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Bornhorst

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(54) **GOBO WHEEL LOCATION DRIVE**

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This patent is subject to a terminal disclaimer.

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Related U.S. Application Data

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(51) **Int. Cl.**
G01B 7/30 (2006.01)
G01L 3/00 (2006.01)
F21S 10/00 (2006.01)

(52) **U.S. Cl.**

CPC **F21S 10/007** (2013.01)
USPC **324/207.25; 73/760; 73/862.08**

(58) **Field of Classification Search**

USPC 324/207.25
See application file for complete search history.

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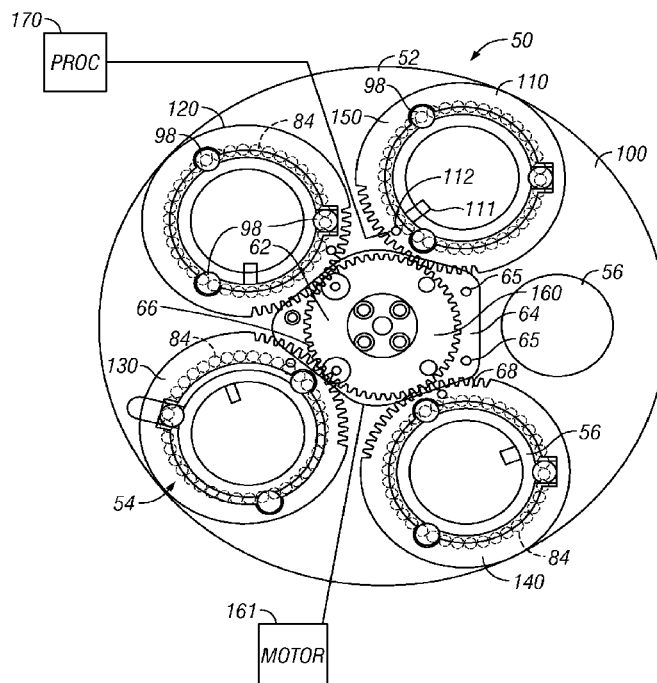
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(57) **ABSTRACT**

A gobo wheel with automatic detection system that automatically detects a rotational position of the gobo. The rotational position can be detected by a magnetic marking system. Each of the gobos can be randomly placed within the holder. The position of the gobos can be automatically determined during a start up routine for example, and then those positions can be stored and used for later determination of a position.

13 Claims, 2 Drawing Sheets



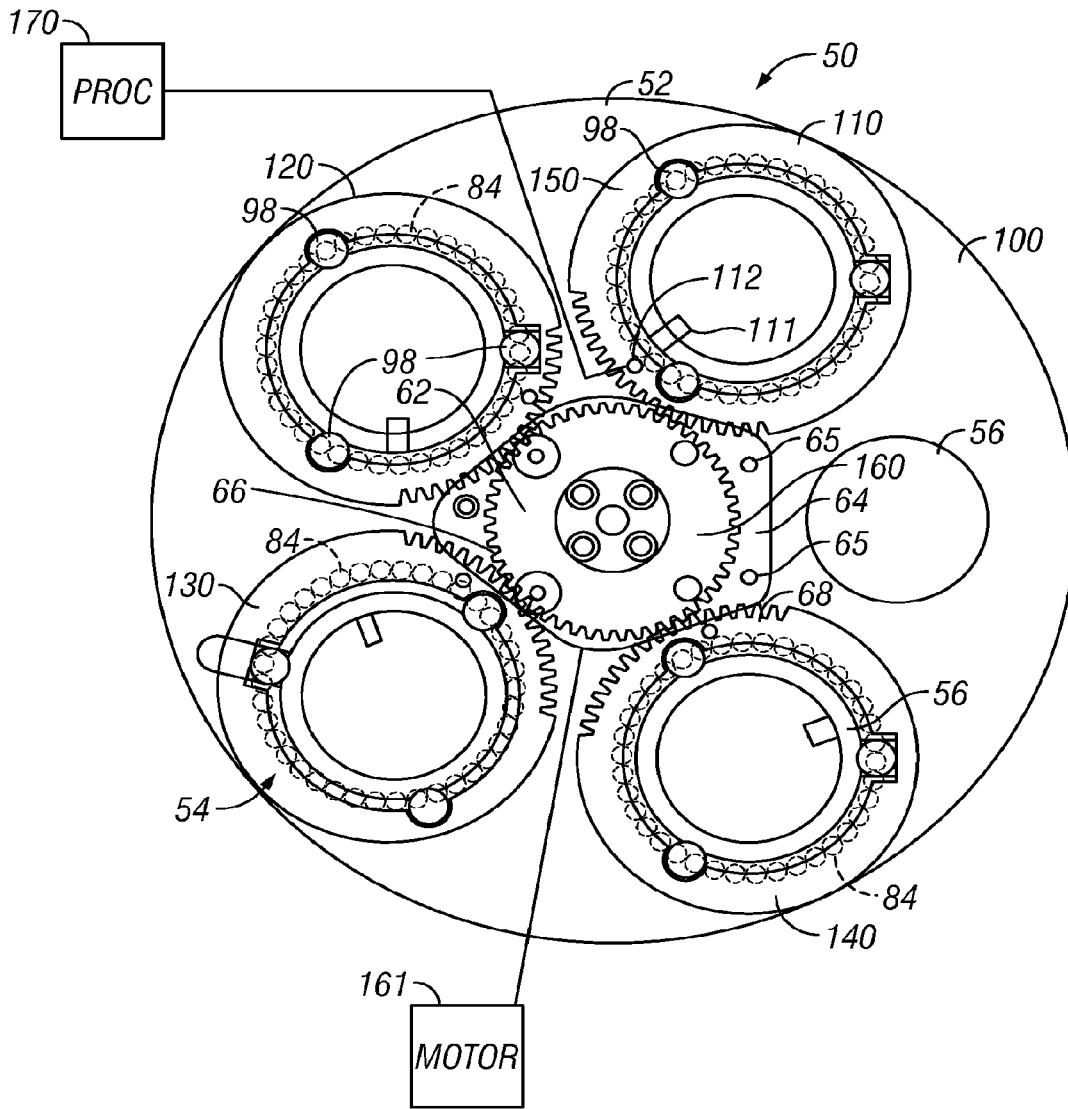


FIG. 1

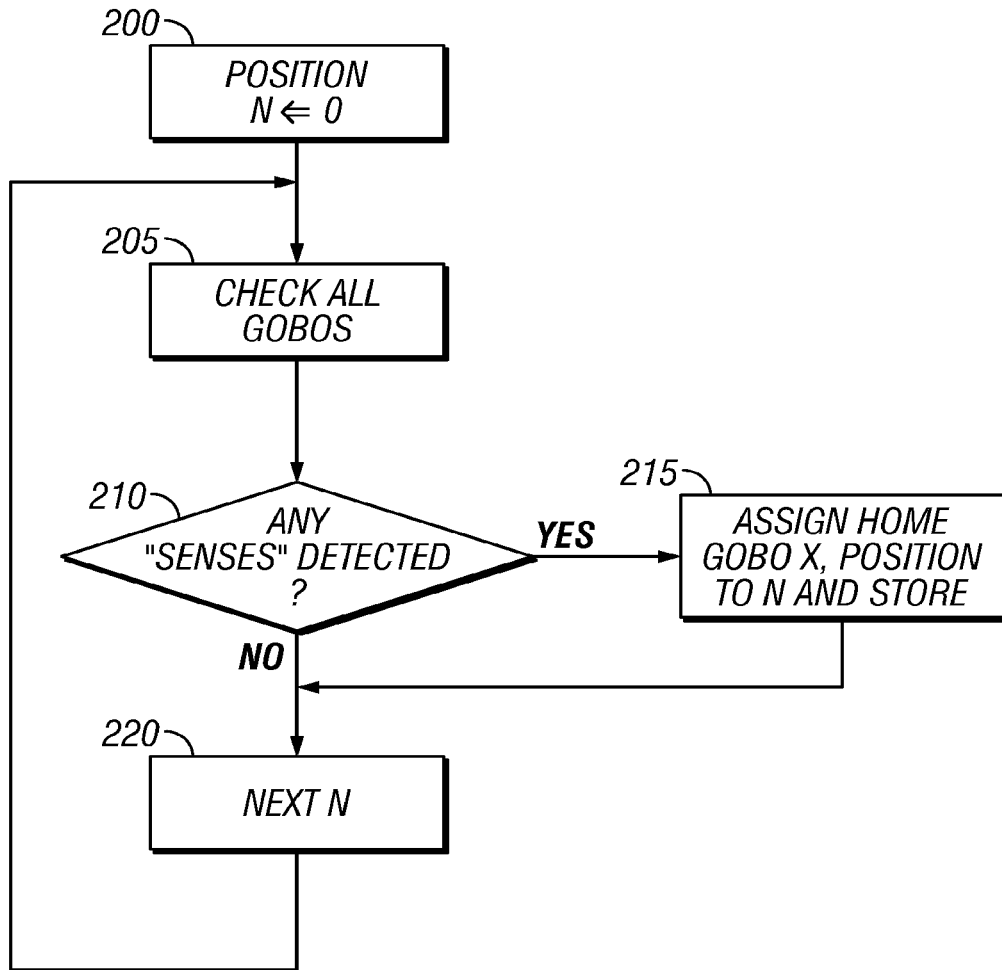


FIG. 2

GOBO WHEEL LOCATION DRIVE**CROSS-REFERENCE TO RELATED APPLICATIONS**

This is a continuation of Ser. No. 12/942,618 filed Nov. 9, 2010, now U.S. Pat. No. 8,132,473 issued Mar. 13, 2012, which is a continuation of Ser. No. 12/546,821, filed Aug. 25, 2009, now U.S. Pat. No. 7,830,139 issued Nov. 9, 2010, which is a continuation of Ser. No. 11/777,006, filed Jul. 12, 2007, now U.S. Pat. No. 7,578,204 issued Aug. 25, 2009. This application also claims priority to U.S. Provisional Application 60/830,773, filed Jul. 13, 2006.

BACKGROUND

A gobo is a device that shapes light. Many lighting devices use a holder for multiple gobos. The holder allows selection of one of the gobos to be placed into the beam of the light beam. It also allows simultaneous rotation of all these gobos, including the one in the light beam.

For example, U.S. Pat. No. 5,402,326 shows a device with a gobo wheel, having five gobos and an open hole thereon. The gobo wheel holds the five gobos, and the gobo wheel is rotatable to allow any of the five gobos to be placed within the "optical train", which is the train of light that passes from the light bulb to the output beam of the light. In addition, the gobo wheels are rotatable as part of an effect of a rotating gobo. The central gear arrangement causes all of the gobos to be rotated simultaneously. When the central gear is actuated, each of the five gobos simultaneously rotate.

SUMMARY

The present application teaches a system which allows calibration of the gobos and their current positions.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other aspects will now be described in detail with reference to the accompanying drawings, wherein:

FIG. 1 illustrates an embodiment.

FIG. 2 illustrates a flow diagram.

DETAILED DESCRIPTION

The general structure and techniques, and more specific embodiments which can be used to effect different ways of carrying out the more general goals, are described herein.

The inventor noticed a problem that existed in gobo wheels of this type. The gobo elements need to be placed on the wheel, and need to be replaceable. However, the orientation of the gobo is very important for properly locating the gobo based on a remote command. The gobo wheels are often placed in their desired orientation. However, if the orientation is incorrect when placed, then the gobo wheels may be out of sync relative to the control.

FIG. 1 illustrates an embodiment. Gobo wheel **100** includes a plurality of gobo elements **110**, **120**, **130**, **140** thereon. Each of the gobo elements includes a toothed outer surface **150**, which interacts with a central sun gear **160**. The sun gear is driven by a motor shown as **161**. The sun gear can be driven in either the clockwise or counterclockwise directions to rotate each of the gobo wheels **110-140** simultaneously.

Each of the gobo wheels **110-140** includes a sensor part thereon. Gobo wheel **110** includes sensor part **111**. In this

embodiment, the sensor part may be a magnet. The magnet is located at a point on the gobo wheel known as position 0. This is a point where the gobo wheel is either upright, or alternatively in a specified position. Each of the gobo wheel locations also includes a detector part **112** which detects the sensor.

In the case of a magnet, the detector may be simply a magnetically actuatable set of contacts which is closed by contact with the magnet. Such contacts are conventional, and are well-known, for example, in the alarm industry. Each of the sensors **112** is connected to a processing part **170**. The processing part **170** may also control the operation of the rotation of the wheel **100** as well as the rotation of the sun gear **160**.

The processor initially runs through a calibration routine which follows the steps of the flowchart of FIG. 2. The operation begins by assigning a current position of each gobo as position 0 at **200**. This current position can be effectively random, since the position will be determined via the routine. A variable *n* is set to 0 at **200**.

Each of the five gobos are checked at **205** to determine if any instances of sensing are detected at **210**. A sense is detected at **210** when one of the sensors **111** is directly adjacent to one of the detectors **112**. When this sense occurs, happens, the gobo is in its "home" position. For gobo *x*, here a gobo **110**, the home position variable is assigned to *n*, and the value is stored at **215**. This value now represents the actual position of the gobo as placed in the holder.

The next *n* is then obtained at **220**, and the process repeats. The system indexes through each of the positions, and therefore obtains an offset for each of the home positions.

For example, the system knows that at any given time, a specified position of the sun gear will represent the home position of the gobo **110**. The system knows the specified home position for each of the other gobos also. For any desired gobo position, therefore, the processor **170** can simply add an offset related to the home position value, and obtain the exact position of the gobo.

This system may be advantageous since the gobos can be placed in any random orientation into the gobo wheel **100**. Alternatively, one can either place or try to place each of the gobo wheels into the calibrated positions, and use the routine of FIG. 2 to determine if they are, in fact, in a calibrated position. The calibration routine can be carried out at each specified amount of time, or when the gobo wheel is replaced or reoriented or on restart.

The above has described the sensors being magnetic, but it should be understood that the sensors can also be optical detection, for example, using a photo diode or infrared diode to detect an optical mark, or can be any other type of proximity sensor.

In addition, while the above has described the use of a specified sun gear arrangement, it should be understood that the above can be used for any gobo calibration sequence. More or fewer than five gobos may be on any gobo wheel, and multiple wheels may also be oriented and calibrated in this way.

The above has described a routine that indexes through all the gobos to carry out a calibration, but it should be understood that any single device can be calibrated in this way.

Although only a few embodiments have been disclosed in detail above, other embodiments are possible and the inventor intends these to be encompassed within this specification. The specification describes specific examples to accomplish a more general goal that may be accomplished in another way. This disclosure is intended to be exemplary, and the claims are intended to cover any modification or alternative which

might be predictable to a person having ordinary skill in the art. For example, other rotatable devices, such as color wheels, may be calibrated in this way.

The computers described herein may be any kind of computer, either general purpose, or some specific purpose computer such as a workstation. The computer may be a Pentium class computer, running Windows XP or Linux, or may be a Macintosh computer. The programs may be written in C, or Java, or any other programming language. The programs may be resident on a storage medium, e.g., magnetic or optical, e.g. the computer hard drive, a removable disk or other removable medium. The programs may also be run over a network, for example, with a server or other machine sending signals to the local machine, which allows the local machine to carry out the operations described herein.

Also, the inventor intends that only those claims which use the words "means for" are intended to be interpreted under 35 USC 112, sixth paragraph. Moreover, no limitations from the specification are intended to be read into any claims, unless those limitations are expressly included in the claims.

What is claimed is:

1. A lighting system, comprising:
 - a lamp, projecting light along an axis;
 - a gobo holder, holding at least one gobo, in a way that allows rotation of said at least one gobo, said gobo holder having a sensor thereon that senses its rotational position;
 - a processor operating to control rotation of said gobos; said processor controlling a calibration routine for detecting home positions of each gobo, and controlling rotating of said at least one gobo to a commanded rotational position relative to said home position.
2. The lighting system as in claim 1, wherein said sensor comprises a detectable part at a first location, which is detected only when at said first location, and said calibration detects when said detectable part is at said first location and establishes that at said home position.
3. The lighting system as in claim 2, wherein said processor receiving a command for said gobo to rotate to a second specified rotated position, and uses said home position to determine a current rotated position of said gobo, and com-

manding said gobo to said second specified rotational position based on said current rotated position and said command.

4. The lighting system as in claim 1, where there are multiple gobos, at least one of which is positioned in said axis; and wherein said processor controls movement of said gobo holder to select one of said gobos by positioning it on said axis.

5. The lighting system as in claim 4, wherein each of multiple gobos rotate based on a common rotation source and where there is a single gobo rotation motor that rotates each of said multiple gobos.

6. A lighting system as in claim 2, wherein said detectable part is magnetically detectable.

7. A lighting system as in claim 5, wherein said multiple gobos are mounted on a surface, further comprising a rotation motor which carries out said common rotation, and a gear which is on said surface and rotated by said rotation motor, to rotate said multiple gobos, and where each of said gobos have a surface that is rotated by said gear.

8. A lighting system as in claim 1 at least one gobo is replaceable in a random rotational orientation.

9. An apparatus, comprising:

a gobo holder, holding a rotatable gobo;

said gobo holder including a detection part adjacent each of said rotatable gobos, wherein said detection part for a gobo enables automatic detection of only one specific position of said gobo, in only one position of said gobo and where said detection part does not detect said position of said gobo in any other orientation other than in said one specific position.

10. An apparatus as in claim 9, wherein said detection part is magnetically detectable.

11. An apparatus as in claim 9, where said detection part is optically detectable.

12. An apparatus as in claim 9, further comprising a rotation part, that rotates said gobo holder, and also rotates other gobo holders whenever said gobo holder is rotated.

13. An apparatus as in claim 9, further comprising a processor, that controls said detection, receives information indicative of said one specific orientation, and controls storing information indicative of said one specific orientation.

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