configured to regulate functioning of said rotary and binning mechanism such that each of said category of diamonds is received in separate bins.

2. The system as claimed in claim 1 further includes a lighting system adapted to assist said camera in capturing said color and luster of diamonds by providing required lighting.
3. The system as claimed in claim 1, wherein said rotary and binning mechanism further includes a rotor configured to rotate said plurality of bins.
4. A method for segregating diamonds, said method comprising:
 - providing plurality of diamonds having various color and luster;
 - identifying at least one of color and luster of said plurality of diamonds; and
 - segregating said plurality of diamonds into various categories based on at least one of said color and luster.

5. The method as claimed in claim 4 further comprises:

obtaining at least one of desired color and desired luster of the diamonds from user;

comparing said desired color and luster of diamonds with said identified color and luster of plurality of diamonds; and

segregating diamonds having desired color and luster.

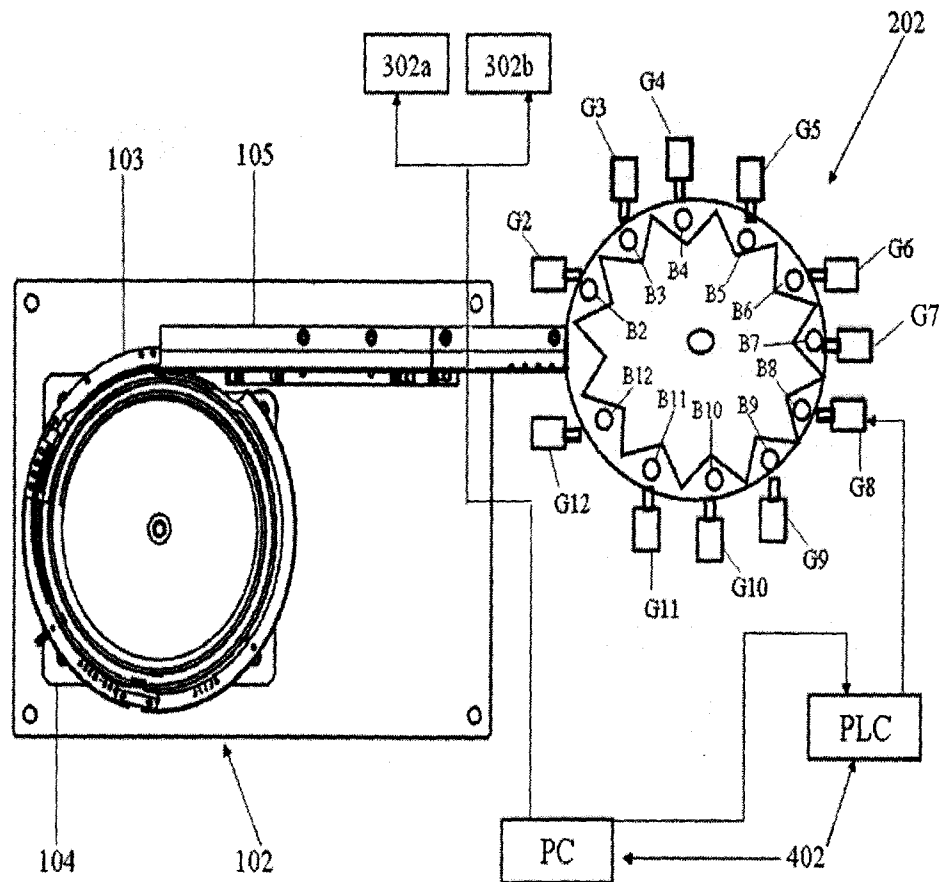


Fig. 1

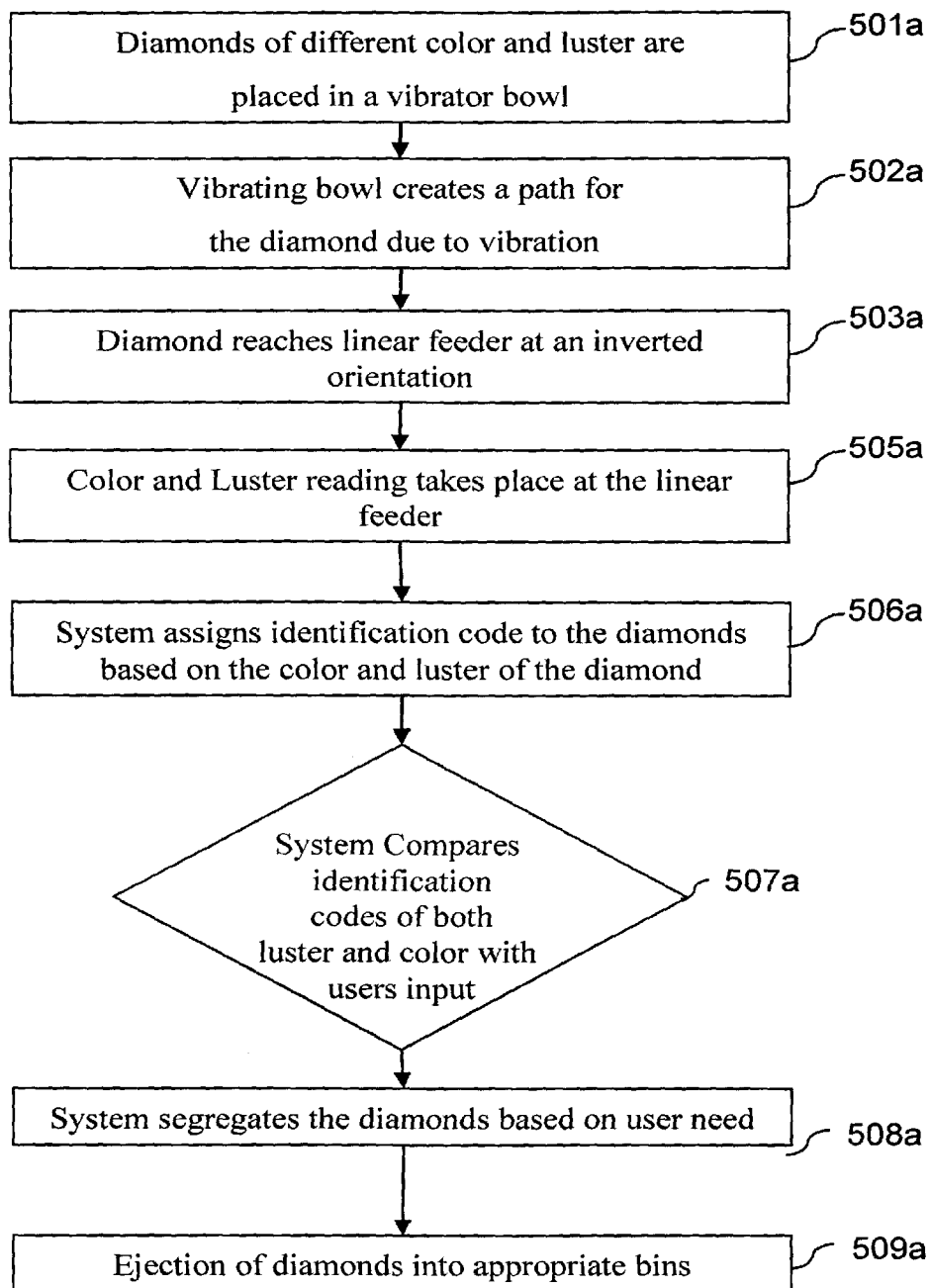
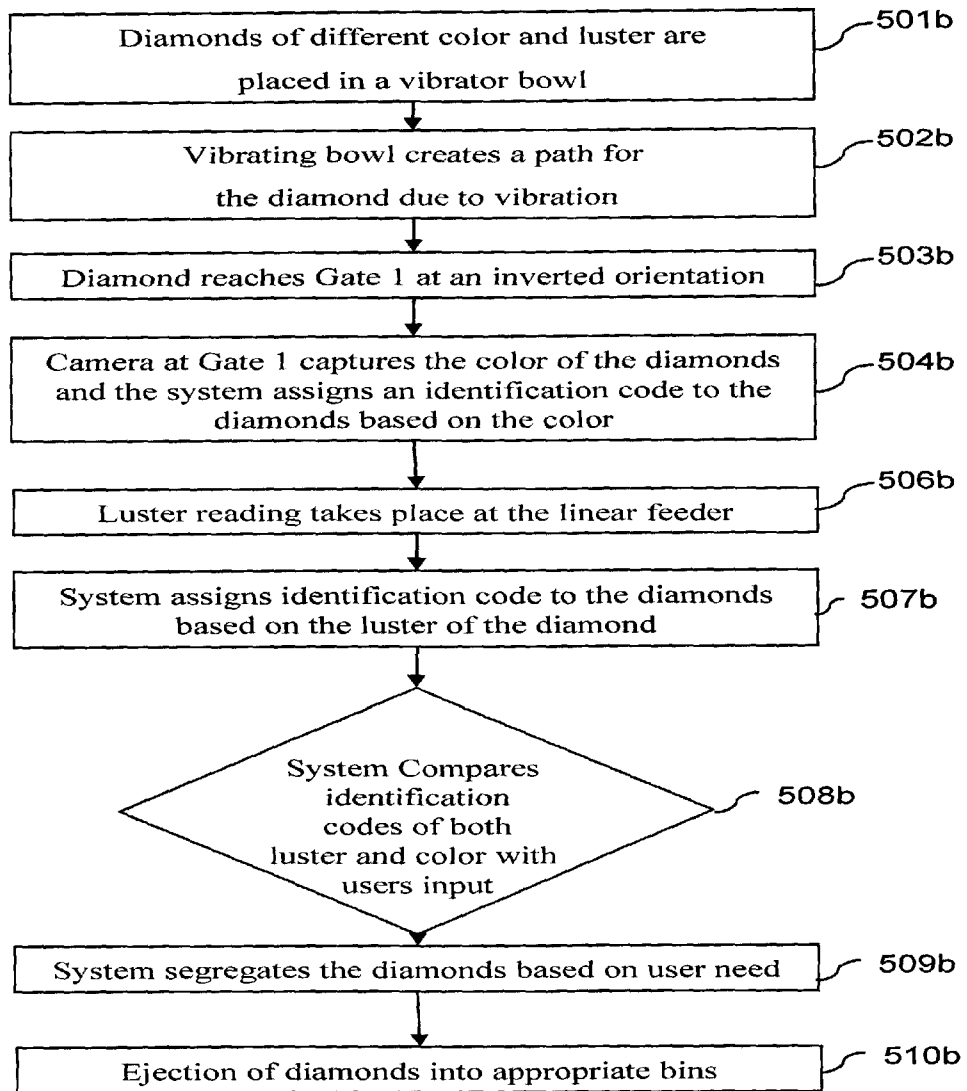


Fig. 2

**Fig. 3**