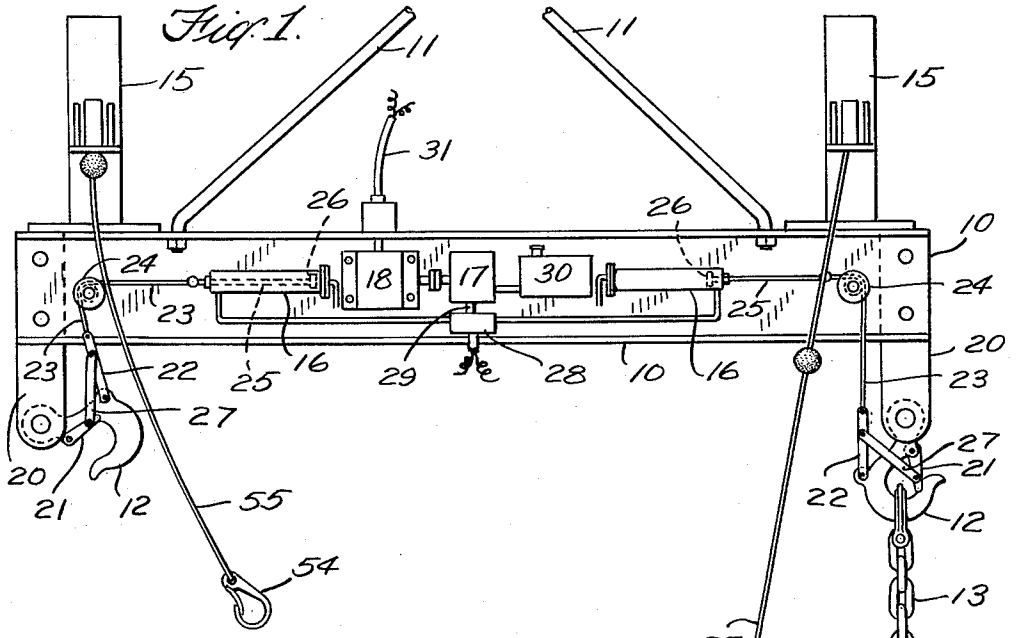
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CHAIN HOIST

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Fig. 1.



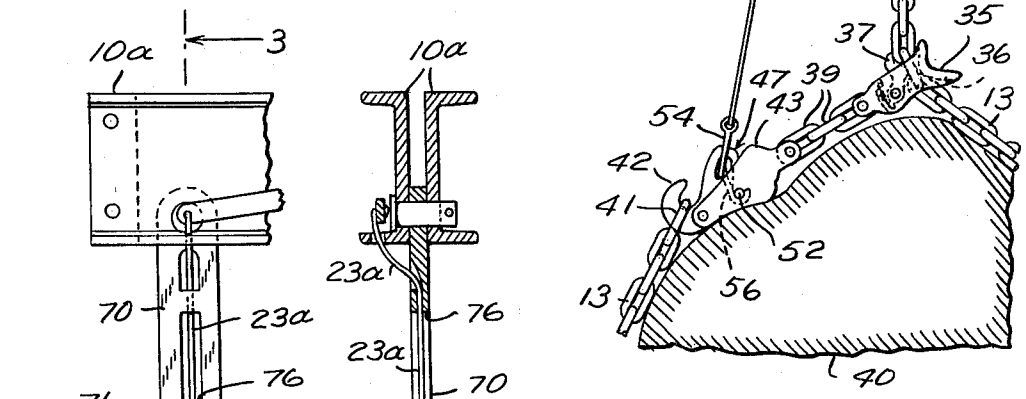


Fig. 2.

Fig. 3.

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Fig. 4.

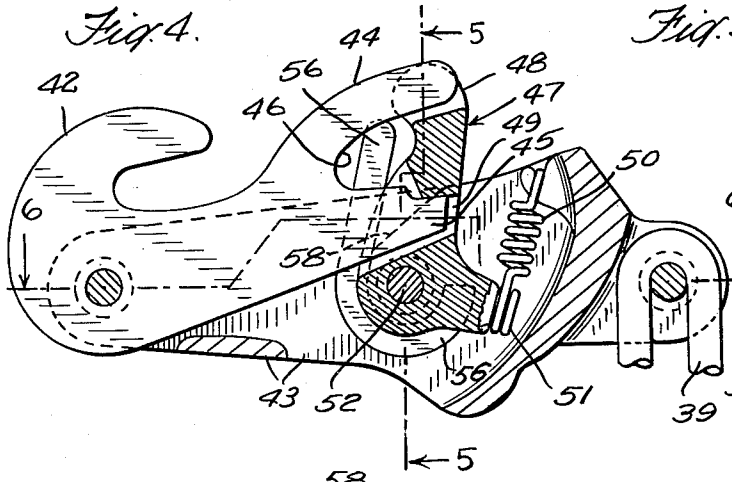
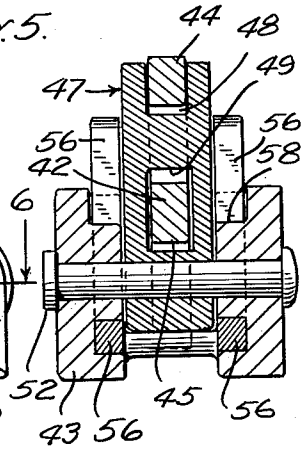


Fig. 5.



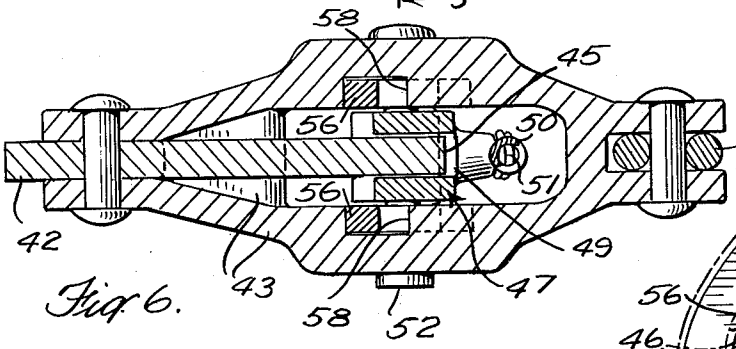


Fig. 6.

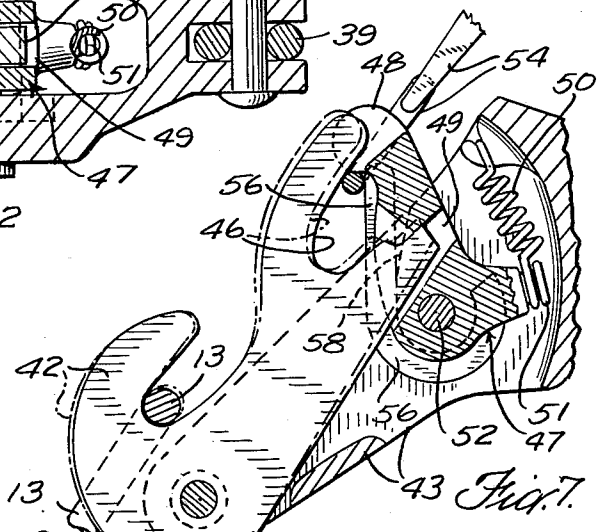


Fig. 7.

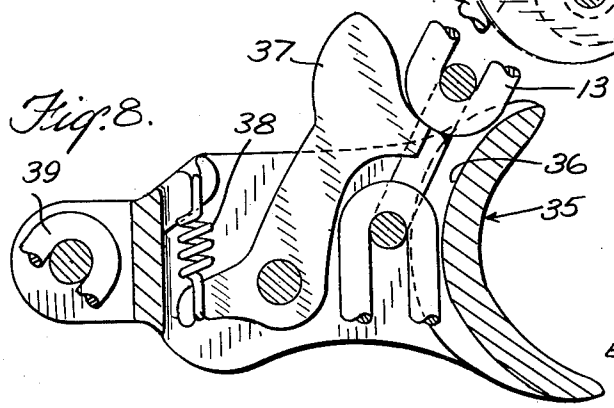


Fig. 8.

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Fig. 9.

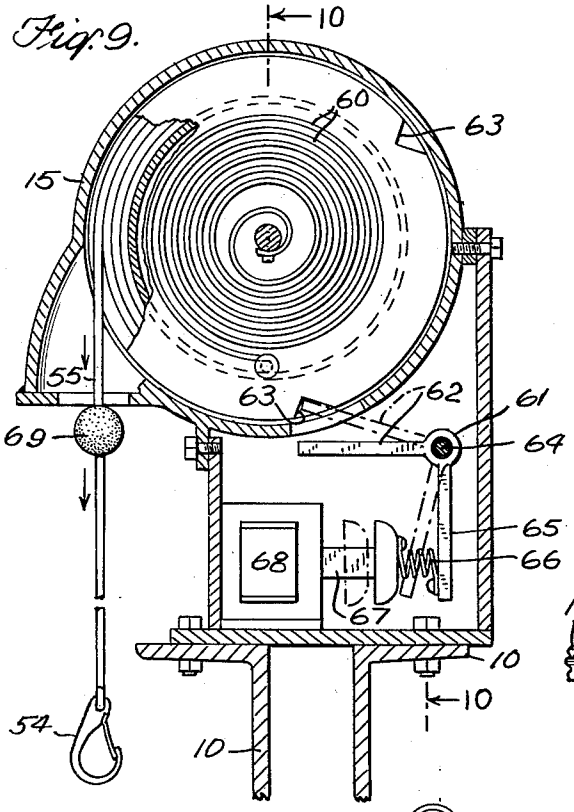


Fig. 10.

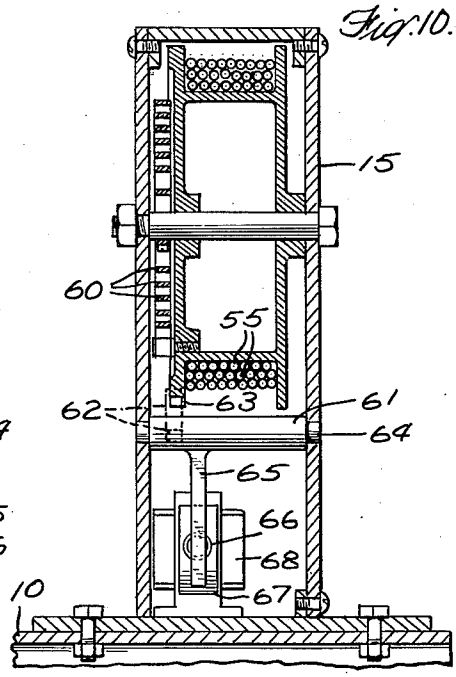
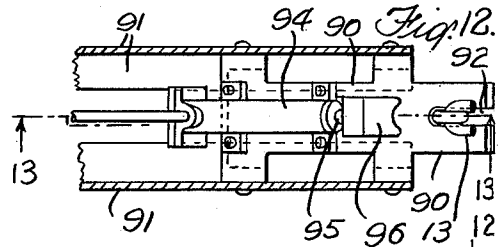


Fig. 12.



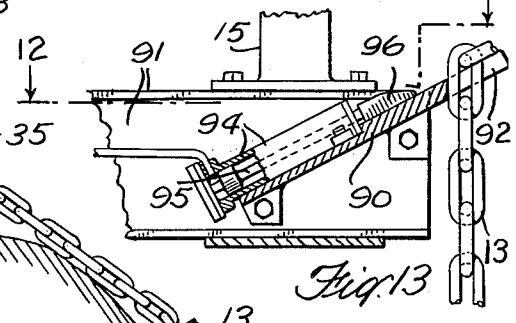


Fig. 11.

Fig. 13

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CHAIN HOIST

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Filed June 11, 1958, Ser. No. 741,295
5 Claims. (Cl. 294—75)

This invention relates to chain hoists of the type used for handling sugar cane or the like and has for an object to provide a hoist of the above type having novel and improved characteristics.

Another object is to provide, in a hoist of the above type, novel and improved trip mechanism adapted to permit the operator of the hoist to release the load from a remote point.

Another object is to provide a remote controlled chain release for dropping the chains from the hoist.

Another object is to provide a safety trip constructed and arranged to prevent accidental actuation of the trip mechanism.

Other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

In accordance with the present invention one or more sling chains are attached to hooks depending from a spreader bar attached to the hoist. The hooks are provided with trip devices for dropping the chain when desired. This trip device is connected to be actuated by a remote controlled fluid pressure device mounted on the spreader bar.

The sling includes a frame having a hook for carrying the sling end of the chain and a guide to hold a chain loop around the load to be lifted. Trip means is provided for the hook which is adapted to be actuated by a trip line carried on a reel on the spreader bar and having remote controlled lock means to cause the reel to apply tension to the line for tripping the hook when the load is to be released. The trip line lock is adapted to be actuated from the hoist operators cabin so that other attendants are not required for releasing the load. This also avoids the possibility of injury to an attendant who would otherwise be required to stand in a position to trip the hook manually.

A safety latch is also provided to prevent the trip line from releasing the hook prematurely. This safety latch may take the form of a ring or hook attached to the frame or to the chain and releasable in response to a predetermined pull on the trip cord, or a resilient member associated with the trip device which is adapted to resist the pull of the trip line until the pull exceeds a predetermined value.

The specific nature of the invention will be better understood from the following description, taken in connection with the accompanying drawings in which certain embodiments have been set forth for purposes of illustration.

In the drawings:

FIG. 1 is a side elevation of a hoisting apparatus embodying the invention;

FIG. 2 is a detail view of a further embodiment of the hook mechanism;

FIG. 3 is a vertical section taken on the line 3—3 of FIG. 2;

FIG. 4 is a longitudinal vertical section through a safety latch hook embodying the invention;

FIG. 5 is a transverse vertical section taken on the line 5—5 of FIG. 4;

FIG. 6 is a transverse horizontal section taken on the line 6—6 of FIG. 4;

FIG. 7 is a detail view of the hook in trip position;

FIG. 8 is a vertical longitudinal section showing the guide unit;

FIG. 9 is a vertical transverse section through the reel;

FIG. 10 is a vertical section taken on the line 10—10 of FIG. 9;

FIG. 11 is a detail of a further embodiment of the safety trip mechanism;

FIG.12 is a horizontal section taken on the line 12—12 of FIG. 13 illustrating a further embodiment of the chain release mechanism; and

FIG. 13 is a vertical longitudinal section taken on the line 13—13 of FIG. 12.

Referring to the drawings more in detail the invention is shown in FIG. 1 as embodying a spreader bar 10 which is connected to a hoist cable by rods or cables 11 and which carries a pair of sling chain hooks 12 on which sling chains 13 are carried. The bar 10 also carries trip line reels 15, fluid pressure cylinders 16 for actuating the sling chain release mechanisms, a pump 17 for supplying fluid under pressure to the cylinders 16 and a motor 18 for actuating the pump 17, and a reservoir 30 for the pressure fluid.

Each hook 12 is pivoted to a bracket 20 attached to the spreader bar 10 and carries a latch 21 adapted to prevent the chain from accidentally falling from the hook.

A link 22 is pivoted to the hook 12 and is attached to a release line 23 which passes over a guide pulley 24 on the bar 10 and is connected to a piston rod 25 of a piston 26 sliding in the cylinder 16.

A link 27 is connected between the latch 21 and the link 22 to retract the latch 21 when the link 22 is actuated.

Normally a link or end ring of the chain 13 is carried by the hook 12 and is secured by the latch 21 as shown at the right in FIG. 1. When the chain is to be released, for example, after the load has been dropped, fluid pressure is applied to the cylinder 16 to actuate the piston 26 for retracting the line 23, thereby pulling upwardly on the link 22 to pivot the hook 12 to the position shown at the left in FIG. 1. At the same time the latch 21 is retracted by the link 27 to release the chain 13 and allow the chain to drop from the retracted hook 12.

The fluid pressure to the cylinder 16 is controlled from the hoist operator's cabin or other remote point by an electrically controlled valve 28 in pressure line 29 leading from the pump 17 to each cylinder 16. The pump 17 may be controlled automatically to maintain the required pressure in the line 29 as by a pressure controlled switch, not shown, in the energizing circuit of the motor 18. Pressure fluid for operating the pistons is derived from the reservoir 30. A cable 31 supplies power to actuate the motor 18 and the various remote controlled valves 28. Obviously the valves 28 may be omitted in which event both hooks are tripped in unison when power is supplied to the motor 18 which may be controlled from the operator's cabin or a manually operated lever (not shown) may be connected to actuate the line 23 in place of or in addition to the power control above described.

The chain 13 passes through a guide 35 (FIGS. 1 and 8) having a curved section 36 over which the chain can slide and having a pawl 37 pressed by a spring 38 into engagement with the chain on the member 36. The pawl 37 is shaped to be automatically retracted when the chain is pulled through the guide 35 in a direction to grip the load but to clamp the chain against reverse movement.

The chain 13 after passing through the guide 35 passes around a load 40. The end ring 41 of the chain is hooked over a hook 42 (FIGS. 1 and 4 to 7) which is pivoted to a frame 43. The frame 43 is connected to the guide 35 by links 39.

The hook is formed with a bifurcated end having fingers 44 and 45 forming a slot 46 therebetween. A latch 47 is pivoted by a point 52 to the frame 43 and is formed with slots 48 and 49 adapted to receive the fingers 44 and 45 respectively, of the hook 42 so as to close the end of

the slot 46, when the latch 47 is in latching position as shown in FIG. 4. A spring 50 engaging an arm 51 on the latch 47 holds the latch in this position.

A snap hook 54 attached to a trip line 55 is adapted to be snapped over the finger 45 into the slot 46, with the hook 42 in load carrying position. When the line 55 is pulled the snap hook 54 engages the latch 47 and retracts the same from the fingers 44 and 45 of the hook 42, thereby allowing the hook 42 to pivot and drop the end of the chain 13 for releasing the load.

In order to prevent accidental tripping of the latch 47 a pair of spring arms 56 are held in the frame 43. These arms 56 extend partly around the pivot 52 and bear against a cam surface 58 formed in the frame 43 which is shaped to limit the bending movement of the arms 56. The arms 56 extend upwardly in front of the latch 47 and across the slot 46 so that the hook 54 cannot engage the latch 47 until the arms 56 have been flexed. The arms are made sufficiently stiff to prevent accidental tripping of the latch but not so stiff but that a substantial predetermined pull on the line 55 will flex the arms and permit the hook 54 to engage and trip the latch 47.

The line 55 is reeled upon the reel 15 on the bar 10 which is spring loaded to keep the line 55 under tension as the chain 13 is raised or lowered. The reel 15 (FIGS. 9 and 10) is provided with a spring 60 for this purpose and with a latching mechanism comprising a solenoid operated latch 61 comprising a latch arm 62 which is adapted to engage notches 63 in the reel which are shaped to lock the reel against rotation in the direction to unwind the line 55 but to permit rotation of the reel in the winding direction. The latch arm 62 is pivoted at 64 and carries an operating arm 65 connected by a tension spring 66 to the plunger 67 of a solenoid 68. The solenoid 68 is energized by a suitable circuit not shown, and is connected to be operated from the operator's cabin. The arm 62 is normally retracted to permit free operation of the reel 15. When the solenoid 68 is energized the arm 62 is brought into latching engagement with a notch 63 of the reel 15 to lock the reel against rotation.

When the load is being carried by the chain as at the right in FIG. 1 the spring 60 causes the reel 15 to maintain the trip line 55 tight but does not exert a tripping force. When the load is lowered, into place as on a truck or on the ground the bar 10 is further lowered by the hoist operator to an extent to produce slack in the chain 13. The spring reel nevertheless keeps the trip line 55 tight. The operator now actuates the solenoid 68 to lock the reel 15 and prevent further lengths of trip line from being unreeled.

The operator then raises the bar 10. Since the reel 15 is locked the line 55 is pulled upward by the upward motion of the bar 10 with a force sufficient to flex the safety arms 56 and trip the latch 47 thereby allowing the hook 42 to pivot to load releasing position. The bar 10 is then raised to pull the end of the chain out from the load in the usual manner. When the solenoid 68 is released the reel 15 reels in line 55 which is now free, until a stop 69 is reached.

FIGS. 2 and 3 show a modified form of hook and chain release mechanism.

Referring to these figures, an arm 70 carrying double hooks 71 and 72 is pivoted to the end of a spreader bar 10*a*, similar to the spreader bar 10 above described. The hooks 71 and 72 are adapted to engage links of hoisting chains 13 or end rings of such chains as in the case of the hooks 12 described in connection with FIG. 1.

For releasing the chains from the hooks 71 and 72 cam plates 74 are provided carrying a pin 75 which is slidable vertically in a slot 76 in the arm 70. These cam plates 74 are attached to a trip line 23*a* corresponding to the trip line 23 of FIG. 1 and connected to be actuated manually or automatically as above described.

This double hook is adapted to carry two hoisting chains which may pass around the same load or separate loads as desired. Both chains are automatically released by actuation of the trip line 23*a* when the operator desires to drop the chains.

FIG. 11 illustrates an additional safety latch which may be used in connection with the hook releasing mechanism illustrated in FIGS. 4 to 7 to supplement the action of the spring arms 56. In some instances, however, the spring arms 56 may be omitted when the latch mechanism of FIG. 11 is used provided the additional safety factor is not necessary.

Referring now to FIG. 11 the trip line 55*a* is similar to the trip line 55 above described and is actuated in the same manner. The trip line 55*a* is attached to a latch hook 80 which in turn is hooked into a spring member 81 comprising a loop portion 82 and a pair of spring arms 83 which are normally held closed by spring action, but are adapted to be flexed sufficiently to allow the passage of the latch hook 80 when sufficient force is applied to the line 55*a*. The loop portion 82 of the spring member 81 is connected by a link 85 to a link of the chain 13 so that the chain 13 is caused to resist the pull of the trip line 55*a* until the pull becomes sufficiently strong to flex the arms 83 of the spring member 81 and thereby release the latch hook 80. A latch hook 54*a*, similar to the hook 54 above described, is connected to the line 55*a* by means of a line 86 which is normally slack, as shown in FIG. 11, so as not to exert a pull on the hook 54*a*. Hence there will be no tripping force exerted until sufficient tension has been applied to the line 55*a* to first release the latch hook 80. A tension is then applied through the line 86 to the hook 54*a* which is connected to trip the latch member 47 as above described.

FIGS. 12 and 13 illustrate a modified type of chain releases. In these figures the hook 12 of FIG. 1 is replaced by an inclined plate 90 disposed between opposed channel members 91 forming a spreader bar 10 above described.

The plate 90 is provided at its end with a slot 92 which is adapted to receive the link of the hoist chain 13 for securing the same.

For removing the chain from the slot 92 a fluid pressure cylinder 94 is provided which is carried on the inclined plate and is provided with a piston rod 95 having a head 96 which is adapted to bear against the chain 13 and push the chain out of the slot 92 when the piston rod is extended. The cylinder 94 is connected to be actuated by fluid pressure in a manner similar to the cylinders 16 described in connection with FIG. 1.

Although certain specific embodiments of the invention have been shown and described for purposes of illustration, it is to be understood that the invention may be adapted for various uses and may be embodied in various forms as will be apparent to a person skilled in the art.

What is claimed is:

1. A sling hoist with remote controlled trip, comprising a bar adapted to be suspended from a hoisting cable, means on said bar to receive a sling chain, a hook and guide assembly including a hook having a pivotally mounted load engaging portion which is adapted to receive the end of the sling chain and to maintain a loop of said chain around a suspended load, a retractable hook latch connected to hold said hook in load carrying position and when retracted releasing said hook to pivot to chain releasing position, a pull member engageable with said latch to retract the same, a trip line connected to said pull member, a reel carrying said trip line and mounted on said bar, spring means normally actuating said reel in a direction to hold said trip line under tension as the sling chain moves relative to said bar, a latch member adapted to latch said reel against rotation in the direction to unwind said line and remote controlled means to actuate said latch member to latch said reel whereby lifting of said bar and reel relative to said hook and guide assembly causes said trip line to exert a pull on said pull

member for retracting said hook latch and releasing the load.

2. A device as set forth in claim 1 in which said reel latch comprises a solenoid operated latch arm adapted to engage notches in said reel and connected to be actuated from a remote point.

3. A device as set forth in claim 1 in which a spring member comprising a pair of spring arms extending parallel to said hook latch is disposed in advance of said hook latch in a position to receive the pull of said pull member.

4. A device as set forth in claim 1 in which said hook carries a bifurcated arm having a pair of fingers forming a slot therebetween, said hook latch is provided with slots receiving said fingers to close the end of said first slot, and said pull member is disposed in said last mentioned slot in a position to engage and retract said latch.

5. A device as set forth in claim 1 in which a releasable link is attached to said chain and to said trip line to take the pull of said trip line until sufficient force is applied to release said link, thereby preventing the pull of said line from being applied to said pull member while said link is engaged.

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