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Evans

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(54) **PAN AND TILT SERVOMOTOR WITH BRAKE**

(75) Inventor: **Nigel Evans**, Moreton-in-Marsh (GB)

(73) Assignee: **Production Resource Group, LLC**, New Windsor, NY (US)

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(51) **Int. Cl.**
B60Q 1/06 (2006.01)

(52) **U.S. Cl.**
USPC **362/386**; 362/269; 362/271; 362/272

(58) **Field of Classification Search**
USPC 362/269, 271–272, 386
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,610,584	A *	10/1971	Pfaff, Jr.	362/403
3,644,728	A *	2/1972	Hessemer et al.	362/212
6,633,286	B1 *	10/2003	Do et al.	345/205
6,866,402	B2 *	3/2005	Belliveau	362/272

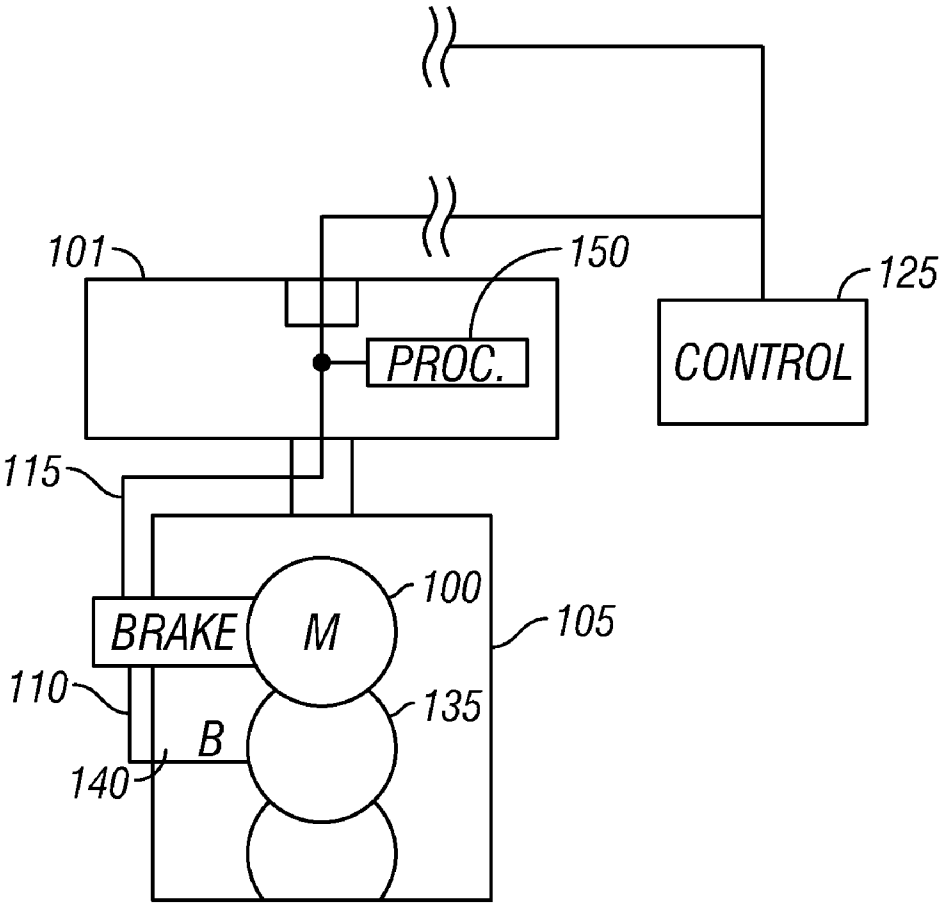
* cited by examiner

Primary Examiner — Sean Gramling
(74) *Attorney, Agent, or Firm* — Law Office of Scott C. Harris, Inc.

(57) **ABSTRACT**

A moving light which has an electronic brake that automatically engages when power is released, to prevent movement of a moving head of a light whenever the power is released.

13 Claims, 1 Drawing Sheet



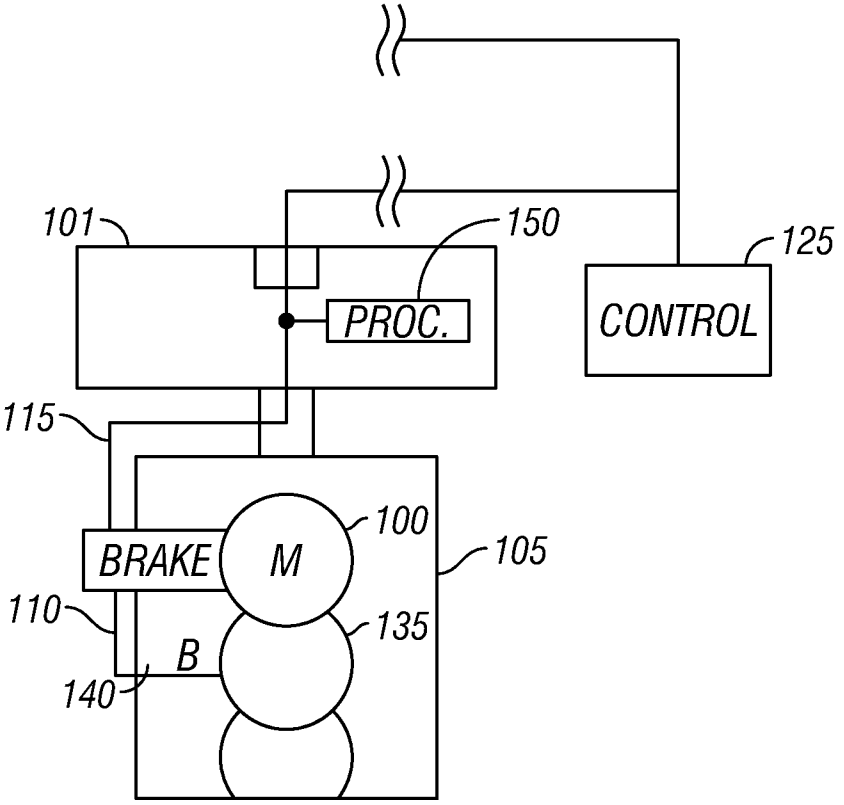

101
150
125
PROC.
CONTROL
115
100
105
BRAKE
M
110
135
B
140

FIG. 1

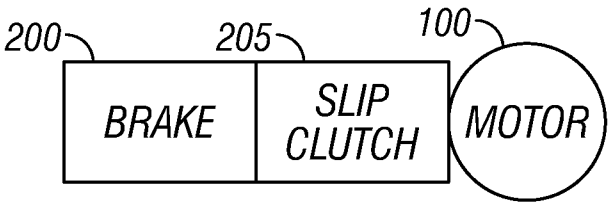

200
205
100
BRAKE
SLIP CLUTCH
MOTOR

FIG. 2

PAN AND TILT SERVOMOTOR WITH BRAKE

This application claims priority from provisional application No. 61/076,756, filed Jun. 30, 2008, the entire disclosure of which is herewith incorporated by reference.

BACKGROUND

Stage lights often motorized and move in pan and tilt directions to point to a stage or the like. However, when being transported, or at other similar times, the lights may be put in a "stowed" position in which their motion axes are locked. Lights like this often use mechanical locks. Once locked, the light cannot be moved.

SUMMARY

The present application describes a system for automatic control of lock status of a locked light.

BRIEF DESCRIPTION OF THE DRAWINGS

In the Drawings:

FIG. **1** shows a light system with a remotely controlled light and a brake; and

FIG. **2** shows a second embodiment with a clutch between the motor and brake.

DETAILED DESCRIPTION

The inventors recognize a problem in the prior art. If a light is "locked" for transport, such that it cannot be moved, one can inadvertently forget to remove that lock before normal operation can begin. Lights are often transported to remote locations, then assembled to an installation, e.g., hung from a truss. The truss may then be lifted high off the ground. If the light is installed on a truss, while still locked, the light is useless until someone releases that lock. This may require a person to climb the truss and manually unlock the lock.

An embodiment describes an electronic brake on the light of a type that allows electrical deactuation.

FIG. **1** illustrates a light **105** that has a base **101** and a moving head **106** that is movable relative to the base. The base may be freestanding, or attached to one or more trusses.

Motor **100** is used to pan or tilt the head **106** of the moveable light **105**. The motor includes an electric brake **110** on the motor, which be energized by an electrical braking signal **115**. The light **100** can be a remotely controllable light, which receives commands over a link from a remote controller **125**, and where that controller may serve to control many such lights. The controls can be DMX or Artnet, or Ethernet based control. In a first embodiment, when the brake is engaged, it can prevent the motor **100** from turning at all. The brake can be selectively actuated and deactuated. In the embodiment, the brake may be a safety style, electronically actuable brake, that automatically goes into braking mode whenever power is interrupted.

There may be a separate motor **135** with its own brake **140**. The two motors respectively control the pan and tilt operation.

The motor is rigidly connected to the pan and tilt mechanism on the lights, in a way such that when the motor is stopped and braked, the light is completely prevented from further movement. The effect is that when the power to the light is turned off, the brake automatically engages. Therefore, whenever the light is off, the brake is on, and the moving light head is locked.

In an embodiment, the brake, once actuated, does not automatically release when power comes on. A software control is used to control the brake off. This may be accomplished by using a latching brake, that latches into the power off, i.e. brake engaged, state. A control signal is be sent to release the brake. That control line is automatically inactivated when the power is turned off. When the power is restored, that control line is controlled by a processor **150** and by a software control routine executed by the processor **150**. Therefore the system also powers up in braked mode. In embodiments, the lights are remotely controlled lights, which are controlled based on commands from a remote console **125**. The remote console **125** may provide the signal to release the brake. In one embodiment, that signal may be initially sent to each electronically-braked light on power up, as a power up reset signal. That signal is received by processor **150**, and used to create the signal to the brake.

In another embodiment, the light itself may automatically power itself up and automatically release the brake, e.g., after 60 seconds of power up, by an internally-created signal that is automatically created by the processor **150**.

In an embodiment, the brake current has two different levels, a first and momentary higher current level which is necessary to open the brake **110**, **140** from its locked position, and a second lower steady state current to maintain the brake in the off, non-braked, state without overheating the brake.

The second embodiment illustrated in FIG. **2** includes a brake assembly **200** that includes a clutch **205** that will slip when the light receives force by more than a certain amount of force. That amount of force may be the amount of force that it takes to otherwise damage the light or the materials. This embodiment still locks the light, but prevents damage to the light if someone tries to force the light into another position when locked.

The clutch **205** also allows an operator to manually move the head to any desired position for servicing or other work where it will be held stationary by the brake **200**. Also, use of the clutch **205** allows the light to be moved enough to fit into whatever transportation container might be used, while still keeping the light in the locked position.

Although only a few embodiments have been disclosed in detail above, other embodiments are possible and the inventors intend 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, the system is intended to be used on a stage light, e.g., one which outputs more than 500 watts of light and is remotely controllable to pointing directions based on commands to pan and tilt the light. It can alternatively be used with other kinds of lights, e.g. intensity controlled lights only.

The brake can also be manually disengaged, e.g., for testing and the like.

In lights that are remotely controlled, the system can automatically check whether the brake is on before accepting remote commands. For example, sending a command to "move" while the brake is on can cause a fault that lights an error light, and prevents the light from trying to move.

Also, the inventors intend 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. 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 computer may also be a handheld computer, such as a PDA, cellphone, or laptop.

The programs may be written in C, or Java, Brew 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 media such as a memory stick or SD media, 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.

What is claimed is:

1. A movable lamp, comprising:

a base;

a moveable head that is moveable relative to said base, said moveable head being controllable for moving, and said moving of said movable head being electrically controlled based on an electrical control, and the moveable head having a light source therein that points in a direction based on the movement of the movable head, to point in a first direction when the movable head is pointed in a first direction and to point in a second opposite direction when the movable head is pointed in a second direction; and

an electronic brake, which is energized to remove a braking effect and thereby allow said moveable head to move relative to said base, and is de-energized to cause a braking force and to prevent said movable head from moving relative to said base,

said electronic brake being configured to automatically latch into its braked state when deenergized, and remain in the braked state until said braking is removed by a remotely received command, and

a processor which creates said remote command to remove said braking from said electronic brake, and wherein said remote command is created by an action of the processor which is separate from power up of the processor; and

where a first power level created by the processor to remove the braking effect once latched into the braked state is a higher power level than a second power level created by the processor to maintain the braking effect removed.

2. A lamp as in claim **1**, wherein said movable head is movable in pan and tilt directions.

3. A lamp as in claim **1**, further comprising a motor that moves said movable head.

4. A lamp as in claim **3**, wherein said brake is on said motor and prevents said motor from moving, to prevent said movable head from moving.

5. A lamp as in claim **3**, wherein said motor is remotely controlled based on a remote command to move said motor.

6. A lamp as in claim **3**, further comprising a clutch between said brake and said head, allowing movement of said head when more than a certain amount of force is applied.

7. A method comprising:

operating a moving head light by moving its head to different pointing locations; and

automatically engaging a brake on said moving head light when power is interrupted to said moving head light, said brake preventing said head from moving until said brake is disengaged, wherein said automatically engaging the brake automatically latches into its braked state, and said brake remains in the braked state until disengaged using a signal which is separate from power being applied to the brake, and not automatically de-engaging the brake when power is normally turned on, said disengaged being carried out by a processor that operates to output a first power level to remove braking effect once latched into the braked state and where said first power level is a higher power level than a second power level created by the processor to maintain the braking effect removed.

8. A method as in claim **7**, wherein said operating comprises moving the light to different directions by changing pan and tilt of the light.

9. A method as in claim **7**, further comprising clutching between said brake and said head, which allows movement of the head when force greater than a specified amount is applied.

10. A method comprising:

operating a moving head light by moving a lighting head to different pointing locations;

automatically engaging a brake on said moving head light when power is interrupted to said moving head light, said brake resisting movement of said head but allowing said head to be moved by applying force of an amount greater than a specified amount of force,

wherein said automatically engaging the brake is carried out by the brake automatically latching the brake into its braked state, and said brake remains in the braked state until disengaged;

said disengaged comprising a processor that operates to output a first power level to remove braking effect once latched into the braked state and where said first power level is a higher power level than a second power level created by the processor to maintain the braking effect removed, and where the first power level is only produced by the processor for a limited time, to avoid overheating the brake, and thereafter, said second power level is output by the processor to maintain the braking effect removed.

11. A method as in claim **10**, wherein said operating comprises remotely controlling the light to different directions by changing pan and tilt of the light based on said remote control.

12. A method as in claim **11**, wherein said engaging a brake comprises separately braking a motor that controls changing pan, and separately braking a second motor that controls tilt direction.

13. A method as in claim **10**, further comprising moving the light to a specified position while said brake is engaged.

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