

[54] **DATE HARVESTING DEVICE**

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[22] Filed: **Jan. 11, 1971**

[21] Appl. No.: **105,542**

[52] U.S. Cl. .... **193/7, 193/25 R, 193/27,**  
193/32, 248/51

[51] Int. Cl. .... **B65g 11/10, B65g 11/18, B65g 11/20**

[58] Field of Search ..... **193/2 A, 7, 25, 27, 32;**  
191/12 R; 248/51, 52

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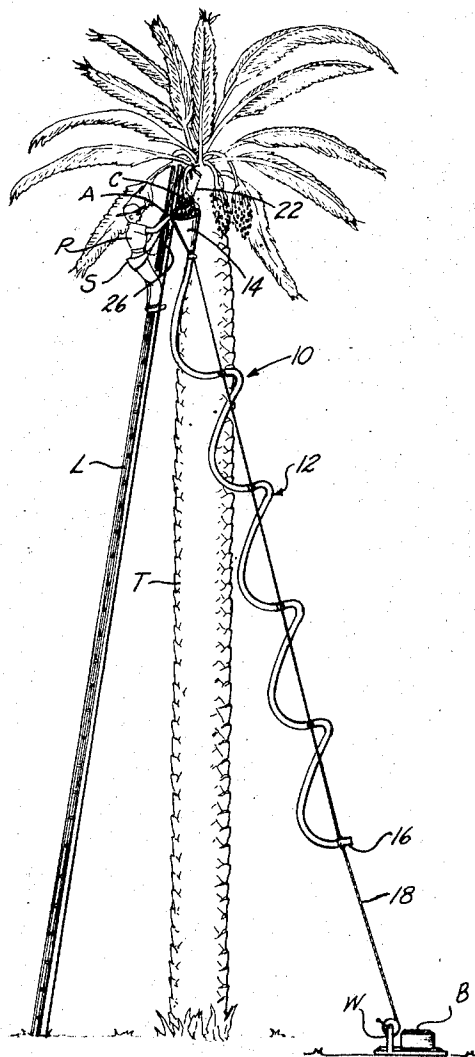
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[57]

**ABSTRACT**

A flexible conveyor tube has intermediate points interconnected by tension springs which draw the points together and configure the tube into a plurality of consecutive loops. One end of the tube has a gathering funnel and the other end is provided with a closure and a pull line. The springs vary in strength from strongest at the closure to least strong at the funnel. The funnel is adapted to be connected to a date tree disposed about a bunch of dates, with the looped tube suspended in depending relation. Dates gravitate into and are held in the uppermost loop. A pull on the line elongates the uppermost spring and varies the configuration of the uppermost loop so that the dates gravitate therefrom into the next loop. Additional pull varies the configuration of the consecutive loops sequentially and controls the speed of gravitational movement of the dates. After the dates are in the lowermost loop, the closure is opened to discharge the dates into a container. A plurality of gathering funnels can be connected to the upper end of the tube for harvesting the pickings of several pickers.

**4 Claims, 7 Drawing Figures**



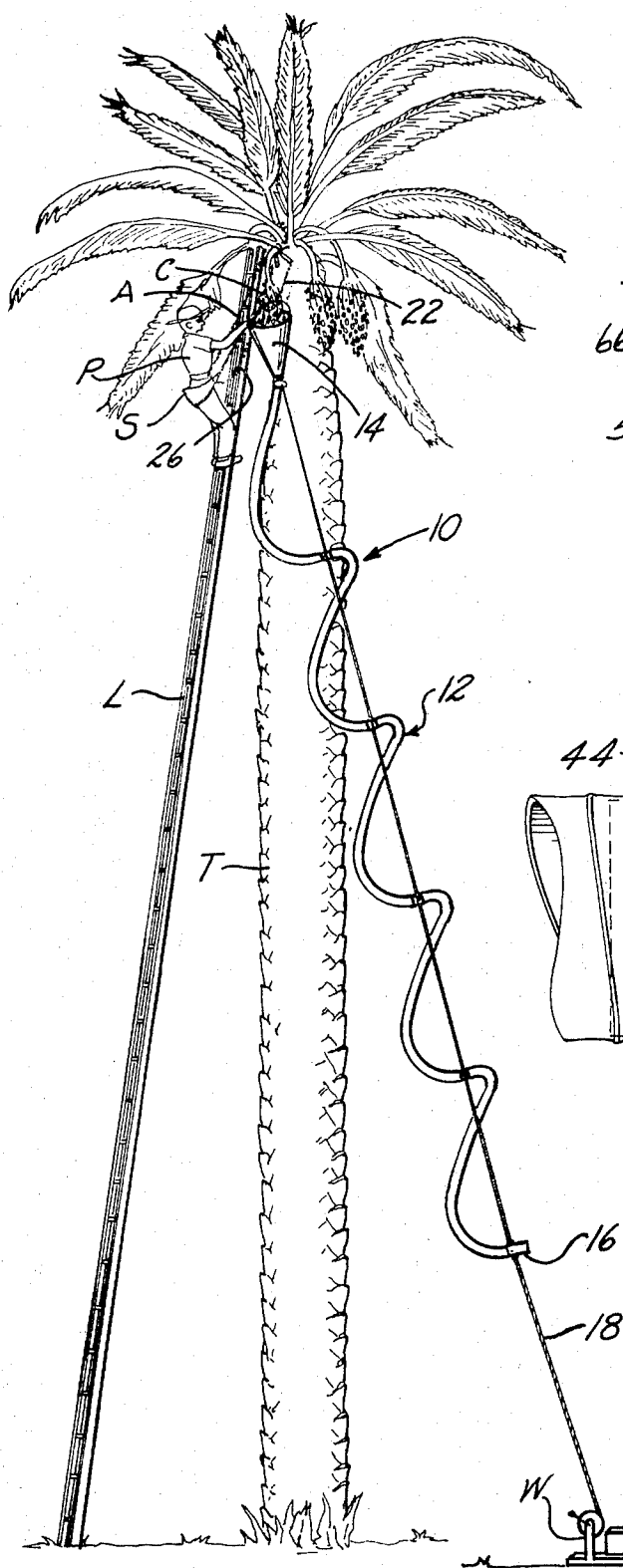


FIG. 1.

FIG. 5.

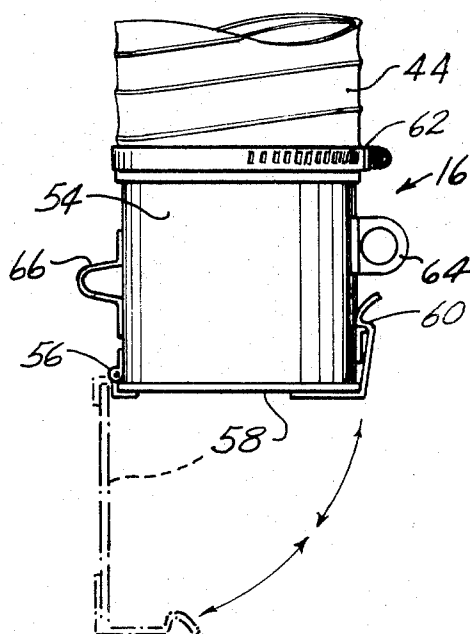
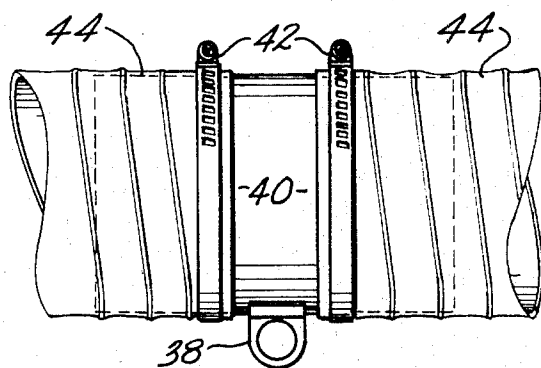


FIG. 4.

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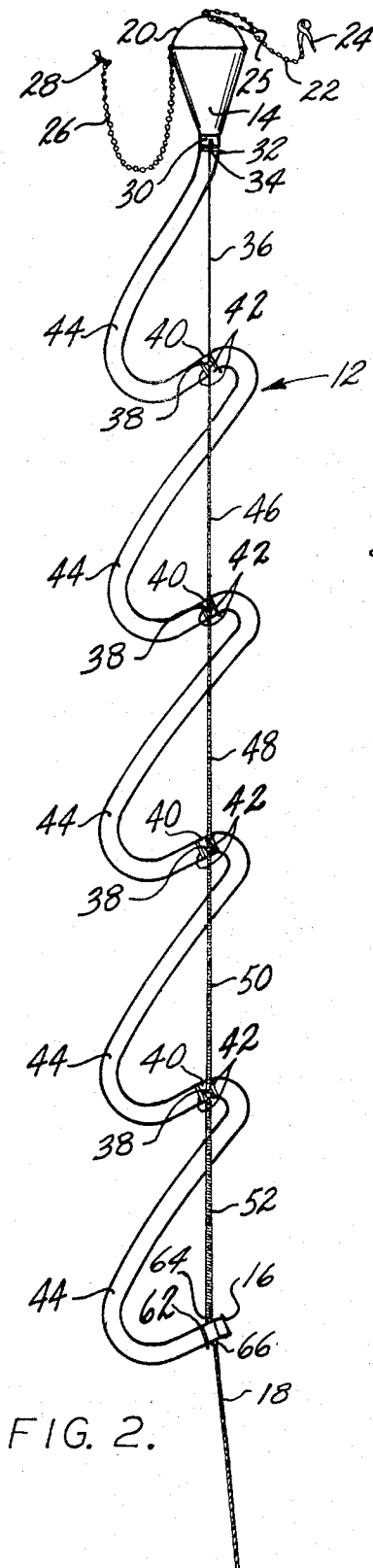


FIG. 2.

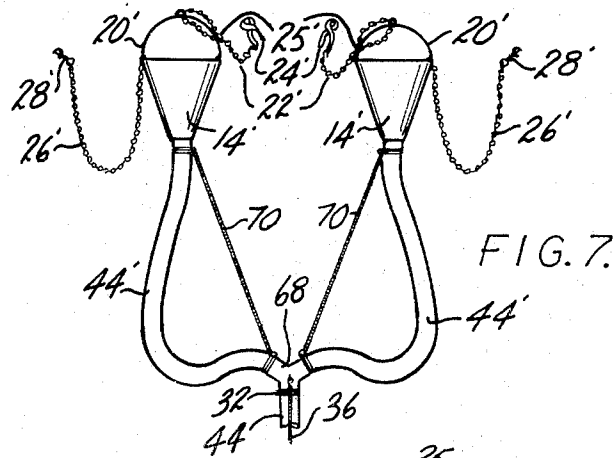


FIG. 7.

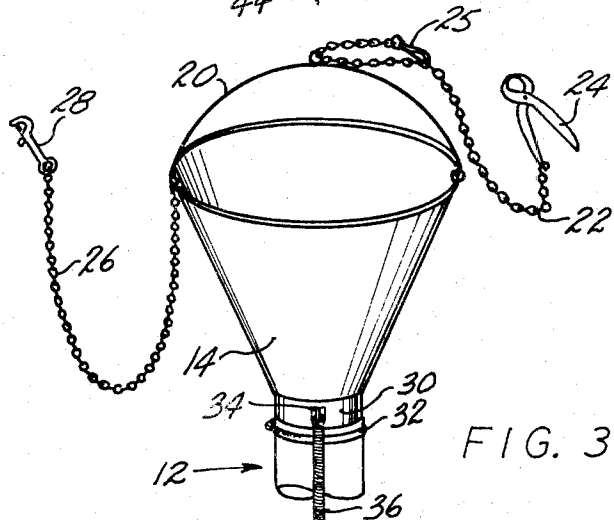


FIG. 3.

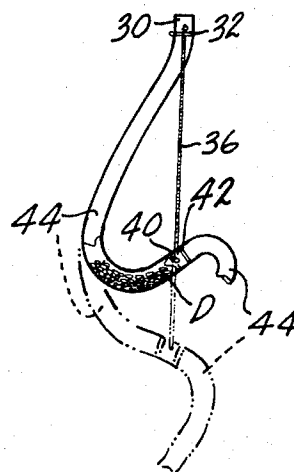


FIG. 6.

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## DATE HARVESTING DEVICE

## BACKGROUND OF INVENTION:

The present invention relates to conveyors and more particularly to a harvesting device for conveying dates by gravity from elevated points to a container on the ground or other lower level, the conveying being performed without bruising or otherwise injuring the fruit.

Tubular conveyors of various types have been proposed for harvesting different kinds of fruit. Before the advent of the present invention, attempts have been made to harvest dates mechanically but they have not met with success. As is probably well-known, data trees grow to considerable heights with the bunches of dates sometimes as much as fifty to sixty feet above the ground level. The use of prior art devices in such cases has not been satisfactory because the dates descend too rapidly, resulting in injury to the dates. At times, malfunctions would occur because of clogging and no provision for shaking the dates loose. Thus, prior to the present invention, the practice has generally been for date pickers to climb up a ladder to the vicinity of a date bunch, the picker carrying several empty cans, or the like, and a line or rope. After securing himself safely to the tree, dates were picked into a can which was then lowered to the ground by the rope. When the cans had been filled and lowered, more cans were needed. In the case where the picker was assisted by a helper on the ground, it was no problem to attach an empty can to be pulled up by the picker. However, the picker often worked alone and had to hook an empty can after having lowered a filled can. Frequently, it required several tries before the empty can was hooked securely enough to be drawn up to the picker. Obviously, this procedure was time-consuming, laborious and fatiguing, with an adverse effect on the picker's production of the amount of dates harvested in a given day.

## SUMMARY OF INVENTION

It is therefore an object of the present invention to provide a novel date harvesting device of simple construction which operates in a reliable manner to deliver relatively large quantities of dates in sound condition.

Another object of the present invention is to provide a novel conveyor tube of predetermined configuration to which motion can be selectively imparted varying such configuration and thereby controlling the movement of articles passing through the tube.

A further object is to provide a novel conveyor tube selectively configured to control the speed of movement of articles therethrough for delivery of the articles in sound condition.

Still another object is to provide a novel conveyor tube configured into a plurality of consecutive loops through which articles move by force of gravity, the speed of movement being governed by varying the configuration of the loops sequentially from the uppermost to the lowermost loop.

A still further object is to provide a novel conveyor tube in accordance with the immediately preceding object which is especially adapted for conveying dates from a bunch on a tree to a container on the ground, the tube being configured into loops by means of tension springs which vary in strength from loop to loop so that a pull on the lower end of the tube operates to vary the configuration of the loops sequentially, beginning

with the uppermost loop, for controlling speed of movement of the dates through the tube for delivery, in a minimum time, of a relatively large amount of dates.

These and other objects and advantages are achieved by the provision of a novel conveyor tube having a gathering funnel at one end and a closure and pull line at the other end. The conveyor tube is made up of a plurality of flexible sections which are detachably connected together by coupling sleeves. Interconnecting the funnel, the coupling sleeves and the closure are a plurality of tension springs which configure the tube to a plurality of consecutive loops. The springs vary in tension from strongest at the closure to least strong at the funnel. The conveyor tube is adapted to be suspended from a date tree with the funnel disposed about a date bunch from which dates gravitate into the uppermost loop. A pull on the tube is effective to elongate the springs sequentially, beginning with the uppermost spring, for varying the configuration of the loops and permitting gravitation of the dates through the tube at controlled rates of speed. Opening of the closure permits discharge of the dates from the lowermost loop. A plurality of funnels can be coupled to the conveyor tube so that several date pickers can be employed for speeding up harvesting of the dates. The number of tube sections in the conveyor tube depends upon the height of the date tree. Unneeded tube sections and associated tension springs are uncoupled from the lower portion of the conveyor tube, the closure and pull line being detached from the longer length conveyor tube and reattached to the shorter one. For very tall trees, tube sections are added as necessary.

## BRIEF DESCRIPTION OF DRAWINGS:

FIG. 1 is an elevational view showing a picker in a date tree and illustrating use of a novel device embodying the principles of the present invention for harvesting dates picked by the picker.

FIG. 2 is a larger scale view of the harvesting device.

FIG. 3 is an enlarged, fragmentary perspective view of the upper end of the harvesting device, showing the gathering funnel and support chains.

FIG. 4 is an enlarged, fragmentary side view of an intermediate portion of the harvesting device, showing a coupling sleeve interconnecting adjacent ends of a pair of conveyor tube sections.

FIG. 5 is an enlarged, fragmentary side view of the lower end of the harvesting device, showing the closure sleeve and pull line.

FIG. 6 is a fragmentary side view of a portion of the harvesting device, illustrating a variation in the configuration of a loop in the conveyor tube for controlling movement of dates therethrough.

FIG. 7 is a fragmentary elevational view showing a pair of gathering funnels adapted to be coupled to the upper end of the conveyor tube for harvesting the pickings of several date pickers.

## DESCRIPTION OF PREFERRED EMBODIMENTS:

Referring to the drawings, there is shown in FIG. 1 a date tree T and a ladder L supporting a worker or date picker P in the vicinity of a date bunch or cluster C, the worker being provided with a saddle or seat S and link attachment chains A adapted to be hooked to branches

of the tree. For harvesting the dates, the picker makes use of a novel device 10 which embodies the principles of the present invention and consists essentially of an elongated conveyor tube 12 having a gathering funnel 14 at its upper end and a closure 16 at its lower end to which a pull line 18 is attached. Pull on the line can be exerted by any suitable means, such as a winch W, or by hand, for drawing the closure down to a container such as a box B. As will later be made more clear, dates are caused to gravitate down the conveyor tube and be discharged therefrom into the container upon opening of the closure.

As better seen in FIGS. 2 and 3, the gathering funnel 14 is provided with a wire handle or bail 20 to which a supporting link chain 22 is connected. The chain is provided with a plier clamp 24 adapted to grip a branch of the date tree and with a spring snap hook 25 for adjusting the effective length of the chain. In the interests of safety, there is also provided a safety chain 26 connected to the rim of the funnel. The chain 26 has a harness snap hook 28 which is adapted to be connected to a link of the attachment chain A for preventing the funnel from falling to the ground in the event that the plier clamp should lose its grip.

The funnel 14 is provided with a coupling sleeve 30 to which the upper end of the conveyor tube 12 is coupled by means of a conventional band clamp 32 of the type that is constricted about the tube and sleeve for holding them together. Secured to the sleeve is a perforated connector tab 34 to which one end of a tension spring 36 is hooked. The other end of the spring is hooked to a perforated connector tab 38 on a coupling sleeve 40, best seen in FIG. 4. There are a plurality of coupling sleeves 40 and associated with each are a pair of constricting band clamps 42 similar to clamp 32. As shown in FIG. 2, the conveyor tube 12 is made up of a plurality of tube sections 44 adjacent ends of which are coupled to the sleeves 40 by the clamps 42. Additional tension springs 46, 48 and 50 interlink the connector tabs on the coupling sleeves. Terminal tension spring 52 interconnects the lowermost coupling sleeve 40 and the closure 16. The closure is in the form of a sleeve 54 having pivoted thereto, as at 56, a lid 58 with a snap hook latch 60, as shown in FIG. 5. The sleeve 54 is coupled to its associated tube section 44 by means of a constricting band clamp 62. The sleeve is also provided with a connector tab 64 which is similar to the connector tab 38. An attachment bracket 66 on the sleeve serves for connection of the pull line 18 thereto.

The aforescribed connection of the tension springs 36, 46, 48, 50 and 52 interconnects spaced points on the conveyor tube 12 and serves to draw the points together in predetermined proximal relationship for forming the tube sections 44 into hook-shaped loops substantially as shown in FIG. 1. When a tension spring is elongated, as by a pull thereon, the spaced points it interconnects are disposed in a distal relationship and the configuration of the loop of the associated tube section 44 is varied for changing the slope of the loop, as shown in dotted lines on FIG. 6, so that any articles, such as dates D, in the lower portion of the loop can gravitate therefrom into the lower portion of the next loop.

The springs 36, 46, 48, 50 and 52 vary in tensional strength and are graduated in strength from least strong

in the uppermost or initial loop to strongest in the lowermost or terminal loop. Typically, each tube section 44 consists of a 10-foot length of wire-reinforced thin plastic tubing having a diameter of 4 to 5 inches and the tension differential in the springs is about three pounds, with about 19 pounds for spring 36, 22 pounds for spring 46, 25 pounds for spring 48, and so on. For taller trees, tube sections are added as necessary, the sleeve 54 then being reattached to the lowermost end of the added tube sections. For shorter trees, the procedure is reversed.

It is believed that the operation of the date harvesting device of the present invention is clearly apparent and is briefly summarized at this point. With the harvesting device 10 relates to a date tree T, as shown in FIG. 1, the gathering funnel 14 being disposed about a date cluster C and the pull line 18 in the hand of an assistant or connected to a winch W, the worker or date picker P picks or shakes dates from the cluster, the dates gravitating down into the loop of the uppermost tube section 44, the lower portion of which receives and holds dates D, as shown in FIG. 6. When there are about 20-25 pounds of dates in the loop, the picker signals an assistant, not shown, who exerts a pull on the line, causing the uppermost spring 36 to stretch or elongate and increase the vertical spacing between the upper and lower ends of the loop of the associated tube section. This causes the lower end portion of the tube section, formerly inclined, now to slope downwardly and the force of gravity will cause the dates to slide past, down into the next tube section. With continued pull on the line 18, the remaining tension springs are elongated in sequence and the dates gravitate from tube section to tube section until they are received and held in the loop of the tube section associated with the closure 16. As necessary, the pull line is jerked or oscillated to shake or jiggle the conveyor tube and overcome any tendency of the dates to clog therein during descent. The device is dimensioned and the container C is located so that when the dates are in the lowermost loop, the closure itself is over the container, after which the latch 60 is unlatched and the closure lid 58 is swung open for discharge of the dates into the container. Obviously, the rate of pull on the line governs the rate of elongation of the tension springs, so that controlling the rate of elongation controls the rate of movement of the dates through the tube, whereby high speeds can be avoided and damage to the dates or other fruit by friction or too rapid a descent is prevented.

The present invention also contemplates the use of a plurality of gathering funnels with each conveyor tube for harvesting the combined efforts of several pickers. For this purpose, as shown in FIG. 7, the previously described gathering funnel 14 is replaced with a tubular Y-connection 68, the upper ends of the tension spring 36 and tube section 44 being connected to one leg thereof. The other legs of the Y-connection are coupled to the lower ends of a pair of tube sections 44', the other ends of which are coupled to a pair of gathering funnels 14', each having a wire bail 20', a support chain 22' with a plier clamp 24' and spring snap hook 25', and a safety chain 26' with a harness snap hook 28'. The ends of each tube section 44' are interconnected by a tension spring 70.

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In operation, the gathering funnels 14' are disposed about date clusters and the chains of the funnels are appropriately attached. Each picker harvests dates from the cluster, which descend from his gathering funnel 14' are received and held in the lower portion of the associated tube section 44'. When a sufficient amount of dates has accumulated in the tube section, about 10 to 15 pounds, the faster picker signals the assistant on the ground to pull on the line 18 and vary the configuration of the tube sections to position the power portions thereof in declining relation so that the dates gravitate from the tube sections through the Y-connection 68 and into the tube section 44. Thereafter, the procedure is the same as previously described in connection with a single gathering funnel.

There has thus been provided a device especially designed for harvesting dates in a rapid and reliable manner under the control of an operator who can selectively determine the speed of descent of the dates through a conveyor tube for obviating damage to the dates during descent and assuring delivery thereof into a container at ground level in sound condition.

Although the present invention has been herein shown and described in considerable detail in what is believed to be the most practical and preferred embodiments thereof, it is to be understood that many variations thereof are possible and that the present invention is not to be limited to such details but is to be considered in its broadest aspects and accorded the full scope of the appended claims.

Having described the invention, what is desired to be secured by Letters Patent is:

1. A device for conveying articles comprising:

a flexible conveyor tube having support means at one

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end thereof for suspending the tube in depending relation for movement of the articles therethrough by gravitational force;

a plurality of resilient linking means interconnecting vertically spaced points on the tube and configuring a portion of the tube into a plurality of consecutive loops adapted to receive and hold articles gravitating therein, the resilience of the linking means being graduated along the length of the tube;

and means attached to the tube for elongating the resilient linking means for increasing the vertical spacing of said points and varying the configuration of the loops for gravitation of the articles therefrom.

2. The device of claim 1, wherein the plurality of linking means includes tension springs which vary in tension from least in the uppermost linking means to greatest in the lowermost linking means.

3. The device of claim 2, wherein the lower end of the tube is attached to a pull line effective to vary the configuration of the loops sequentially beginning with the uppermost loop.

4. The device of claim 1, wherein said one end of the tube is provided with a coupling sleeve for connecting a gathering funnel thereto and the other end of the tube has a coupling sleeve with a closure and a pull line, said tube includes a plurality of tube sections between the funnel and the closure having ends coupled together by coupling sleeves, and tension springs linking said coupling sleeves and forming the tube sections into consecutive loops, said springs varying in tension from least in the uppermost loop to greatest in the lowermost loop.

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