COUNTING GAMING CHIPS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 62/668,936, filed May 9, 2018, the entire contents of which is incorporated herein by reference.

BACKGROUND

[0001a] Gaming chips can be used in a casino in lieu of currency. The gaming chips can be made from various materials including colored metals, injection-molded plastics, and compression molded clay. The gaming chips can be stored in a chip tray. The chip tray can be placed in a gaming table. A casino can include cameras to enable security to monitor the gaming floor.

SUMMARY

[0001b] According to an aspect of the present invention, there is provided a system comprising at least one imaging device and at least one computing device coupled to the at least one imaging device. The at least one imaging device is configured to capture at least a portion of a gaming table to generate an image. The at least one computing device is configured to: obtain the image from the at least one imaging device; identify a gaming chip tube in a gaming chip tray; determine a first position corresponding to an end of a first plurality of gaming chips stacked in the gaming chip tube; identify a spacer based at least in part on recognizing a predefined pattern on the spacer; determine a second position corresponding to the spacer; and determine a first count of the first plurality of

gaming chips in the gaming chip tube based at least in part on the first position and the second position.

[0001c] According to another aspect of the present invention, there is provided a method comprising: capturing, via at least one imaging device, an image corresponding to a gaming chip tray; identifying, via at least one computing device, a gaming chip tube in the gaming chip tray; determining, via the at least one computing device, a first position corresponding to an end of a first plurality of gaming chips stacked in the gaming chip tube; identifying, via the at least one computing device, a spacer based at least in part on recognizing a predefined pattern on the spacer; determining, via the at least one computing device, a second position corresponding to the spacer; and determining, via the at least one computing device, a first count of the first plurality of gaming chips in the gaming chip tube based at least in part on the first position and the second position.

[0001d] According to another aspect of the present invention, there is provided a non-transitory computer-readable medium on which is stored a program that is executable by at least one computing device and that, when executed by the at least one computing device, causes the at least one computing device to: obtain an image from at least one imaging device; identify a gaming chip tube in a gaming chip tray; determine a first position corresponding to an end of a first plurality of gaming chips stacked in the gaming chip tube; identify a spacer based at least in part on recognizing a predefined pattern on the spacer; determine a second position corresponding to the spacer; and determine a first count of the first plurality of gaming chips in the gaming chip tube based at least in part on the first position and the second position.

[0001e] According to another aspect of the present invention, there is provided a system comprising at least one imaging device and at least one computing device coupled to the at least one imaging device. The at least one imaging device is configured to capture at least a portion of a gaming table to generate an image. The at least one computing device is configured to: obtain the image from the at least one imaging device; identify a spacer based at least in part on recognizing a predefined pattern on the spacer; identify a plurality of gaming chips that are stacked as a gaming chip stack in a gaming chip tube and that include the spacer on an end; and determine a count of the plurality of gaming chips in the gaming chip tube based at least in part on a height of the gaming chip stack.

[0001f] A system can include one or more imaging devices and one or more computing devices. The imaging device can capture a portion of a gaming table. The computing device can be in communication with the imaging device. The computing device can capture an image from the imaging device. The computing device can identify a gaming chip tube in a gaming chip tray, determine a first position corresponding to a bottom of the gaming chip tube, identify a spacer based at least in part on recognizing a predefined pattern on the spacer, determine a second position corresponding to the spacer, and determine a count of gaming chips in the gaming chip tube based at least in part on the first position and the second position.

CLAIMS

1. A system comprising:

at least one imaging device; and

at least one computing device coupled to the at least one imaging device; wherein:

the at least one imaging device is configured to capture at least a portion of a gaming table to generate an image; and

the at least one computing device is configured to:

obtain the image from the at least one imaging device;

identify a gaming chip tube in a gaming chip tray;

determine a first position corresponding to an end of a first plurality of gaming chips stacked in the gaming chip tube;

identify a spacer based at least in part on recognizing a predefined pattern on the spacer;

determine a second position corresponding to the spacer; and

determine a first count of the first plurality of gaming chips in the gaming chip tube based at least in part on the first position and the second position.

2. The system of claim 1, wherein the at least one computing device is further configured to:

identify a second gaming chip tube in the gaming chip tray;

determine a third position corresponding to an end of a second plurality of gaming chips stacked in the second gaming chip tube;

identify a second spacer based at least in part on recognizing the predefined pattern on the second spacer;

determine a fourth position corresponding to the second spacer; and

determine a second count of the second plurality of gaming chips in the second gaming chip tube based at least in part on the third position and the fourth position.

3. The system of claim 1, further comprising at least one second imaging device, wherein the at least one second imaging device is configured to capture at least a portion of the gaming chip tray, and the at least one computing device is further configured to :

obtain a second image from the at least one second imaging device;

determine a third position corresponding to the end of the first plurality of gaming chips in the second image;

identify the spacer based at least in part on recognizing the predefined pattern on the spacer in the second image;

determine a fourth position corresponding to the spacer identified using the second image; and

determine a second count of the first plurality of gaming chips in the gaming chip tube based at least in part on the third position and the fourth position.

4. The system of claim 3, wherein the at least one computing device is further configured to :

determine that the second count of the first plurality of gaming chips fails to match the first count of the first plurality of gaming chips; and

perform a remedial action responsive to the determination that the first count fails to match the second count.

5. The system of claim 1, wherein the predefined pattern on the spacer differs from a pattern on any of a plurality of denominations of the first plurality of gaming chips.

6. The system of claim 1, wherein the at least one computing device is further configured to calculate a delta between the first position and the second position, and determine the first count of the first plurality of gaming chips by rounding a result of the delta divided by a predefined gaming chip size.

7. The system of claim 1, wherein the end of the first plurality of gaming chips corresponds to a bottom of the gaming chip tube.

8. A method comprising:

capturing, via at least one imaging device, an image corresponding to a gaming chip tray;

identifying, via at least one computing device, a gaming chip tube in the gaming chip tray;

determining, via the at least one computing device, a first position corresponding to an end of a first plurality of gaming chips stacked in the gaming chip tube;

identifying, via the at least one computing device, a spacer based at least in part on recognizing a predefined pattern on the spacer;

determining, via the at least one computing device, a second position corresponding to the spacer; and

determining, via the at least one computing device, a first count of the first plurality of gaming chips in the gaming chip tube based at least in part on the first position and the second position.

9. The method of claim 8, further comprising:

identifying, via the at least one computing device, a second gaming chip tube in the gaming chip tray;

determining, via the at least one computing device, a third position corresponding to an end of a second plurality of gaming chips stacked in the second gaming chip tube;

identifying, via the at least one computing device, a second spacer based at least in part on recognizing a second predefined pattern on the second spacer;

determining, via the at least one computing device, a fourth position corresponding to the second spacer; and

determining, via the at least one computing device, a second count of the second plurality of gaming chips in the second gaming chip tube based at least in part on the third position and the fourth position.

10. The method of claim 8, further comprising:

obtaining, via the at least one computing device, a second image from at least one second imaging device;

determining, via the at least one computing device, a third position corresponding to the end of the first plurality of the gaming chips in the second image;

identifying, via the at least one computing device, the spacer based at least in part on recognizing the predefined pattern on the spacer in the second image;

determining, via the at least one computing device, a fourth position corresponding to the spacer identified using the second image; and

determining, via the at least one computing device, a second count of the first plurality of gaming chips in the gaming chip tube based at least in part on the third position and the fourth position.

11. The method of claim 10, further comprising:

determining, via the at least one computing device, that the first count of the first plurality of gaming chips fails to match the second count of the first plurality of gaming chips; and

in response to determining that the first count of the first plurality of gaming chips fails to match the second count of the first plurality of gaming chips, performing a remedial action.

12. The method of claim 8, wherein the image is captured by the at least one imaging device capturing at least a portion of a gaming table.

13. The method of claim 8, wherein the predefined pattern on the spacer differs from a pattern on any of a plurality of denominations of the first plurality of gaming chips.

14. The method of claim 8, further comprising calculating, via the at least one computing device, a delta between the first position and the second position, wherein the first count of the first plurality of gaming chips is determined by rounding a result of the delta divided by a gaming chip size.

15. The method of claim 8, wherein the end of the first plurality of gaming chips corresponds to a bottom of the gaming chip tube.

16. A non-transitory computer-readable medium on which is stored a program that is executable by at least one computing device and that, when executed by the at least one computing device, causes the at least one computing device to :

obtain an image from at least one imaging device;

identify a gaming chip tube in a gaming chip tray;

determine a first position corresponding to an end of a first plurality of gaming chips stacked in the gaming chip tube;

identify a spacer based at least in part on recognizing a predefined pattern on the spacer;

determine a second position corresponding to the spacer; and

determine a first count of the first plurality of gaming chips in the gaming chip tube based at least in part on the first position and the second position.

17. The non-transitory computer-readable medium of claim 16, wherein the program, when executed by the at least one computing device, further causes the at least one computing device to:

identify a second gaming chip tube in the gaming chip tray;

determine a third position corresponding to an end of a second plurality of the gaming chips stacked in the second gaming chip tube;

identify a second spacer based at least in part on recognizing a second predefined pattern on the second spacer;

determine a fourth position corresponding to the second spacer; and

determine a second count of the second plurality of gaming chips in the second gaming chip tube based at least in part on the third position and the fourth position.

18. The non-transitory computer-readable medium of claim 16, wherein the program, when executed, further causes the at least one computing device to :

obtain a second image from at least one second imaging device;

determine a third position corresponding to the end of the first plurality of gaming chips in the second image;

identify the spacer based at least in part on recognizing the predefined pattern on the spacer in the second image;

determine a fourth position corresponding to the spacer; and

determine a second count of the first plurality of gaming chips in the gaming chip tube based at least in part on the third position and the fourth position.

19. The non-transitory computer-readable medium of claim 18, wherein the program, when executed, further causes the at least one computing device to:

determine that the first count of the first plurality of gaming chips fails to match the second count of the first plurality of gaming chips; and

perform a remedial action.

20. The non-transitory computer-readable medium of claim 16, wherein the image is captured by the at least one imaging device capturing at least a portion of a gaming table.

21. The non-transitory computer-readable medium of claim 16, wherein the predefined pattern on the spacer differs from a pattern on any of a plurality of denominations of the first plurality of gaming chips.

22. The non-transitory computer-readable medium of claim 16, wherein the program, when executed, further causes the at least one computing device to calculate a delta between the first position and the second position, and the first count of the first plurality of gaming chips is determined by rounding a result of the delta divided by a gaming chip size.

23. The non-transitory computer-readable medium of claim 16, wherein the end of the first plurality of gaming chips corresponds to a bottom of the gaming chip tube.

24. A system comprising:

at least one imaging device; and

at least one computing device coupled to the at least one imaging device; wherein:

the at least one imaging device is configured to capture at least a portion of a gaming table to generate an image; and

the at least one computing device is configured to:

obtain the image from the at least one imaging device;

identify a spacer based at least in part on recognizing a predefined pattern on the spacer;

identify a plurality of gaming chips that are stacked as a gaming chip stack in a gaming chip tube and that include the spacer on an end; and

determine a count of the plurality of gaming chips in the gaming chip tube based at least in part on a height of the gaming chip stack.