# United States Patent [19]

**Fontana**

[11] **3,840,148**

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[54] **CONVEYANCE EQUIPMENT WHICH ALLOWS THE DISCHARGE OF ALL OR PARTLY OF THE LOAD BY MEANS OF AN ELECTROMAGNETIC CONTROL DEVICE**


[76] Inventor: **Ludovico Fontana,** Via Principe Amedeo 31, Bari, Italy



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[52] **U.S. Cl.** ..... **221/153,** 221/90, 221/129

[51] **Int. Cl.** ..... **B65g 59/00**

[58] **Field of Search** ..... 221/90, 129, 151, 152, 221/153, 295, 197, 154; 133/5 R, 5 B



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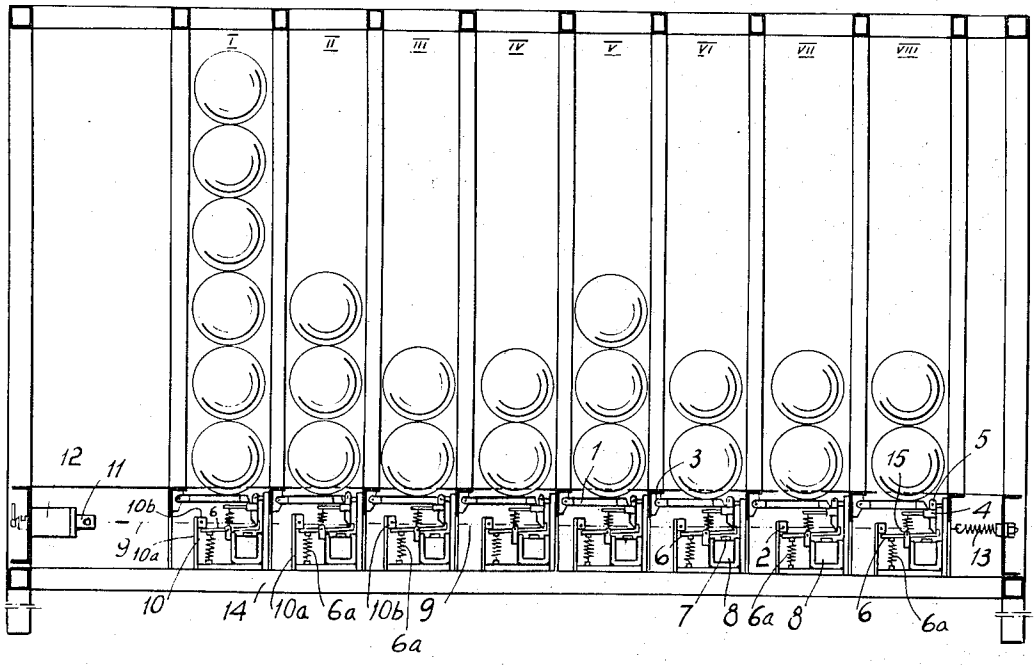
*Primary Examiner*—Robert B. Reeves
*Assistant Examiner*—H. Grant Skaggs
*Attorney, Agent, or Firm*—McGlew and Tuttle



[57] **ABSTRACT**

Conveyance equipment or a holder which allows the unloading of all or a portion of the load transported, by means of an electric control device, and comprising a sturdy metal frame which is divided into a plurality of vertical compartments, the bottom of each compartment being closed by a door which can rotate about a pin for the opening of the bottom itself, so as to allow the load contained in each compartment, to go out by the action of gravity, each door being combined with an electro-magnetic device which prevents the doors from turning; this door is opened by means of a horizontal armature of said magnetic device and a vertical pawl engaged with the free end of the respective door.


**1 Claim, 4 Drawing Figures**



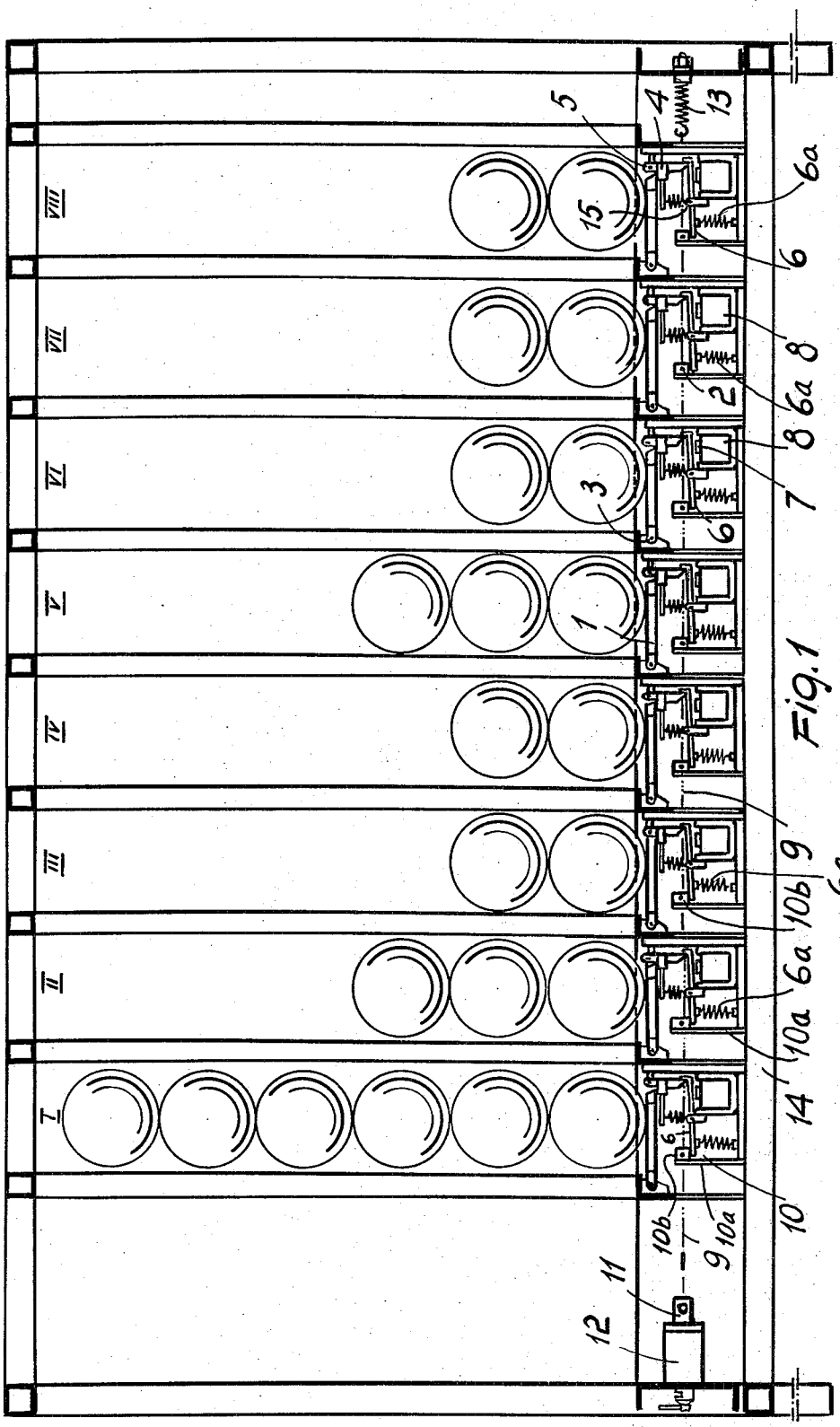



Fig. 1

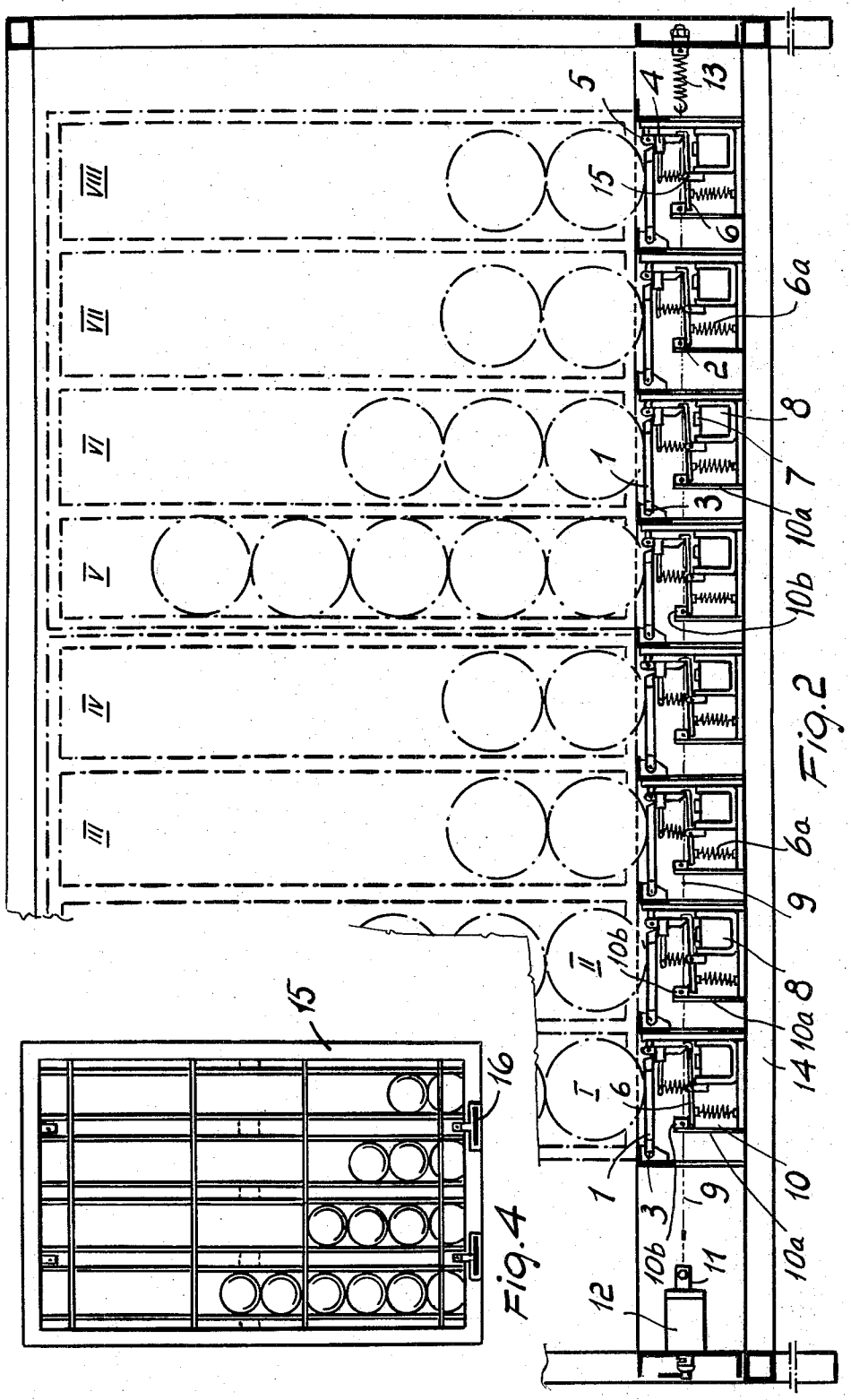

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Fig. 2


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Fig. 4

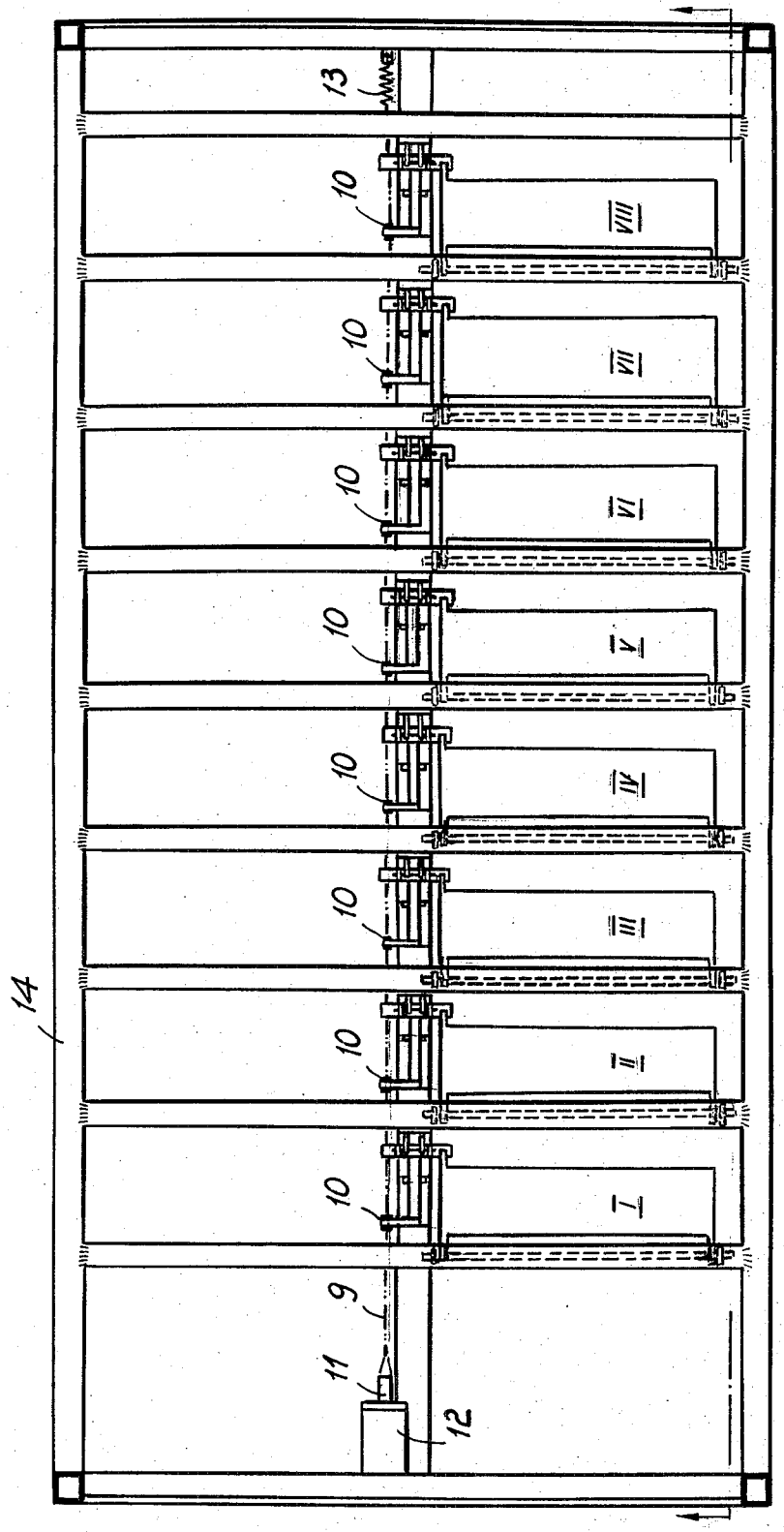


Fig. 3

# CONVEYANCE EQUIPMENT WHICH ALLOWS THE DISCHARGE OF ALL OR PARTLY OF THE LOAD BY MEANS OF AN ELECTROMAGNETIC CONTROL DEVICE

## BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates in general to devices for storing and releasing loads and, in particular, to a new and useful load transport carrier for carrying a plurality of vertically stacked articles which includes at least one compartment for the articles which has a door closing the bottom thereof which is hinged at one end and held by a movable holder or pawl and which includes electrically operated means for releasing the pawl to open the door for the discharge of the articles.

2. Description of the Prior Art

In so many circumstances there is the need of having at disposal equipment which is able to allow the conveyance and the discharge of all or a part of the load, through the simple sending of electric power impulses, by resorting to an automatic control as well as hand control.

## SUMMARY OF THE INVENTION

In accordance with the invention there is provided a load transport carrier for carrying a plurality of vertically stacked articles which comprises a container having one or more vertically extending compartments each of which is closed on its lower end by a pivotal door which is held in a closed position by a pawl. The pawl is operated by an electrically controlled solenoid, for example, to release the door so that it may pivot downwardly to permit the movement of the articles out of the compartment by gravity. The device also includes a safety control for anchoring the armature of the individual solenoids so that the pawl cannot be displaced to open the compartments and discharge the load when the device is being transported.

Accordingly, it is an object of the invention to provide an improved load transport carrier which comprises a container having at least one vertically extending compartment with a door closing the bottom thereof which may be released to selectively open any compartment for the discharge of the load therefrom.

A further object of the invention is to provide a transport carrier which is simple in design, rugged in construction and economical to manufacture.

For an understanding of the principles of the invention, reference is made to the following description of typical embodiments thereof as illustrated in the accompanying drawing.

## BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. 1 is a schematic transverse sectional view of a container having a plurality of load compartments constructed in accordance with the invention;

FIG. 2 is a view similar to FIG. 1 but with the container filled with the individual container members each defining a separate compartment;

FIG. 3 is a top plan view of the embodiment shown in FIG. 2; and

FIG. 4 is a front elevational view on a reduced scale of the embodiment shown in either FIGS. 1 or 2.



## GENERAL DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawing in particular the invention embodied therein comprises in each of the embodiments a container or enclosing frame **14** of a steel or a light alloy which is divided either by dividing walls as shown in FIG. **1** or by individual compartment forming elements as shown in FIGS. **2** and **3** so as to form a plurality of vertically extending compartments for receiving individual loads or articles which are shown as being of spherical shape and which are arranged in individual vertical stacks in each compartment.

Each compartment is closed at the bottom by a door **1** which can turn about an axis **3.** Each door **1** is prevented from rotating by means of a pawl **4.** This pawl **4** in turn can rotate about its axis **5** only when the armature **6** has been attracted by the core **7** of the electromagnet when in the associated coil **8** a suitable electric current is caused to pass. The rotation of a pawl **4** releases the corresponding door **1,** allowing the rotation around the axis **3,** which opens the bottom of the corresponding compartment. The load enclosed in said compartment is then freely unloaded by the action of gravity. Therefore, all the times the coil **8** of an electromagnet is energized there is caused the discharge of the load contained in the corresponding compartment.

The energization of the various coils **8,** of course can be reached by means of both a hand control and an automatic control.

It is absolutely necessary that the conveyance of the load should take place with the utmost safety. Therefore the equipment is completed with a safety contrivance.

It is indeed needed to warrant that the doors cannot open haphazard because of vibrations or shocks.

The safety device is made up of a tie wire **9** which unites all the locks **10** of all compartments. The tie wire **9** is connected to the armature **11** of an electro-magnet **12** and is kept under tension through a spring **13.** In the position of safety the nose **2** of the lock **10** prevents the armature **6** from rotating around its axis **15,** thus preventing in turn the rotation of the pawl **4** and thence the rotation of the door I.

When the electro-magnet **12** is energized, the armature **11** is pulled inside the electro-magnet therefore the tie wire recedes from all the noses **2** of the locks **10** for the associated armatures **6.** In this position the armatures **6** can rotate freely when the respective coils **8** are energized. The locks **10,** as shown in FIG. **1** and **2** advantageously comprise a resilient strap or spring member **10a** having a block member **106** at their outer ends which engage over the outer ends of the armatures **6** in the locked position and hold the armatures in a position at which they block the pawl **4.** The locks **10** are all connected to the tie wire **9** and they are released by energizing the electromagnet **12** to move the plunger **11** and the tie wire to displace the locks **10** and move the block portion **10*b*** off the armature **6** so that it may be attracted against the force of its associate spring **6*a*** by its associated coil **7** to release the pawl **4.**

Of course, without departing from the boundaries of the instant invention, the equipment may be made in such a manner that the system of the doors comes to be independent of the vertical compartments in which the load is stowed. For example, the outfit may be made up of a single frame carrying the system of the doors and

of a plurality of discrete containers (see FIG. 2 to FIG. 4). After the load has been placed in the various compartments, into which each container is divided, should be taken to introduce the containers themselves into the frame carrying the doors. The containers of course will be constructed in such a manner that the base dimensions of their various compartments are like those of the corresponding doors and that furthermore the different vertical compartments go to position themselves exactly on the corresponding doors.

The containers of the embodiment shown it FIG. 4 will be made of a rugged metal or plastics frame **15** and will be equipped with suitable safety members **16** which do not allow the load to go out of the container itself. When the container is accommodated in the conveyance outfit it is necessary to draw out the safety device **16** from its seat in order to allow the cargo to rest on the doors **1**.

It is apparent that at each opening operation of the door there will correspond the unloading of part of the load accommodated in the corresponding compartment of the container.

The loading of the outfit is carried out after taking care previously of putting the doors into the horizontal closing position.

When the unloading of a part or of all the load conveyed is desired, it will be necessary first to energize the electro-magnet which controls the safety device and afterwards to energize electrically as many coils as are the doors which are desired to be acted on.

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles. What I claim is:



**1.** A load transport carrier for carrying a plurality of vertically stacked articles in a plurality of separate compartments, comprising a container having a plurality of vertically extending side by side compartments, a door closing each of said compartments having one end pivoted to one side of said compartment adjacent the bottom end thereof and an opposite end, a movable pawl supporting said opposite end of said door in a position in which said door extends horizontally across the lower end of said compartment, each compartment being substantially unobstructed above said door and being of a size to contain a plurality of vertically stacked articles which rest on said door, and electrically operated solenoid means connected to said pawl for shifting said pawl to release said door to discharge the articles from said compartments including an armature for operating each pawl pivotally mounted adjacent said pawl and having one end engageable with said pawl to hold it in a position to close said door and an electromagnetic coil alongside said armature being excitable to attract said armature to release said pawl and open said door, and a safety device connected to said armature and holding it in engagement with said pawl to keep said door closed during transportation said safety device includes a lever alongside said armature engageable with the end thereof which is opposite to the end engageable with said pawl and holding said armature in engagement with said pawl, a connecting cable connected to each of said levers, spring means connected to said cable and holding all of said levers in engagement with respective armatures and an electromagnet connected to said cable to move said cable in a direction opposite to said spring biasing said cable to release said levers from engagement with said armatures.

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