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[54] **ARTICLE-RELEASE SHACKLE FOR TROLLEY-SUPPORTED HANDLING SYSTEMS TO FACILITATE PROCESSING**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 1,720, Jan. 9, 1970, Pat. No. 3,656,206.

[52] **U.S. Cl.** **17/11**

[51] **Int. Cl.** **A22c 21/00**

[58] **Field of Search** 17/11, 44.1, 11.2

[56] **References Cited**

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[57] **ABSTRACT**

A shiftable and article-releasable shackle for use with a trolley-supported handling system to facilitate processing, such as the evisceration of poultry, which utilizes a multiplicity of vertically suspended shackle elements, suspended at upper ends from the trolley system and having adjacent the lower extremities thereof retaining elements for interconnection of the suspended articles. In operation and functional structure, an abutment cable and/or deflection elements are fixedly mounted at a point or points in the course of travel of the shackles for striking against and preferably camming the shackles angularly and particularly the retaining elements in such a way as to release the articles which then drop with the aid of gravity.

3 Claims, 7 Drawing Figures

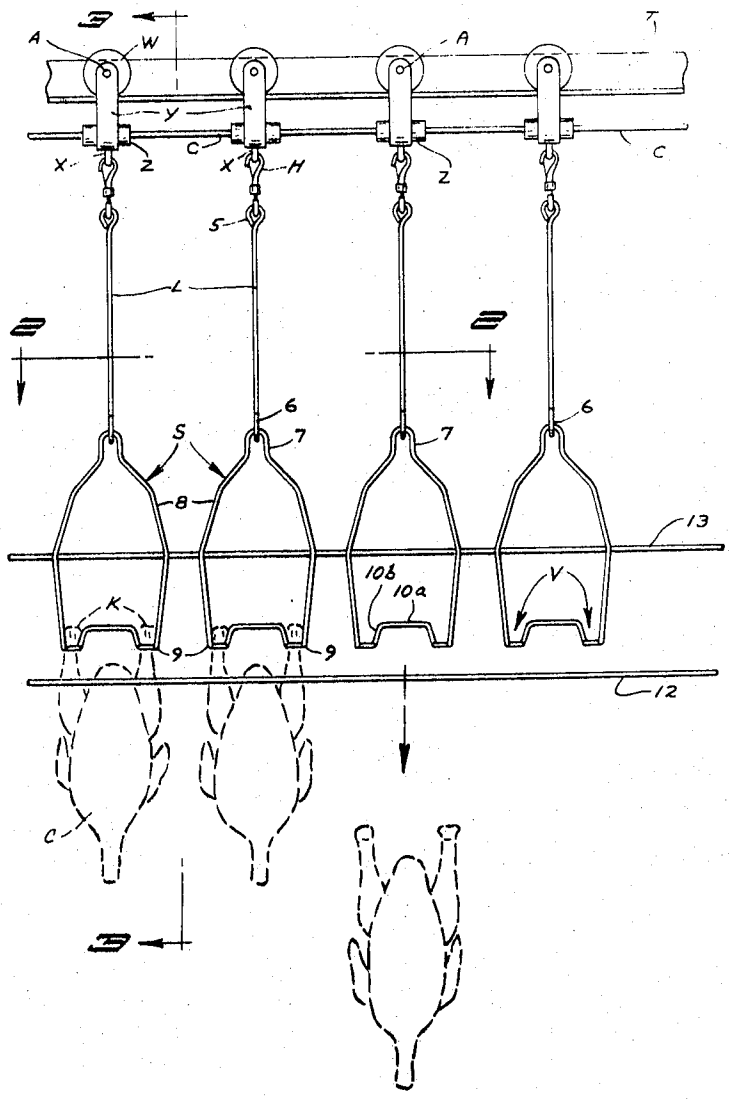
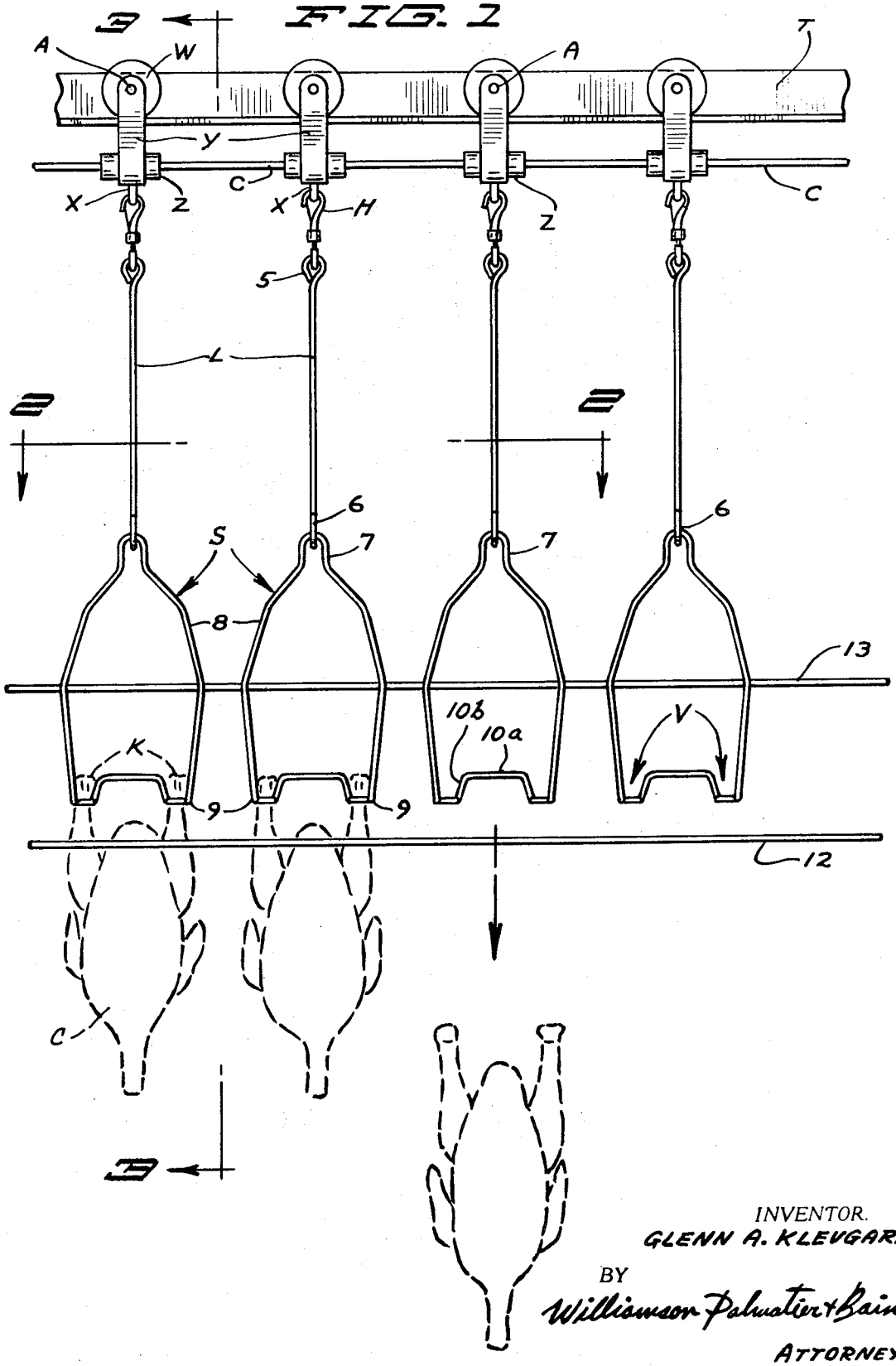
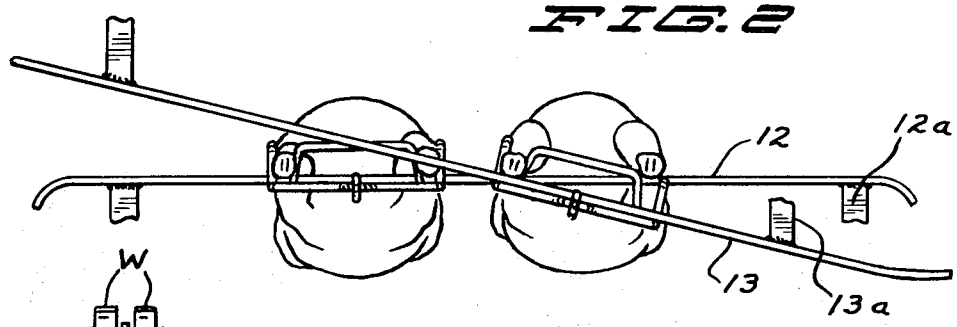


FIG. 1



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FIG. 2



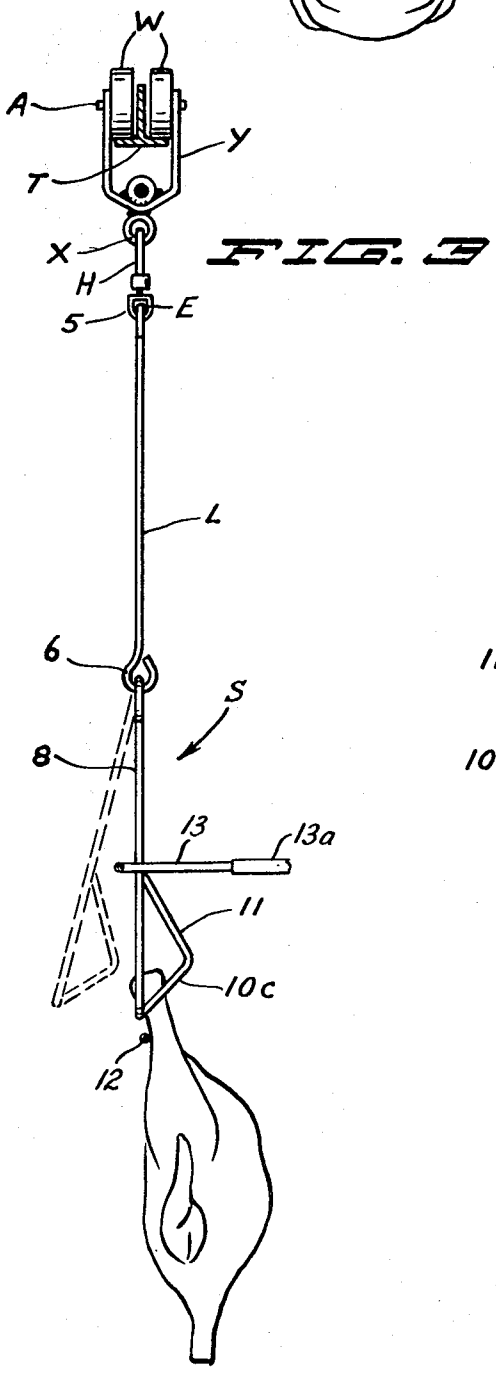


FIG. 3

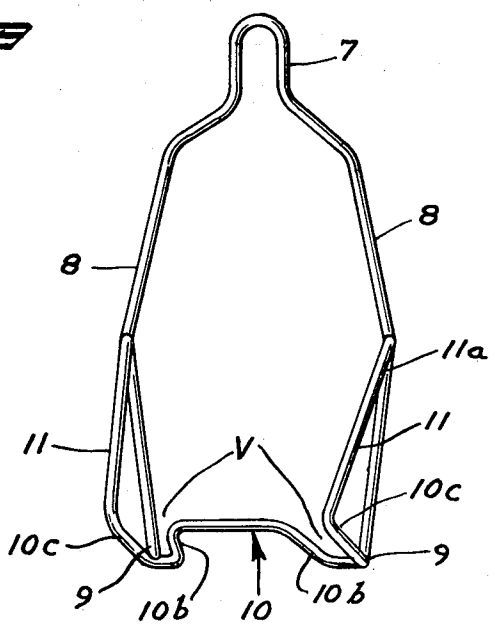


FIG. 4

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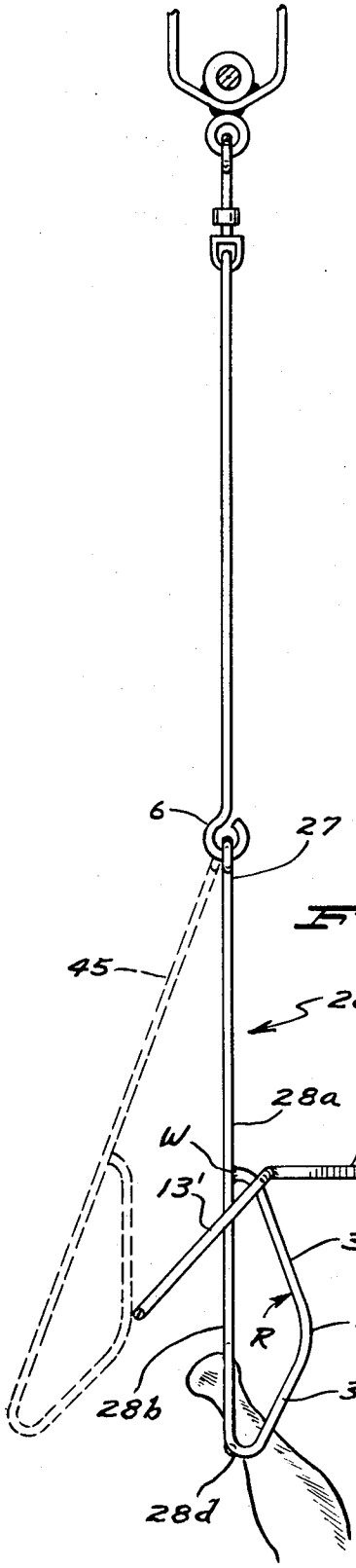


FIG. 5

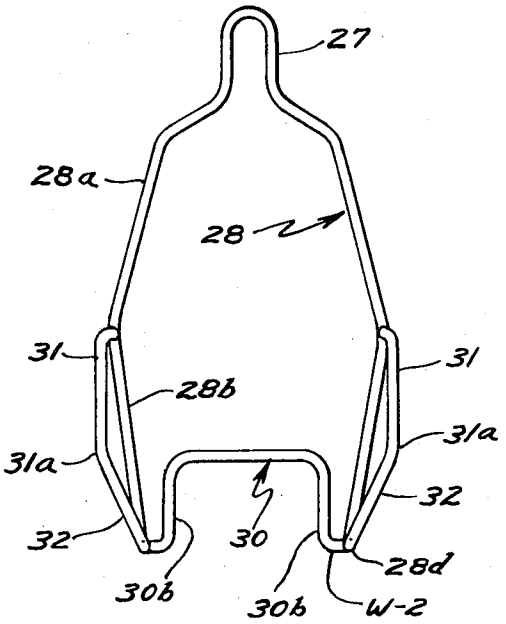


FIG. 6

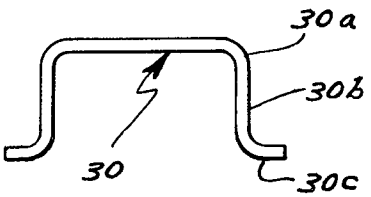


FIG. 7

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ARTICLE-RELEASE SHACKLE FOR TROLLEY-SUPPORTED HANDLING SYSTEMS TO FACILITATE PROCESSING

This application is a continuation-in-part of co-pending application Ser. No. 1,720 entitled "Article-Release Shackle For Trolley-Supported Handling Systems to Facilitate Processing," filed Jan. 9, 1970, now U.S. Pat. No. 3,656,206.

This invention relates to a movable multi-shackle system for use in poultry processing operations such as the eviscerating of the fowls, and wherein a multiplicity of shackles are supported trolleywise and moved continuously or intermittently through a general horizontal line of travel. Such systems of the prior art have been employed in poultry processing operations where with the fowl carcasses suspended by their rear legs are successively processed for cleaning, removal of innards and the like.

It is an object of my invention to provide, in a shackle system of the class identified, new and improved mechanism for detachably retaining the respective fowls in suspended relation during travel and processing, and for further providing automatic and successive release of the suspended fowl carcasses after a processing operation, such as in eviscerating, is completed.

The invention further provides, as an integral unit, a new and improved shackle device wherein fowls may be readily attached and suspended by the hind legs thereof and which is adapted during travel for combinative release operation with a very simple, converging camming wire, rail or other element employed as part of the system.

More specifically, the invention provides in close combinative relation with a multiplicity of novel shackles suspended for travel and for retaining poultry carcasses, mountings for the respective shackles permissive of outward swinging of the individual shackles successively from substantially a vertical plane to an upwardly declined plane with leg-grasping elements for utilizing gravity to release the attached foot joints of the carcasses when the shackles are successively swung outwardly through a relatively small acute angle. The combination further requires a camming or deflecting element, such as a horizontal rod, plate or the equivalent, placed in a converging relation with respect to the general horizontal line of travel of the carcasses and disposed in the path of the shackles to successively engage and swing the same in their normal travel after individual carcasses have reached a predetermined point.

The foregoing objects and purpose of the invention will be more apparent from the following description made in conjunction with the accompanying drawings wherein like reference characters refer to similar parts throughout the several views and in which:

FIG. 1 is a side elevation showing an embodiment of the invention and illustrating the improved shackles supporting a plurality of fowl carcasses, after eviscerating or other processing, and also showing release and dropping of a carcass upon operation of the ejection or release mechanism;

FIG. 2 is a vertical section taken substantially along the line 2—2 of FIG. 1 showing a carcass supported by the improved shackle immediately prior to ejection or release of the legs from the shackle, and showing also mechanism including a shackle in the very act of release of the supporting legs of the carcass;

FIG. 3 is a vertical section taken along the line 3—3 of FIG. 1, the dotted lines indicating the outward swinging of a shackle produced by a converging camming wire or rod;

FIG. 4 is a perspective view of a preferred type of the novel shackle removed from the supporting and trolley apparatus;

FIG. 5 is a perspective view of a second and improved form of the complete shackle removed from the remaining portions of the apparatus;

FIG. 6 is a side elevation of the same showing pivotal connection of the top of the shackle with a depending link; and

FIG. 7 is an elevation of an inverted U-shape rod piece which comprises the lower part of the improved shackle and with side portions thereof, forms the retaining notches for receiving and permitting release of the feet-knuckles of the poultry legs.

Referring now in detail to the invention and apparatus illustrated, a supporting trolley structure for supporting and facilitating travel of a multiplicity of depending vertically placed support links L is employed, and as shown, comprises an inverted rigid T-rail T upon the horizontal outturned flanges of which a multiplicity of U-shaped yokes Y are roller-supported each by a pair of spaced wheels W journaled on horizontal axes A which are in the form, as shown, of pins axially projecting from the outward side of the two wheels W and journaled in bearings, drilled or otherwise formed at the upper ends of the arms of the yokes Y.

As shown, the yokes Y near the depending ends thereof have affixed as by welding thereto, small horizontal sleeves Z which are suitably clamped or otherwise affixed to an elongate or continuous flexible element, such as a small cable C, the sleeves of the respective yokes being spaced apart some distance for separate manipulation of the carcasses or other units to be processed. The numerous and similar vertical links L, as shown at their upper ends, are swingably and pivotally connected by swivel eyes E with detachable spring hooks H which in turn interlock with depending small attachment eyes X affixed to the lower extremities of the yokes Y.

Links L are attached at their upper ends to the swivel loops E by loops 5 which may be bent from the rod material of the links, and at the lower end of links L generally circular shackle-supporting loops 6 are provided preferably lying generally in places which are disposed perpendicular to the general line of travel of the apparatus.

It will be understood that the track T may have inclines, declines or undulations formed therein which of course the rollers or wheels will follow in travel. To conform to such variations, cable C is flexible and it is to be understood that the motorized mechanism, drum or other pulling mechanism is connected with cable C to impart longitudinal movement to such cable and consequently generally horizontal traveling movement of the yokes Y and the components, elements or materials supported in suspended relation from such yokes.

Referring now to the preferred construction of the individual multi-function shackles indicated as entire-

ties by the letter S, the general shape is that of an inverted yoke having an upper U-shaped attachment element **7** which is swingably connected with the lower loop **6** of its appropriate link L; and having spaced arms **8** which first diverge from the attachment portion **7** and then past their medial portions, as shown, slightly converge to rather widely spaced lower extremities **9**.

Spanning the depending extremities **9** of the arms **8**, and if desired integrally formed therewith, is a specially shaped knuckle-retaining bar, indicated as an entirety by the numeral **10**, having a central substantially straight intermediate rod portion **10*a*** which is continued and merged into somewhat convergent knuckle-retaining elements **10*b*** preferably integrally formed with central rod portion **10*a*** and, as shown, lying in a common place therewith and having the outer arms **10*c*** of the U-shaped formations connected or integrally formed with diagonal brace rods **11** which have their upper ends **11*a*** welded or otherwise affixed to the intermediate portion of the depending shackle arms **8**.

The specific poultry leg-retaining elements illustrated which comprise the widely spaced notched sections defined by the bent rod arm portions **10*c*** and **10*b***, may constitute a great variety of elements and materials to provide for retaining the legs of the carcass of a fowl with the fowl suspended. The notched retaining elements, generally indicated by the letter V, are preferably disposed in a common plane and have somewhat converging notches with engagement edges for receiving the lower portions of the leg of the fowl, preferably and most advantageously, at points against the enlargements or foot knuckles of the fowls.

The leg-retaining portions **10**, when the shackles are in normal operation with the carcasses of fowls suspended therefrom, have the retaining elements V inclined to the horizontal to cooperate with the force of gravity in retaining the fowls in the suspended relation shown in the drawings with the knuckles K of the legs of the fowl being engaged and directly suspended by the retaining elements V.

The present invention provides for suspending and traveling the poultry carcasses P in suspended relation from the hind or leg portion thereof downwardly and spaced individually apart through a processing line. The processing is usually carried out manually but at least in part may be carried out by automatic machinery and takes place while the carcasses are vertically suspended as shown in FIGS. **1** and **2**. One or more processing operations, such as burning or riddance of pinfeathers and eviscerating, is accomplished on the continually moving or intermittently moving trolley-supported line. Travel movement is imparted by pull upon the common cable C which interconnects the suspending mechanisms in spaced relation.

While it is not absolutely necessary to maintain the carcasses in predetermined suspended vertical position, I prefer to provide, at least at the portions of the travel line of the system where processing takes place, a horizontal, or if desired, declined guide element **12** generally horizontally disposed and preferably made of a smooth cable or other flexible element mounted in fixed relation to engage against the intermediate portions of the legs of the fowl in suspended relation. The operators or, if machinery is used, the machines thus have a predetermined retaining line to depend on for assisting in the eviscerating or other processing to be done.

My invention contemplates, in close combinative relationship with the depending special shackles and trolley-supported moving mechanism, an ejection mechanism for liberating the legs of the respective carcasses at a predetermined point or points from the shackles, thereby through gravity enabling the carcasses to be dropped or to fall into a conveyor or apparatus which relates to the next step of the general processing of the poultry or other carcasses.

Generally speaking, such ejection means consists in a deflection mechanism or camming means, for at a predetermined located or at predetermined locations, producing a relative movement between the extremity joints or knuckles K and the V-shaped carcass-retaining elements or notches V.

A very economical and efficient release mechanism is shown as accomplished by mounting a deflecting or camming cable **13** substantially horizontally disposed and crossing or first merging with and then diverging from the guide medium or cable **12**. As shown, the diverging release cable **13** is disposed at substantially the mean height of the shackles **8** and will produce a camming action or deflection of the shackles outwardly on the hinge joints provided between the lowermost loop **6** of links L and the uppermost shackle loop **7**, as clearly shown in FIGS. **2** and **3**. The deflection or outward swinging bodily of the shackles **8** successively takes place after a process operation such as eviscerating the carcasses and, as shown in FIGS. **1** and **2**. The outward swinging or deflection of the shackles **8** is rather fast but gradual and with the help of the fixed guide cable **12**, causes the upper legs of the carcasses to be disconnected with the help of gravity from the notch-retaining elements V of the shackles.

While in FIG. **3**, which shows a deflected dotted line ejection position of one of the shackles S, it will be understood that in the scope of the invention herein, the arms **10*b*** and **10*c*** which together constitute the retaining elements V, may well be deflected to a position where they are declined with respect to the horizontal, permitting the knuckles K to slide outwardly with the help of gravity and in such instance not requiring the guide cable which is constantly substantially in engagement with the legs of the carcasses a few inches below the feet knuckles K.

It will be understood that in the lateral deflection of the shackles S, caused by the diverging release deflectors or cable **13**, the shackle can swing over and clear the cable if the cable is elongated and if desired, short sections of a rod or other deflecting member may be supported in divergent acute angle to the line of travel from overhead.

From the foregoing description it will be seen that a novel, simple and efficient trolley-supported handling system has been provided, particularly adapted to suspend a multiplicity of fowls in poultry processing, but also adapted to various other uses where a line of vertically supported and horizontally spaced articles are moved and traveled through a predetermined course for processing, testing and the like.

As contrasted with known prior art, my multi-function shackle and handling system is substantially simpler, involves fewer parts, and is more responsive and efficient in action.

It will further be seen that with the inventive structure disclosed, the shackles S, links L and snap hooks H may be readily detached from sleeves Z and readily sterilized in boiling water. Alternatively at a stage of the overall travel of the handling system after dropping of the carcasses or other articles, the shackles S and links L may be run through a tub of boiling water or other fluid for sterilizing and cleansing the same. The prior art devices for handling poultry to my knowledge, are difficult to clean and sterilize.

Referring now to the form of the invention illustrated in FIGS. 5 to 7 inclusive, each of the shackles indicated as an entirety by **28**, is formed as shown with an upwardly projecting loop or terminal **27** for pivotal connection with the depending loop of a link L. The two sides of an integral, substantially rigid rod (after bending thereof) diverge downwardly and outwardly from the projecting terminal **27**, at first rather sharply, to shoulders **28***a* and then continue divergence downwardly more gradually and along substantially straight lines to points **28***b* which constitute shoulders and thereafter converge slightly through straight sections **28***c* which extend to the lower terminal loop portions **28***d*.

Inwardly of the depending sides of shackle **28**, angular longitudinal camming sides are formed, as shown in FIGS. **5** and **6** comprising integral substantially rigid rod elements indicated as entireties by R, and having upper elongate straight portions **31** angled obtusely to lower rod portions **32**, the apex of such angulation being substantially at medial shoulders **31***a*. The entire camming rod structure R can be integrally formed from the two side rods of shackle **28** as clearly shown in FIG. **6** by employing rods of adequate length to provide for upturning of the stock at the lower terminal portions **28***d* and then rigid interconnection of the upper extremities of the rod arms **31** as by welding W, with the medial portion of the depending shackle frame element.

To complete the shackle and brace the lower depending sides thereof, a transverse, generally inverted U-shape rigid rod **30** is interconnected as by welding W-2 at the lower side legs **30***b* thereof with the lower loop terminal portions **28***d* of the depending shackle arms. It will be noted (see FIGS. **5** and **7**) that said inverted U-rod **30** is bent at elbows **30***a* to form the side legs **30***b* with short, outturned extremities **30***c* which are welded to the lower terminal portions **28***d*. It will be understood that when depending U-shape member **30** is rigidly secured across the bottom portion of the shackle, the plane defined by the side legs **30***b* lies substantially in a common plane with the plane defined by the lower rod portions **32** of the shackle sides.

At each side of the lower portion of the shackle V-shape retaining notches are defined between the respective side legs **30***b* of the U-shape member **30** and the lower portions **32** of the frame sides which are adapted to readily receive and and retain enlargements of pendent articles or poultry carcasses to be processed. Usually in poultry processing the foot knuckles K (see FIGS. **2** and **3**) retain the poultry carcasses in depending position.

With this improved form of the invention the outward swinging of the entire shackle on the pivotal connection between the upper attachment loop **27** and the hook **6** is very efficiently graduated and controlled as the shackle travels along the controlling actuated cable **13'** which extends as viewed from above in an intersecting acute angle direction from the normal line of travel of the shackles, as supported from the track T.

The actuating cable is so mounted (see FIGS. **2** and **6**) that it will continue to swing the shackle **28** to the left and outwardly from its normal position, contacting along first the upper rod portion **31** and then, passing beyond the elbow **31***a*.

In the preferred shackle form shown in FIGS. **5** to **7** inclusive, the actuating cable or rod **13'** not only crosses or intersects the general line of travel of the hangers Y and links L, but also in the actuating cycle of each shackle, it descends or is declined from the horizontal, as shown in FIG. **6**. Therefore, the shackles, by first travel engagement of their upper camming rod portions **31**, are uniformly swung outwardly to the left as shown in FIG. **6** to a point as shown in the dotted lines of FIG. **6**, where the respective elbows **30***a* thereof pass the actuating rod. At such point through slide action and without employment of the rod **12** (engaging the leg portions of the poultry carcass below the kunckles K), gravity alone disengages and drops the carcass from the shackle.

Thereafter the actuating rod **13'** rides along the lower camming rod portion **32** of the shackles, gradually causing the shackles to assume the normal upstanding positions.

The form of my invention of FIGS. **5** to **7** inclusive, because of the close cooperation between the descending actuating rod **13'** and the camming sides indicated as R of the shackle, provide the highly accurate, smooth operation and ejection of the poultry legs and the like, without sharp jerks of impetus.

It will be understood that the preferred form of the invention may be utilized with lower guide cable **12** extending substantially horizontally below the lower terminals of the shackles and normally engaging the poultry legs just below the knuckles, but it will be understood that with the preferred form, this guide cable **12** may be eliminated if desired.

What is claimed is:

1. For use with a moving trolley-supported handling system for facilitating processing of a multiplicity of suspended articles such as poultry carcasses and moved through a predetermined, generally horizontal course of travel,

a shiftably suspended, article-releasable shackle comprising for each of said supported articles,

a depending frame member having adjacent its lower end a shiftable retaining element for connection with and support of the articles,

said shackles disposed in horizontally spaced relation being swingably supported from the movable trolley system by supporting links, and in operation of the system travel successively through a predetermined course,

each shackle having adjacent its lower end notched retaining means for releasably engaging and supporting an article,

deflecting release means extending at an acute angle across the general line of travel of said shackle for engaging said shackles and swingably deflecting the same to successively release and drop the articles carried thereby, and

wherein each shackle has a camming element protruding in a plane perpendicular to said line of travel from the shackle frame and diverging generally angularly downward from the upper portion thereof to an article-release point,

said deflection release means being stationary and positioned at a height to be engaged by the said cam element of each shackle during travel and throughout a predetermined interval of the travel movement thereof.

2. The structure and combination set forth in claim 1 wherein,

said cam element comprises also a convergent lower portion thereof extending downwardly from said article-release point.

3. The structure set forth in claim 1 wherein,

said camming element comprises a stiff rod bent to conform to said shape and having its ends affixed to the shackle frame.

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