

Feb. 3, 1959

L. B. STANDIFER, JR., ET AL

2,872,237

AUTOMATIC HOOKS

Filed July 6, 1955

3 Sheets-Sheet 1

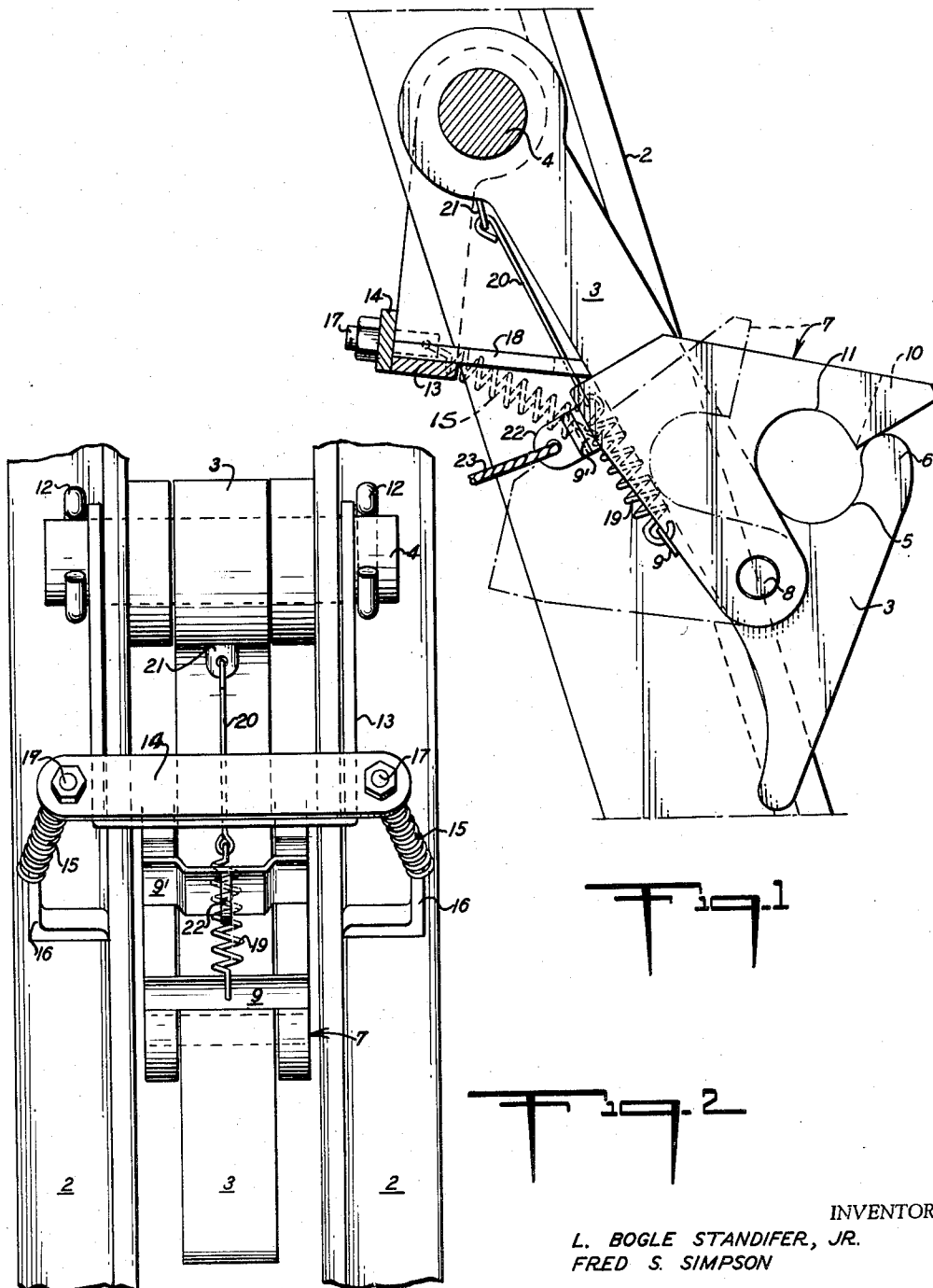


Fig. 1

Fig. 2

INVENTORS

L. BOGLE STANDIFER, JR.
FRED S. SIMPSON

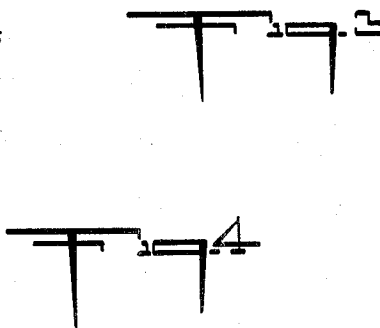
BY *Shuck & Mathis*

ATTORNEYS

L. B. STANDIFER, JR., ET AL

AUTOMATIC HOOKS

3 Sheets-Sheet 2



INVENTORS

L. BOGLE STANDIFER JR
FRED S. SIMPSON

BY Smecker & Mathis

ATTORNEYS

Feb. 3, 1959

L. B. STANDIFER, JR., ET AL

2,872,237

AUTOMATIC HOOKS

Filed July 6, 1955

3 Sheets-Sheet 3

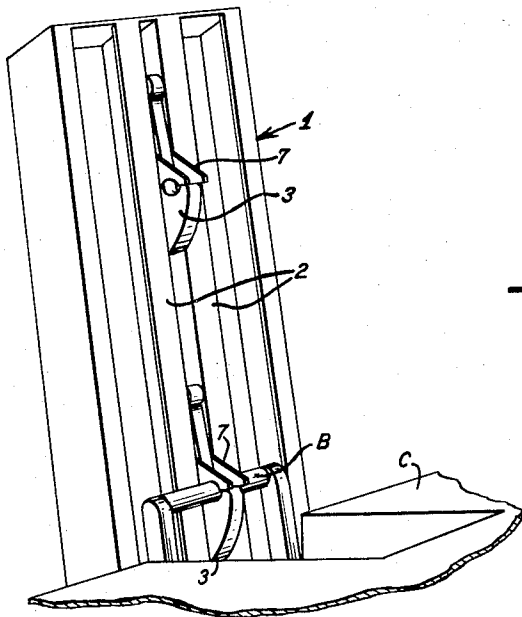


Fig. 5

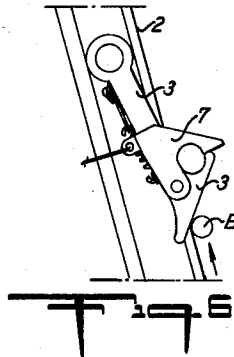
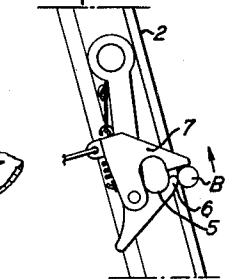


Fig. 6

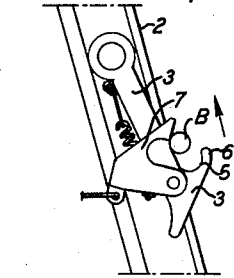


Fig. 7

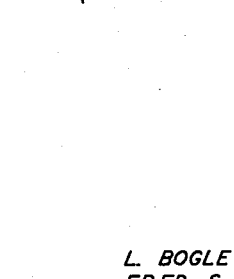


Fig. 8



Fig. 9

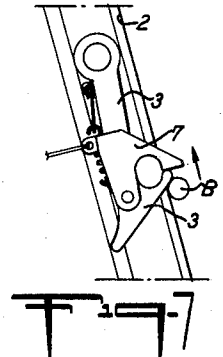
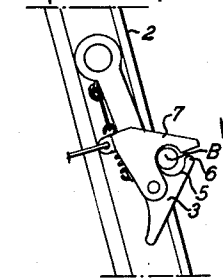


Fig. 10

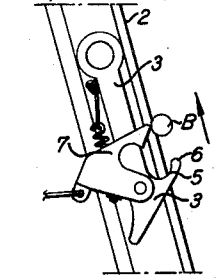


Fig. 11

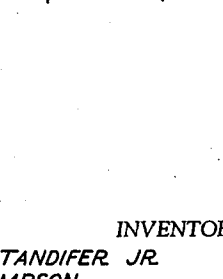


Fig. 12

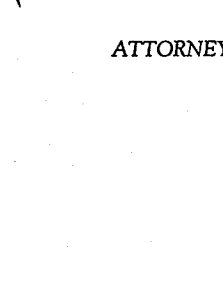


Fig. 13

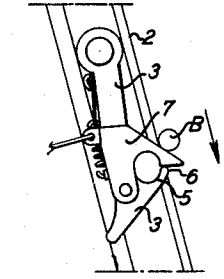


Fig. 14



Fig. 15

INVENTORS

L. BOGLE STANDIFER, JR.
FRED S. SIMPSON

BY *Shurden & Mathis*

ATTORNEYS

1

2,872,237

AUTOMATIC HOOKS

Lafayette Bogle Standifer, Jr., Knoxville, and Fred S. Simpson, Powell, Tenn., assignors to Dempster Brothers, Inc., Knoxville, Tenn., a corporation of Tennessee

Application July 6, 1955, Serial No. 520,230

7 Claims. (Cl. 294—83)

This invention relates to improvements in automatic hooks, particularly of the type employed in transporting and dumping equipment, such as disclosed in the patents of George R. Dempster, No. 2,369,722, February 20, 1945, and No. 2,404,830, July 30, 1946.

In such transporting and dumping equipment a container is lifted by a hoisting unit onto a skid frame and is provided with a bail connected with the container for engagement with an automatic hook on the skid frame to facilitate dumping of the container either by tilting action or by lowering of a drop bottom door thereon. Frequently the containers are loaded improperly with the load centered toward one side or the other which causes a shifting of the container on the skid frame. At times the container may turn completely over because of a shifting of the load to the rear which would raise the bail out of the dumping hook. Frequently in dumping the tilt-type container, the bail is raised vertically by an upward travel of the container on the skid frame. Such occurrences may cause disengagement of the container from the skid frame and the hook customarily provided thereon for holding the container in place which would interfere with the proper dumping of the container and the handling thereof on the unit.

One object of this invention is to overcome these objections by providing a safety catch which will insure the fastening of the bail in the hook until the catch is released and it is desired to disengage the container from the skid frame.

Another object of the invention is to improve the construction of the automatic hook of a hoisting and dumping unit by providing for the automatic locking of the shuttle of the hook to retain the container effectively in the hook, not only during transportation, but also during dumping, until the shuttle is released and moved by outside force being imparted thereto.

Still another object of the invention is to provide not only for the locking, but also for the positive removal of the shuttle out of the path of a bail on a container, without the necessity for using a separate safety catch in association therewith.

A still further object of the invention is to simplify and improve the construction of an automatic hook of a hoisting and dumping unit by providing for the locking of the shuttle thereof in a retaining position with respect to the bail in the hook, without adding appreciably to the construction thereof, and yet providing for the effective removal of the shuttle when disengagement of the container is desired.

These objects may be accomplished according to certain embodiments of the invention in which an automatic hook is provided with a shuttle for trapping a bail on a container seated in the hook, with means connected with the shuttle, not only for retaining the shuttle in locked relation to the bail until the shuttle is positively moved with respect thereto, but also having means for effecting release of the shuttle when desired. The shuttle is retained resiliently in its locking position, as, for ex-

2

ample, by means of spring connection therewith, and yet suitable means may be used for releasing the shuttle when desired, either manually or by power device, such as a hydraulic cylinder, solenoid or other suitable means.

These embodiments of the invention are illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevation of an automatic hook mounted on a carriage as one embodiment of this invention;

Fig. 2 is a rear elevation thereof;

Fig. 3 is a side elevation of a modified form of automatic hook;

Fig. 4 is a rear elevation thereof;

Fig. 5 is a perspective view of the carriage, with the hook and container in place thereon; and

Figs. 6 to 15, inclusive, are diagrammatic side views showing the automatic hook in different positions illustrative of the sequence of movements of the container bail with respect thereto.

The invention is shown as applied to transporting and dumping equipment of the type which uses a skid frame mounted on a carriage such as that set forth in Patent No. 2,369,722, granted February 20, 1945. The carriage is designated generally by the numeral 1 and includes skid frame members 2 spaced apart and adapted to receive thereon a container C (Fig. 5) either of the tilt-type or of the drop bottom type which may be transported and dumped from the hoisting unit of the equipment. The container C is usually provided with a bail B to be engaged by an automatic hook on the carriage 1 to facilitate handling and dumping of the container.

In the form shown, the automatic hook comprises a body 3 in the form of an elongated member or casting pivotally supported by a pin 4 which extends transversely of the carriage 1 between spaced portions of the skid bars 2 in which the pin 4 is secured. The lower end portion of the body 3 has a laterally projecting hook formed with a throat or seat 5 adapted to receive the bail B therein, and an extended tip 6 on the opposite side of the throat 5 from the body 3, tending to retain the bail seated in the throat.

A shuttle is indicated generally at 7 pivotally mounted at 8 on the body 3 of the hook. The shuttle 7 is formed of a pair of side plates connected together along their back edges by bars 9 and 9' welded or otherwise fixed thereto and extending forwardly in embraced relation with the body 3 on opposite sides of the latter in overlapping relation with the tip 6 of the hook, projecting outwardly from the latter. These side plates are connected together by a spacer block 10 at the forward ends thereof in position to seat upon the tip 6. The shuttle 7 is also provided with a notch 11 in the under edges of the plates beside the spacer block 10 and in coacting relation with the throat 5 in the hook. The throat 5 and notches 11 are sufficiently enlarged to receive freely therein the bail B of the container, as will be apparent in Figs. 9 and 10 of the drawings.

The pin 4 extends through flanges on the skid frame members 2, as will be apparent from Fig. 2, and preferably this pin 4 is retained in place by cotter pins 12.

Suspended from the pivot pin 4 is a U-shaped hook bracket 13, the opposite ends of which are supported by the pivot pin 4, while the intermediate portion thereof extends downward around the flanges of the skid bars 2, as shown in Figs. 1 and 2. A bar 14 extends across the back edges of the hook bracket 13 and is connected at its opposite ends with coiled springs 15. Each of the coiled springs 15 is anchored at one end to a hook tab 16 secured to the adjacent skid bar 2, while the opposite end of the coiled spring 15 is connected with a bolt 17 extending through the bar 14 at the adjacent end thereof. The bolts 17 may be adjusted with respect to the bar 14 to vary the tension on the springs 15. A finger 18 extends

3

from the bar 14 against the back face of the hook body 3 to swing the body 3 about the pivot pin 4 under the action of the springs 15.

A coiled spring is also provided at 19 normally tending to return the shuttle 7 to a closed position over the throat 5, as illustrated in full lines in Fig. 1. The coiled spring 19 is anchored at one end to the bar 9 and is connected at its opposite end by an extension member 20 with a tab 21 on the body of the hook 3 adjacent the point of pivotal support thereof. Thus, swinging movement of the shuttle 7 about the pivot 8 thereof will apply tension to the spring 19, normally tending to return the shuttle from the dotted line position to the full line position in Fig. 1.

Provision should be made for opening the shuttle with respect to the hook, which may be accomplished either manually or automatically, as desired. In the embodiment shown in Figs. 1 and 2, the connecting plate 9' of the shuttle 7 is provided with a tab 22 thereon to which a length of cable 23 is connected, preferably extending to a point within convenient reach of an operator, such as into the cab of the vehicle. The operator, in turn, by pulling on the cable 23, can move the shuttle open whenever desired, to release the container therefrom.

One example of power operated means for the shuttle is illustrated in Figs. 3 and 4. In this instance, the power means comprises a hydraulic hoist which is substituted for the manually operated cable in the example shown in Figs. 1 and 2.

The hydraulic hoist includes a cylinder within which a piston is operatively mounted, the cylinder being illustrated at 24. This is a single-acting cylinder having a hose connection 25 at one end thereof for supplying fluid under pressure to the interior of the cylinder.

The cylinder 24 is mounted on the hook body 3 by mounting bars 26. The bars 26 are welded or otherwise secured rigidly to the body of the cylinder 24 at one end, and at the opposite end are connected by means of bolts 27 to the body 3 to effect a secure mounting of the cylinder in place thereon.

At its lower end the piston in the cylinder is connected through a piston rod 28 with a push bracket 29 in the form of a yoke bearing upon a push bar 30 that extends between the side plates of the shuttle 7. The bracket 29 may be adjusted axially of the piston rod 28 by means of adjusting nuts 31 thereon.

Also secured to the push bar 30 is a tab 32 with which a coiled spring 33 is connected at one end, while the opposite end of said coiled spring 33 is connected with a tab 34 on the cylinder 24. This connection of the spring 33 is such as to maintain normally the shuttle 7 in its closed position over the throat 5, as illustrated in Fig. 3.

Whenever hydraulic pressure is supplied through the hose 25 to the cylinder 24, the piston therein is forced downward, thus forcing the connecting rod 28 in a downward direction, as viewed in Fig. 3, and acting through the bracket 29 and pin 30 to swing the shuttle 7 about its pivotal support 8 away from the throat 5, thus releasing the bail from the latter and permitting disconnection of the container.

In other respects, the form of the invention illustrated in Figs. 3 and 4 is the same as that shown in Figs. 1 and 2, as described above, although the spacer bar 18 of the latter is replaced with a pair of spacer bars 35 that are mounted on opposite sides of the body 3 of the hook and extend laterally therefrom in positions to engage the hook bracket 13 to swing the hook forward under the influence of the coiled springs 15.

The invention is shown in Fig. 5 applied to a carriage in which two safety automatic hooks are used, either for high or low dumping. However, a single hook may be employed and frequently is, according to the use thereof desired.

The sequence of operations are illustrated in Figs. 6 to 15. These are the steps employed in picking up a drop

4

bottom container, transporting it to a dumping position, dumping the container, returning it to a point of use, and then disengaging the container from the hook so that it may be set down on the ground.

In Fig. 6, the container is being pulled up the skid faces provided by the bars 2, with the bail B moving toward the hook 3, which is in its forwardly turned position under the influence of the springs 15, the latter being omitted from Figs. 6 to 15 for simplicity of illustration and only the hook itself being shown.

In Fig. 7, the bail B has not only moved into engagement with the inclined lower forward face of the hook 3, but has actually pushed back the body of the hook against the tension of the springs 15 to a point where the bail B is moved over the outer edge of the tip 6, and continuing upward, as in Fig. 8, raises the overlapping end of the shuttle 7. During these movements, the container is being elevated by the hoisting means on the vehicle, but as soon as the bail B has lifted the shuttle 7, which action can be detected by the operator through the clicking sound resulting therefrom, and the bail B clearing the upper edge of the tip 6, the body of the hook 3 will be swung outward under the bail to the position shown in Fig. 9. This is accomplished by the springs 15, as described.

Then, upon releasing the raising movement imparted to the container, the bail B drops into the throat 5 of the hook and the shuttle 7 closes thereover under the action of the spring 19 or 33 and remains in that position during the transportation of the container, as illustrated in Fig. 10.

When it is desired to dump the contents of the container the bail B remains in the position shown in Fig. 10, holding the bail and the body of the container connected therewith in a fixed position with respect to the carriage 1. After the dumping, the container is normally moved to the point of use when it is desired to disengage the container from the carriage.

At such point, the shuttle 7 is withdrawn from over the bail, as illustrated in Fig. 11, either by manipulating the cable 23 or by operating the hydraulic cylinder 24. After thus opening the shuttle 7, the hoisting mechanism can be operated to raise the bail out of the throat 5, as shown in Fig. 12. As soon as the bail has been lifted to a point above the shuttle 7, the latter is released and closes by the action of the spring 19 or 33. It will be noted, however, that the bail has pushed the body of the hook back in the position shown in Fig. 13 as it rides over the forward end of the shuttle, but after clearing the shuttle, the hook swings forward again, as shown in Fig. 15. The bail, in turn, rides down over the inclined upper edge of the shuttle and clears the hook by swinging the latter back and forth under the influence of the bail which rides along in close proximity to the skid bars 2 against which the container bears when an inclined skid frame is used on the carriage.

When the automatic hook is used with a tip-over or other type of container, not involving a drop bottom container, it is evident that some of the steps described above may be omitted.

It will be apparent that the bail can pass up and down over the hook at will, but immediately after the bail enters the hook it cannot get out of the hook accidentally until the shuttle is positively raised to release the bail. Thus, a very positive lock is provided for retention of the bail after it has been caught automatically in the hook. A very safe, but automatic, hook is thus provided for receiving and holding the bail of the container.

The pivotal support 8 for the shuttle 7 being located below the throat 5 assures that the shuttle will remain closed and locked over the bail in the throat against accidental disengagement. Any upward movement of the bail would press against the shuttle in the notches 11, but would have no tendency to swing the shuttle open such as would result if the shuttle had a flat or straight lower edge.

While the invention has been illustrated and described

in certain embodiments, it is recognized that variations and changes may be made therein without departing from the invention as set forth in the claims.

We claim:

1. An automatic hook comprising an upright elongated body having a hook portion thereon adapted to receive a bail therein, a shuttle overlying the hook portion and having a recess in the underside thereof in opposed relation to the hook portion in position for engagement by the bail in said recess, means pivotally connecting the shuttle with the body portion below the hook portion, said shuttle having a lip thereon projecting laterally outside of an upright plane through the outer edge of the hook portion in position for engagement by the bail and having an upper surface inclined upwardly from said lip to deflect the bail away from the hook portion.

2. An automatic hook comprising an upright elongated body having a hook extending laterally therefrom with a throat therein and an upturned lip on the opposite side of the throat from the body, a shuttle having an upper surface extending downwardly over the top of the hook portion and projecting outwardly away from the body an appreciable distance beyond an upright plane through the outer edge of the lip in position for engagement by a bail, said shuttle having a recess in the underside thereof in coacting relation with the throat, and means pivotally mounting the shuttle on the body at a point below the throat.

3. An automatic hook comprising an upright elongated body having a hook extending laterally therefrom with a throat therein and an upturned lip on the opposite side of the throat from the body, a shuttle having an upper surface extending downwardly over the top of the hook portion and projecting outwardly away from the body an appreciable distance beyond an upright plane through the outer edge of the lip in position for engagement by a bail, said shuttle having a recess in the underside thereof in coacting relation with the throat, means pivotally mounting the shuttle on the body at a point below the throat, and resilient means connected with the shuttle normally tending to close the shuttle over the hook portion.

4. An automatic hook comprising an upright elongated body having a hook extending laterally therefrom with a throat therein and an upturned lip on the opposite side of the throat from the body, a shuttle having an upper surface extending downwardly over the top of the hook portion and projecting outwardly away from the body an appreciable distance beyond an upright plane through the outer edge of the lip in position for engagement by a bail, said shuttle having a recess in the underside thereof in coacting relation with the throat, means pivotally mounting the shuttle on the body at a point below the throat, resilient means connected with the shuttle normally tending to close the shuttle over the hook portion, and means connected with the shuttle for moving the shuttle to an open position away from the hook portion.

5. An automatic hook comprising an upright elongated

body having a hook portion on the lower end thereof adapted to receive a bail therein, said hook portion including an upturned lip spaced outwardly from the body with a throat or seat in the hook portion between the lip and the body, means pivotally supporting the body about a transverse axis at a point above the hook portion, a shuttle having an upper surface extending downwardly and laterally from the body overlapping the hook portion and projecting outwardly an appreciable distance beyond the lip in position for engagement by the bail, said shuttle having a recess in the underside thereof in opposed coacting relation with the throat or seat for confining the bail, means pivotally mounting the shuttle on the body at a point below the recess, and means for resiliently closing the shuttle over the hook portion.

6. An automatic hook comprising an upright elongated body having a hook portion on the lower end thereof adapted to receive a bail therein, said hook portion including an upturned lip spaced outwardly from the body with a throat or seat in the hook portion between the lip and the body, means pivotally supporting the body about a transverse axis at a point above the hook portion, a shuttle having an upper surface extending downwardly and laterally from the body overlapping the hook portion and projecting outwardly an appreciable distance beyond the lip in position for engagement by the bail, said shuttle having a recess in the underside thereof in opposed coacting relation with the throat or seat for confining the bail, means pivotally mounting the shuttle on the body at a point below the recess, means for resiliently closing the shuttle over the hook portion, a tab connected with the shuttle, and a cable connected with the tab for moving the shuttle to an open position relative to the hook portion.

7. An automatic hook comprising an upright elongated body having a hook portion on the lower end thereof adapted to receive a bail therein, said hook portion including an upturned lip spaced outwardly from the body with a throat or seat in the hook portion between the lip and the body, means pivotally supporting the body about a transverse axis at a point above the hook portion, a shuttle having an upper surface extending downwardly and laterally from the body overlapping the hook portion and projecting outwardly an appreciable distance beyond the lip in position for engagement by the bail, said shuttle having a recess in the underside thereof in opposed coacting relation with the throat or seat for confining the bail, means pivotally mounting the shuttle on the body at a point below the recess, means for resiliently closing the shuttle over the hook portion, and a power device connected with the shuttle for moving the shuttle to an open position with respect to the hook portion.

References Cited in the file of this patent

UNITED STATES PATENTS

2,445,106	Dempster	July 13, 1948
2,729,496	Jones	Jan. 3, 1956