

Sept. 8, 1970

E. L. BIVANS
HOPPER ESCAPEMENT

3,527,367

Filed Oct. 17, 1968

2 Sheets-Sheet 1

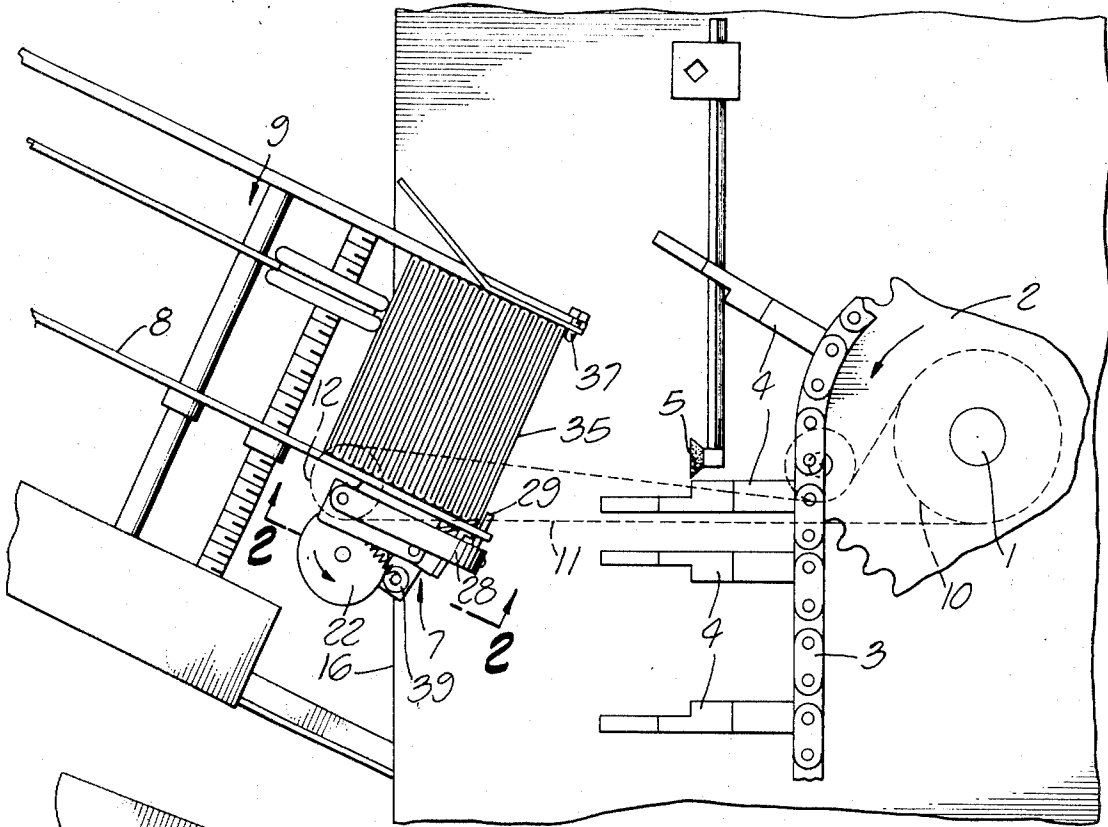


FIG. 1.

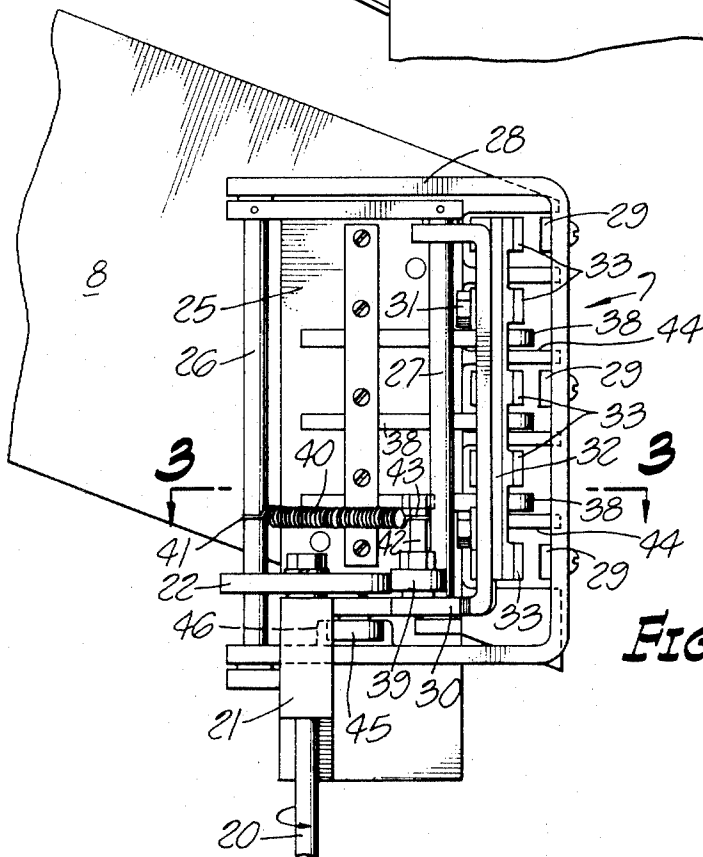


FIG. 2.

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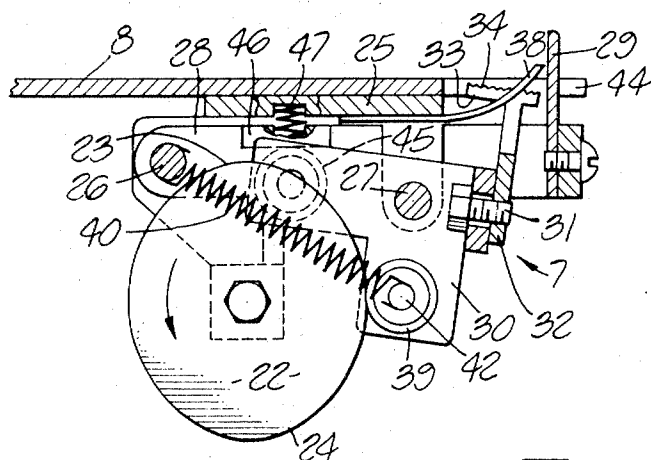


FIG. 3.

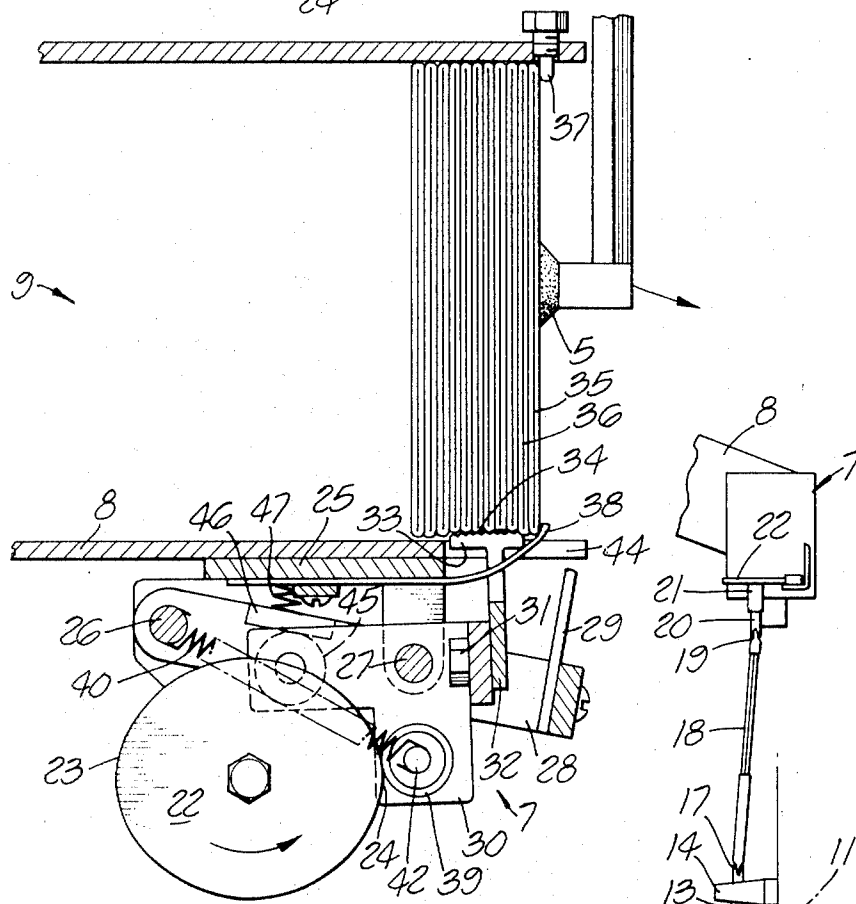


FIG. 4.

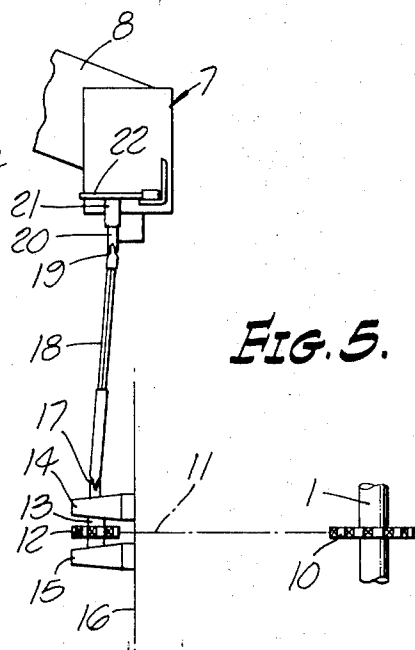


FIG. 5.

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3,527,367

HOPPER ESCAPEMENT

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5 Claims

ABSTRACT OF THE DISCLOSURE

The disclosure relates to an escapement device for controlling the release of carton flats from a hopper in timed relation with the operation of a vacuum pickup which removes the carton flats one at a time.

BRIEF SUMMARY OF THE INVENTION

A hopper escapement unit is provided for installation on a cartoning machine for carton flats to release the flats one at a time in timed relation with the operation of a vacuum pickup. This unit is driven, for example, by shaft 156, FIG. 5 of applicant's Pat. No. 3,373,665, Mar. 19, 1968, and the cartons are stacked in vertical position for gravity feed in a magazine as shown in the patent. The escapement unit operates in timed relation with the patented machine and controls the release of a few vertical carton flats, the foremost of which is picked off by the vacuum cup while restraining the remainder of the carton flats in fixed position in the magazine. The unit includes a differential lever mechanism for operating a clamp device to engage one side of a few of the vertical flats to urge them against the opposite side of the magazine to restrain the weight of the remainder of the flats rearwardly of those restrained while withdrawing a stop finger to release a few flats in front of those restrained for withdrawal of the front flat by the vacuum cup against the action of a flexible finger. The clamping action provides a sturdy abutment for the vacuum cup device which picks off the front carton flat free from interference with the weight of the bulk of the carton flats. In the alternate position, the clamp device is released and a stop finger extends in front of the foremost flat to support the weight of the entire stack. A cam device is operated by the above-mentioned shaft for moving the stop finger out of position and moving the clamp device into position at one time, while performing the reverse operations at another time. The cam device is in the form of a symmetrical cam.

BRIEF DESCRIPTION OF THE VIEWS OF THE DRAWINGS

FIG. 1 is a top plan view of the hopper escapement.

FIG. 2 is a sectional view on line 2—2 of FIG. 1.

FIG. 3 is a sectional view on line 3—3 of FIG. 2.

FIG. 4 is a view similar to FIG. 3 showing the mechanism in an alternate position.

FIG. 5 is a diagrammatic view of the drive means.

DETAILED DESCRIPTION

Referring in detail to the drawings, the drive shaft 1 in FIGS. 1 and 5 corresponds to shaft 156 in FIG. 6 of applicant's patent referred to above. Sprocket 2, chain 3, fingers 4, and vacuum cup 5 find their counterpart in FIG. 6 of the patent. The escapement device is generally indicated at 7 in FIG. 1 and is mounted on adjustable side panel or wall 8 of the magazine 9 which is similar to the carton magazine in the patent.

The drive for escapement device 7 is taken from shaft 1, see FIG. 5, this shaft having a sprocket 10, chain 11 for a driven sprocket 12 on a short shaft 13 carried by

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bearing blocks 14 and 15 mounted on the upright conveyor frame indicated at 16. Shaft 13 is coupled by a universal joint 17 to a telescoping shaft 18 connected by universal 19 to shaft 20 having a bearing 21. Shaft 20 extends above bearing 21 and has mounted thereon a symmetrical elliptical cam 22 connected by friction engagement for ready adjustment of the angular position of the cam. Cam 22 has two opposite lobes 23 and 24, FIG. 4, in order to operate the escapement 7 twice per its revolution or once each time that the vacuum cup device 5 picks up a carton flat from the magazine.

The escapement device 7 includes a vertical base member 25 on which the bearing 21 is mounted. This base member also carries two upright rods 26 and 27 acting as axles or pivot pins, respectively, for an arm 28 on the outer end of which is mounted stop fingers 29, the other pin 27 having pivotally mounted thereon the bell crank 30 secured to one side by bolt 31 on an arm 32 terminating at its outer end in a plurality of clamp devices 33, each having a rough face as shown at 34 to engage the edges of the upright cartons as shown in FIG. 4.

The pin 27 in being located at one side of the panel 8 results in movement of the clamp device 33 in a direction slightly rearwardly of the magazine, to remove the pressure of the stack of flats, which may have as many as 200 flats, from the other flats in front of it. The clamped flats act as an abutment to counteract the pressure of vacuum cup device 5 when it presses against the foremost cartons to pick off the front one.

FIG. 4 shows the clamp device 33 in an operative position wherein two flats 35 and 36 are unrestrained by the device 33, being held in position only by one or more stop pins 37 at one side of the magazine and by a flexible spring 38 at the other side, whereby the front flats 35 and 36 are in condition so that the front one can be picked off by the vacuum cup device 5.

Bell crank 30 has mounted thereon a cam follower roller 39 which is acted on by lobe 24 to swing the clamping device 33 to the position shown in FIG. 4.

Tension spring 40 has one end 41 thereof mounted on the roller shaft 42, and the other end 43 thereof mounted on the pin 26.

In FIG. 4, the clamp device 33 is active and the stop device 29 is inactive. These items are moved to their respective alternate positions when cam 23 moves one-quarter turn as shown in FIG. 3, wherein the stop device 29 is active, being in front of the foremost flat in the magazine to support the entire load of flats, clamp device 33 being withdrawn through slot 44 out of the path of the flats. At this time, cam roller 45 mounted on bell crank 30 bears against projection 46 of arm 28, under action of compression spring 47. At this time, the bell crank 30 swings in a clockwise direction, as shown in FIGS. 3 and 4, roller 39 moving inwardly to a low spot on cam 22 whereby the spring 40 in urging bell crank 30 clockwise, causes roller 45 to engage projection 46 and swing stop 29 to active position as shown in FIG. 3 against the action of spring 47.

FIG. 2 shows three stop fingers, all indicated at 29, also showing five clamp devices marked 33.

The panel 8 is adjustable, as explained in the patent, in order to accommodate carton flats of different widths, and the drive, including the universals 17 and 19, as shown in FIG. 5, permit this lateral adjustment.

I claim:

1. A hopper escapement device for a stack of vertical articles in a hopper, a stop device at the exit of the hopper, means supporting said stop device for movement either to a position in front of the foremost article or to a position out of the path of the articles, a spring device located rearwardly of said stop device in position to

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impositively restrain the articles while permitting their withdrawal one at a time, a clamp device located rearwardly of said spring device, said clamp device having means supporting the same for movement either to a position to clamp one edge of the articles against the opposite side of the hopper or to another position out of the path of the articles, and means for operating said stop device and said clamping device in opposite senses, one being active while the other is inactive.

2. A hopper escapement device according to claim 1, said articles being carton flats, said hopper being arranged on a slant for gravity feed of the carton flats, a vacuum cup device, and means for operating said vacuum cup device, said stop device and said clamp device in timed relation for withdrawal of the carton flats one at a time by said vacuum cup device.

3. A hopper escapement device for carton flats arranged in a stack in a hopper, said hopper having an impositive restraining device adjacent the hopper exit for temporarily restraining escape of the carton flats while permitting their withdrawal under action of a vacuum cup device, the improvement comprising clamping means adjacent the exit of the hopper for clamping certain of the carton flats to form an abutment for the weight of the carton flats aft of the clamping device to the exclusion of a few carton flats between the clamping device and said impositive means, and means for operating said clamping device and said vacuum cup device in timed relation with each other, in combination with a stop device in front of said impositive restraining device, said stop device including means supporting the same for movement to a position in front of the foremost carton in the hopper and means for alternately moving said clamping means and said stop means into active position wherein either the major portion of or all of the carton flats are restrained from movement along the hopper.

4. A hopper escapement device for carton flats arranged in a stack in a hopper, said hopper having an impositive restraining device adjacent the hopper exit for temporarily restraining escape of the carton flats while permitting their withdrawal under action of a vacuum cup device, the improvement comprising clamping means adjacent the exit of the hopper for clamping certain of the carton flats to form an abutment for the weight of the carton flats aft of the clamping device to the exclusion of a few carton flats between the clamping device and said impositive

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means, and means for operating said clamping device and said vacuum cup device in timed relations with each other, in combination with a stop device in front of said impositive restraining device, said stop device including means supporting the same for movement to a position in front of the foremost carton in the hopper and means for alternately moving said clamping means and said stop means into active position wherein either the major portion of or all of the carton flats are restrained from movement along the hopper, said alternately moving means comprising a symmetrical elliptical cam and differential levers controlled thereby, one of said levers supporting said clamping means and another of said levers supporting said stop device.

5. A hopper escapement device for carton flats arranged in a stack in a hopper, said hopper having an exit and a vacuum cup device for removing one carton flat at a time, means adjacent said exit for restraining a few of the carton flats to form an abutment to restrain the weight of the remainder of the flats rearwardly of those restrained, without restraining one or more flats in front of those restrained for withdrawal of the front flat by said vacuum cup device, and means for operating said vacuum cup device and said restraining means in timed relation with each other, said hopper having an adjustable panel to accommodate carton flats of different widths, said escapement device being in the form of a unit mounted on said panel, a drive for said restraining means for operating the same between active and idle positions, said drive including a flexible drive shaft connected at one end to said unit and having a bearing support at another end on the machine frame for said hopper and vacuum cup device.

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U.S. Cl. X.R.

221—298; 271—26