

- [54] **CORDLESS, BALANCED WINDOW COVERING**
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- [73] Assignee: **Newell Operating Company**, Freeport, Ill.
- [21] Appl. No.: **303,773**
- [22] Filed: **Sep. 9, 1994**

2,390,826	12/1945	Cohn .	
2,420,301	5/1947	Cusumano .	
2,824,608	2/1958	Etten .	
3,194,343	7/1965	Sindlinger	185/39 X
3,358,612	12/1967	Bleuer	267/156 X
4,856,574	8/1989	Minami et al.	160/168.1 P
5,054,162	10/1991	Rogers .	
5,133,399	7/1992	Hiller et al.	160/170 R X
5,157,808	10/1992	Sterner	267/156 X
5,170,830	12/1992	Coslett	160/84.04
5,363,898	11/1994	Sprague	160/191 X
5,391,967	2/1995	Domel et al.	160/168.1 P X
5,413,161	5/1995	Corazzini	160/168.1 P X

Related U.S. Application Data

- [63] Continuation-in-part of Ser. No. 223,989, Apr. 6, 1994, Pat. No. 5,482,100.
- [51] Int. Cl.⁶ **F06B 9/30**
- [52] U.S. Cl. **160/168.1; 160/170; 160/DIG. 17**
- [58] Field of Search 160/168.1 R, 170 R, 160/171 R, 172 R, 84.02, 84.04, 84.06, 191, 193, 192, 168.1 P; 267/155, 156; 185/37, 39, 45

Primary Examiner—David M. Puroi
Attorney, Agent, or Firm—Foley & Lardner

[57] **ABSTRACT**

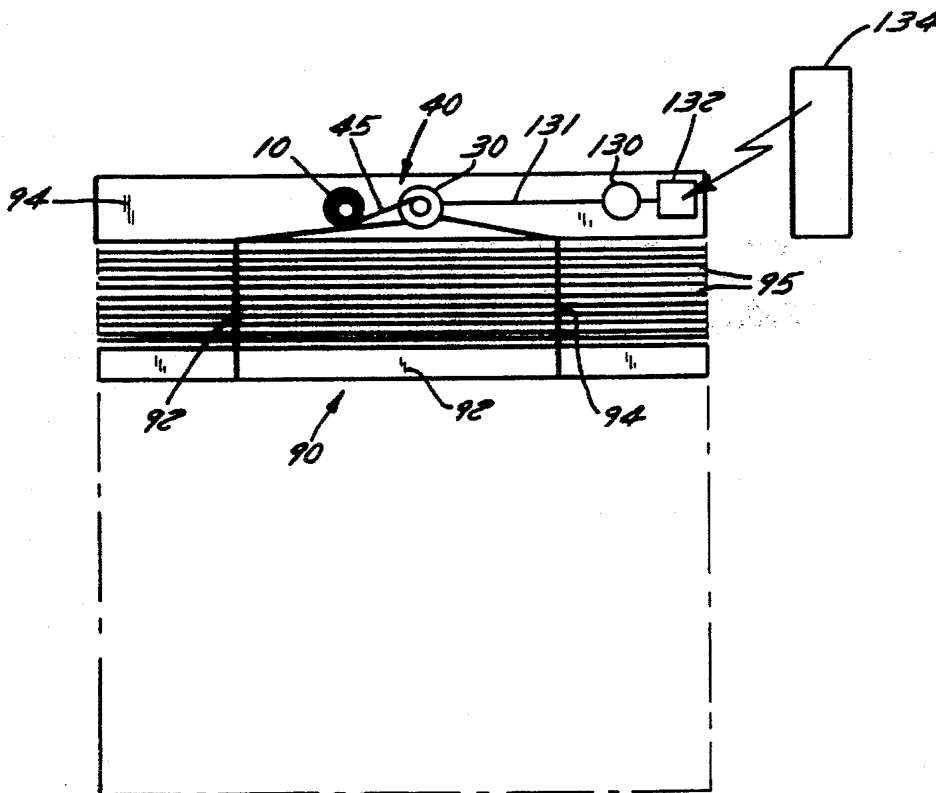
A cordless, balanced venetian blind or shade with a constant, or a variable force spring motor includes conventional window covering components without the outside hanging lifting cords or cord locking mechanisms. One or more spring motors are employed. A cord spool, in the preferred embodiment, is coupled to one of the spring drums to serve to wind the cords to cause the blind to be raised or lowered, simply by manipulation of the bottom bar of the blind system. Due to the spring forces, the system compensates for the increasing weight on the cords as the window covering is raised and for the decreasing weight as it is lowered.

[56] **References Cited**

U.S. PATENT DOCUMENTS

13,251	7/1855	Bixler .
1,721,501	7/1929	McKee .
2,266,160	12/1941	Burns .
2,276,716	3/1942	Cardona .
2,324,536	7/1943	Pratt .

20 Claims, 3 Drawing Sheets



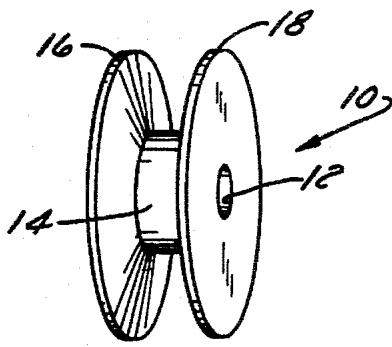


FIG. 1A

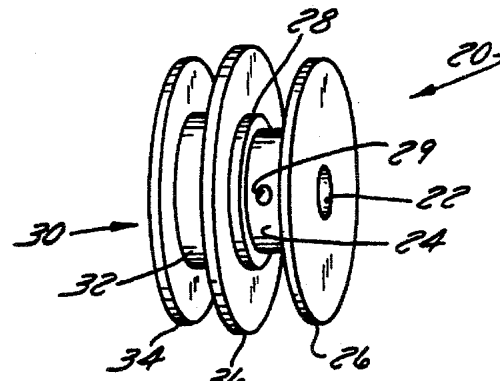


FIG. 1B

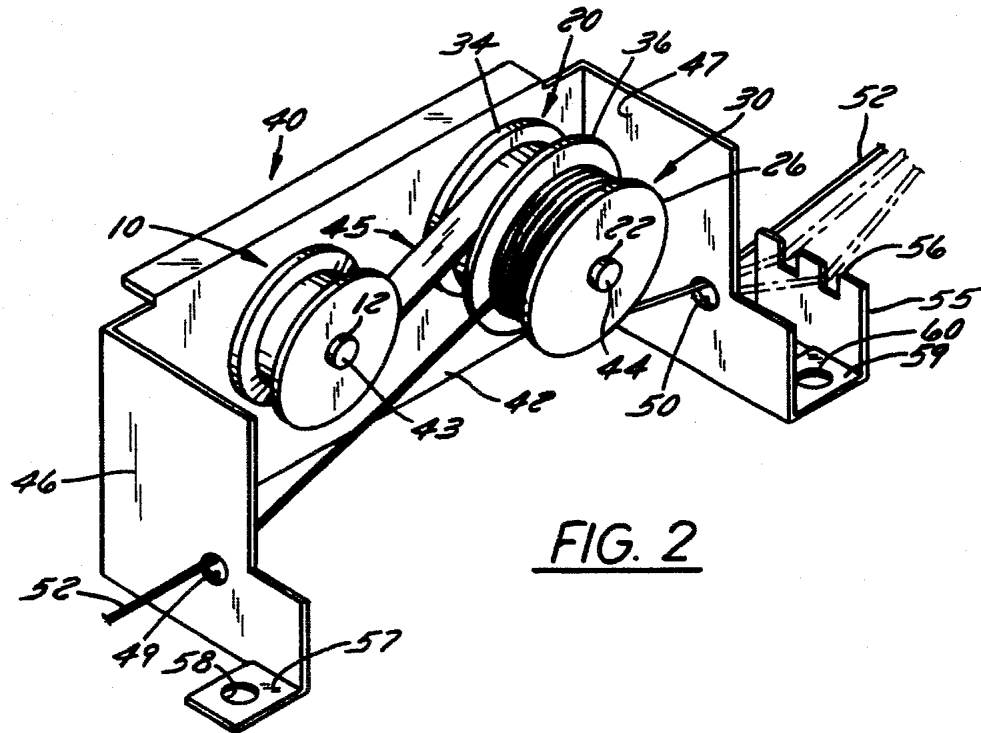


FIG. 2

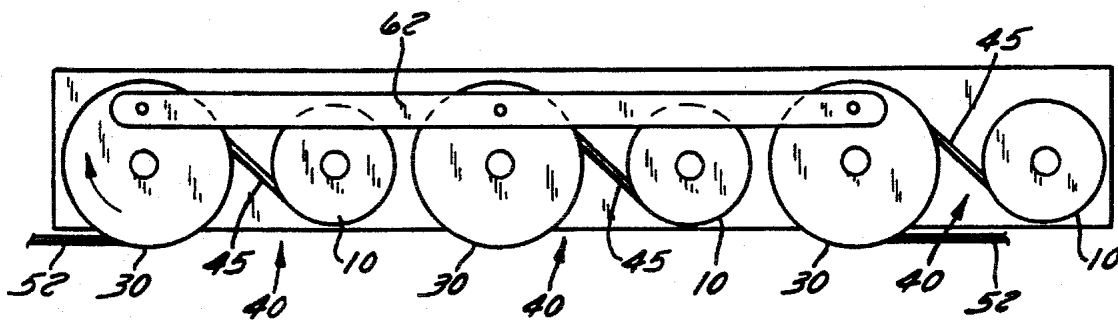


FIG. 3



FIG. 4A

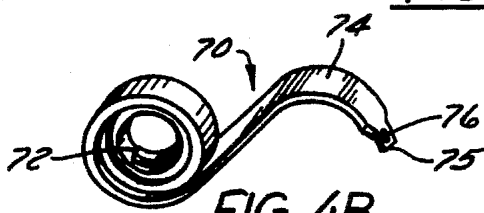


FIG. 4B

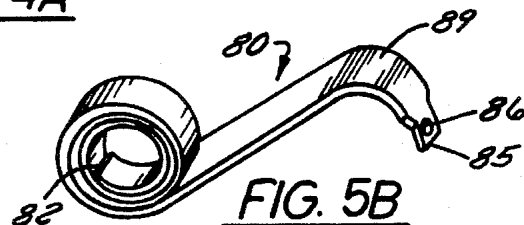


FIG. 5B

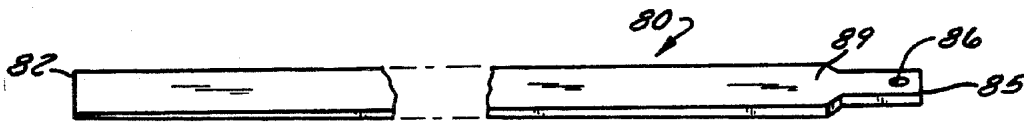


FIG. 5A

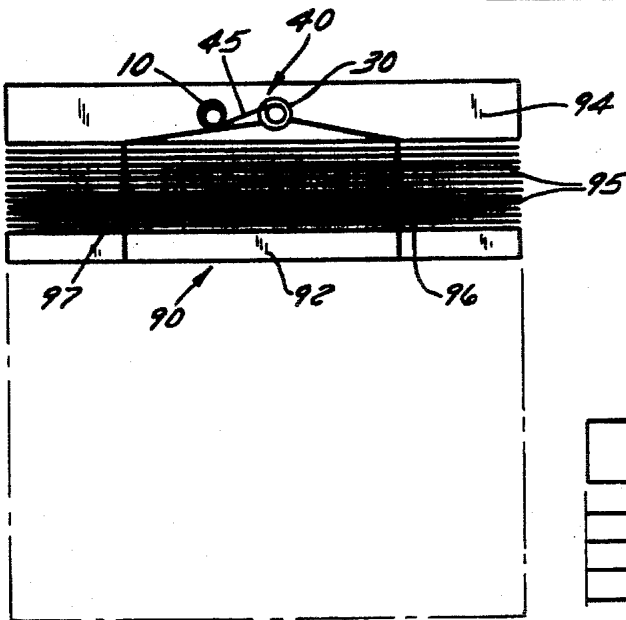


FIG. 6

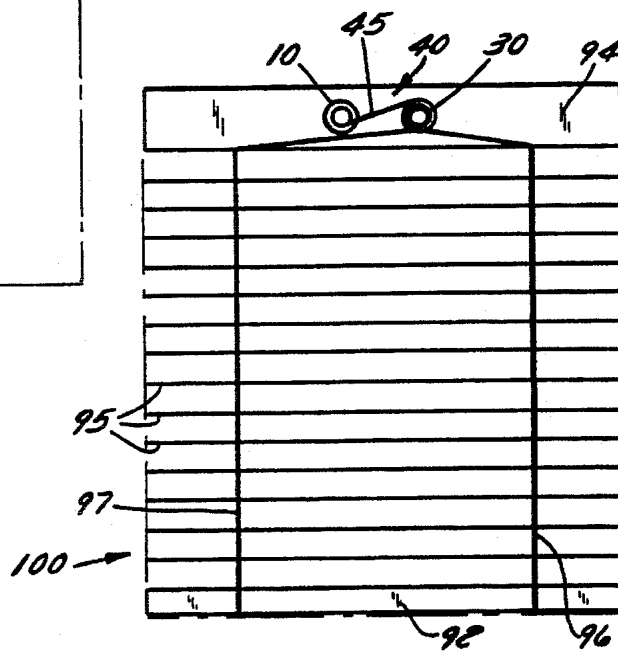


FIG. 7

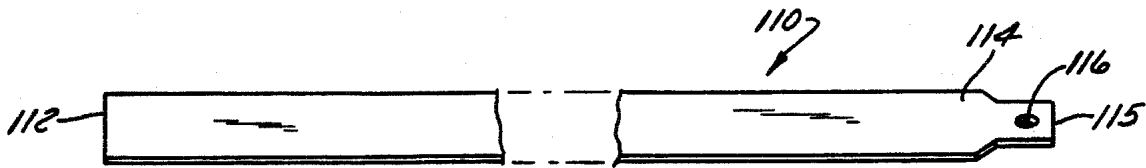


FIG. 8A

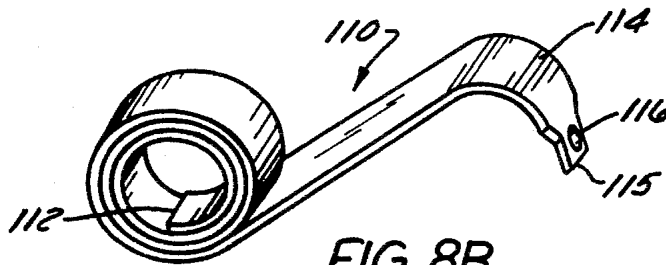


FIG. 8B

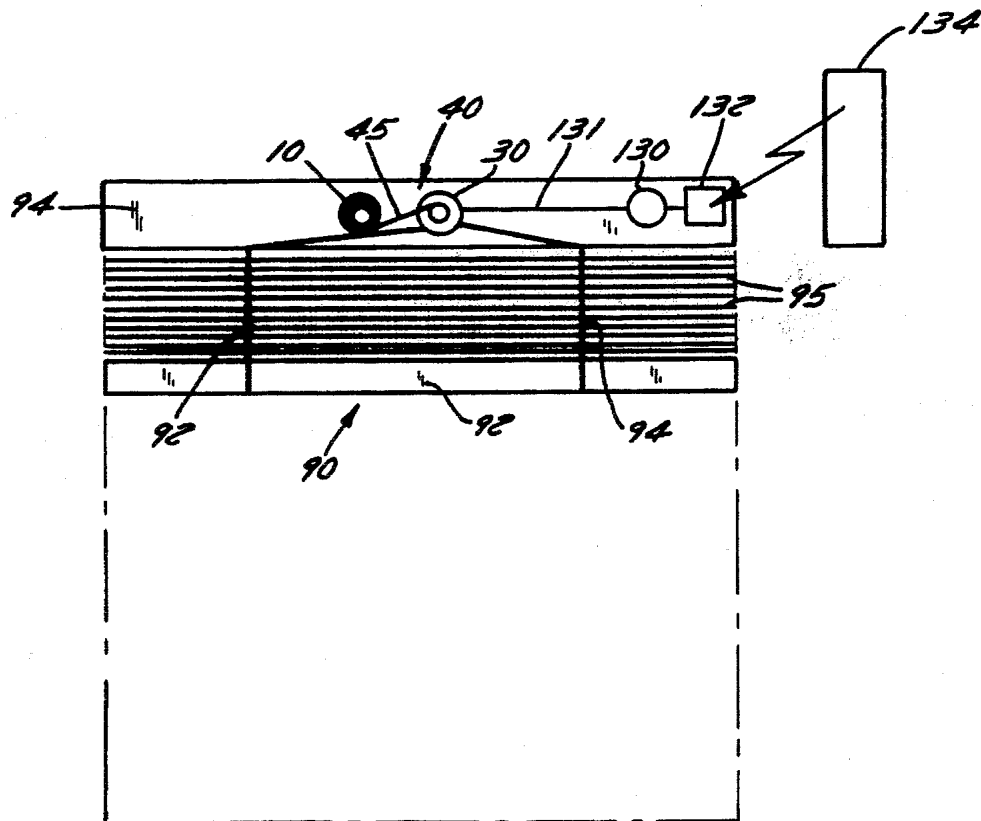


FIG. 9

CORDLESS, BALANCED WINDOW COVERING

CROSS-REFERENCES TO RELATED APPLICATIONS

The present invention is a continuation-in-part of U.S. patent application Ser. No. 08/223,989, filed Apr. 6, 1994, now U.S. Pat. No. 5,482,100, issued Jan. 9, 1996.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to the art of spring motors useful for a variety of applications, including venetian blinds and window shades. More specifically the present invention relates to a system in which lifting cords and cord locking mechanisms are eliminated from shades or blinds. Still more specifically, the invention relates to window covering systems which employ one or more constant or consistent, variable force springs to balance the weight of accumulated window covering material, depending upon the extent to which the blind or shade is raised or lowered. The present invention also relates to motorized blinds and shades.

2. Description of the Prior Art

Venetian blinds have been known for many years and typically include a plurality of slats made from metal, plastic, wood or other materials and supported by ladders. Such blinds typically include a bottom bar and a tilt mechanism to cause the slats to move from a horizontal position to a nearly vertical position to open and close the blinds with respect to the passage of light. It is also conventional with such systems to use lifting cords coupled to the bottom bar, passing through the slats and into mechanisms within the blind headrail. The cord is used to raise the bottom bar, accumulating individual slats as the bar is raised. Because of the natural tendency of the bar and accumulated slat weight to free fall, locking mechanisms are also commonly employed with such prior art devices. Pleated and other types of shades also include a bottom bar and similar raising, lowering, and cord locking mechanisms.

Several attempts have been made to eliminate the lifting cord locks, some of such attempts going back nearly 140 years. See, for example, Bixler, U.S. Pat. No. 13,251, issued Jul. 17, 1855 for "Inside Blinds." In this device, a pair of "fusees" are employed, namely spirally grooved pulleys, to wind a cord passing therebetween. The two fusees are arranged so that as a barrel spring is being wound the cord joining the fusees compensates for changes in spring force. A spool is provided for accumulation of the lifting cord.

U.S. Pat. No. 2,420,301, issued May 13, 1947 to Cusumano for "Venetian Blind" also employs a cone-shaped member with grooves and an elongate coil spring. This design dispenses with normal draw cords and provides a counterbalance so that the slats may be retained at any vertical position without a lock or anchorage and so that the blinds can be raised with relatively small effort.

A different device is shown in Pratt's U.S. Pat. No. 2,324,536 issued Jul. 20, 1943 for "Closure Structure." In this device, tapes and coil springs are employed to raise and lower a blind particularly suited for use in a vehicle such as a train. The complex structure disclosed in this patent is especially suitable for devices in which the bottom bar and the slats ride in tracks as they move upwardly and downwardly.

Other patents show various spring devices used with venetian blinds. For example, in Cohn's U.S. Pat. No. 2,390,826, issued Dec. 11, 1945 for "Cordless Venetian Blinds," two coil springs are used to provide even force, with a centrifugal pawl stop. The blind is raised by freeing the pawl to allow the spring to provide a lift assist. Other more conventional systems employing springs and ratchet and pawl mechanisms include those shown in Eiten's U.S. Pat. No. 2,824,608, issued Feb. 25, 1958 for "Venetian Blind"; U.S. Pat. No. 2,266,160, issued Dec. 16, 1941 to Burns for "Spring Actuated Blind"; and U.S. Pat. No. 2,276,716, issued Mar. 17, 1942 to Cardona for "Venetian Blind."

Various attempts have also been made in the prior art to motorize blinds and shades. In most of these systems hard wiring is required because larger motors are required to move the bottom rail and accumulated window material.

None of the aforementioned patents disclose the use of spring motors of the type disclosed herein to eliminate the conventional pull cords and locks of venetian blinds or shades in a simple and easily adaptable mechanism having few components parts. A system which overcomes the disadvantages of the more complex and cumbersome systems of the prior art would represent a significant advance in this art.

SUMMARY OF THE INVENTION

The present invention features a cordless blind or shade in which a spring motor is used to eliminate conventional pull cord and cord-lock mechanisms.

The present invention also features a system in which either the spring strength or the number of spring motors may be altered, depending upon the size of the window covering. The invention further features techniques for increasing the friction on the cords used to raise and lower the blinds or shade to assist in maintaining a desired position against any spring force which may exist through the range of travel of the bottom bar.

The present invention still further features a system which is easy to adapt to a wide variety of blind or shade designs and sizes and the capability of applying spring forces in a variety of ways and combinations.

A different feature of the present invention is the use of spring motors and small electric motors to provide highly desirable automatic or remote controlled capabilities for shades and blinds.

How the present invention accomplishes these features will be described in the following detailed description of the most preferred embodiments, taken in conjunction with the FIGURES which illustrate blind systems, although shade applications are also enhanced by the present invention. Generally, however, the features are accomplished by employing constant force or consistent variable force spring motors in a blind or shade system, while eliminating conventional pull cord and associated cord-lock mechanisms. The features are accomplished by using springs wound on drums, the springs being of constant cross-section (constant force) or varying in width, thickness, or both along their length (variable force) whereby spring force imparted to a coiled spring is transferred from one drum to another. For these spring motors, such force is at its highest level when the blind or shade is fully raised, i.e., when the cords are supporting the full weight of the window covering. The spring force is at its lowest point when the window covering is fully lowered and, in the case of blinds, the slats are being

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