May 1, 1928. 1,667,957

E. E. STEVENSON

HOISTING HOOK

Filed Oct. 6. 1926 3 Sheets-Sheet 1

Fig. 1.

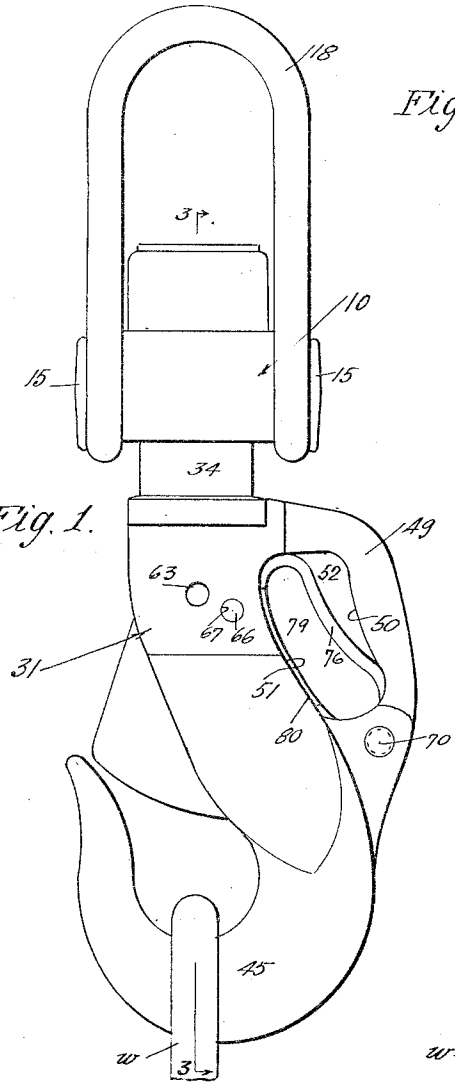


Fig. 2.

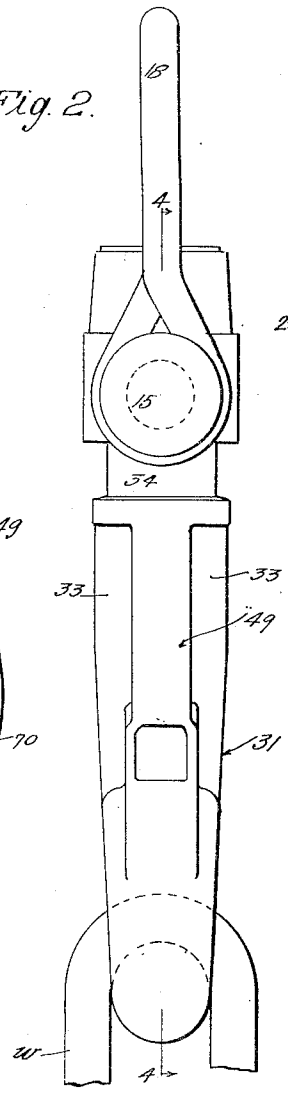
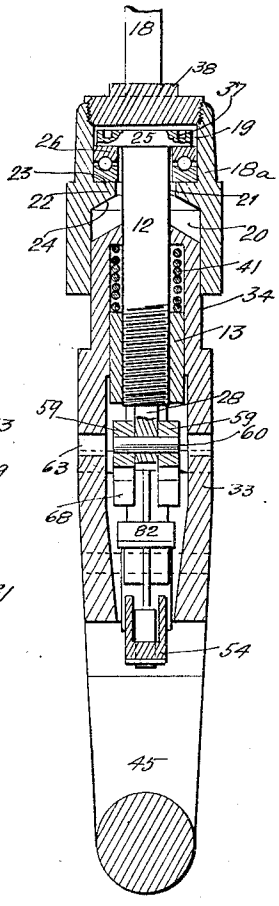


Fig. 3.



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HOISTING HOOK

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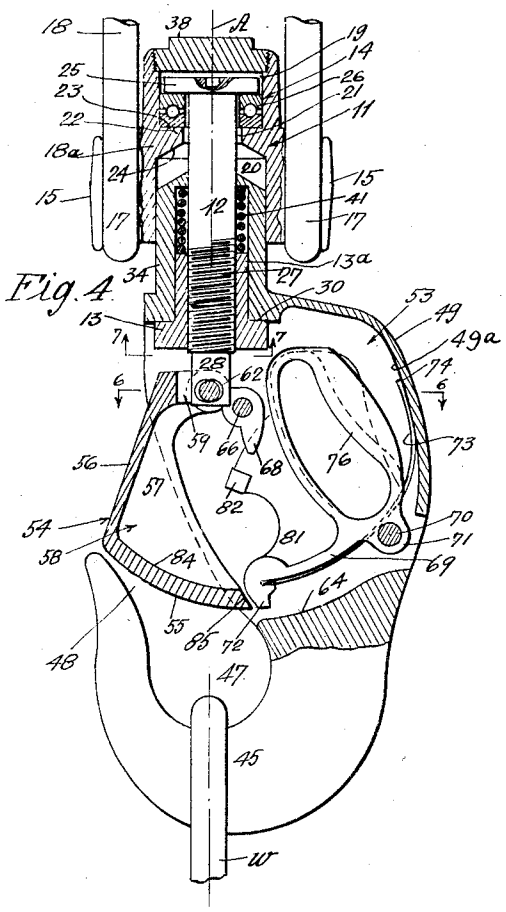


Fig. 4.

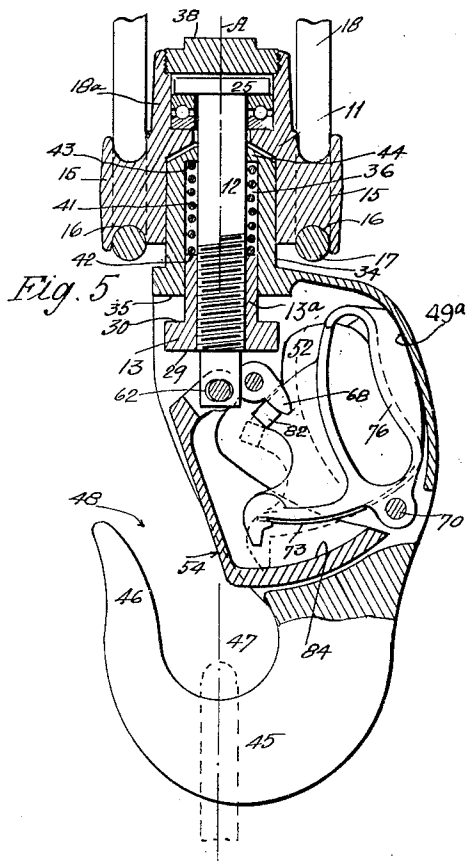


Fig. 5.

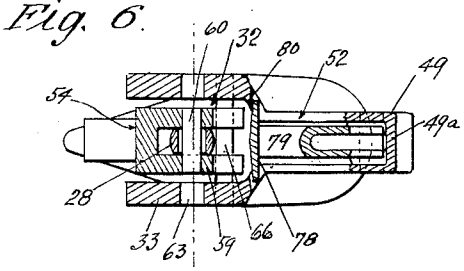


Fig. 6.

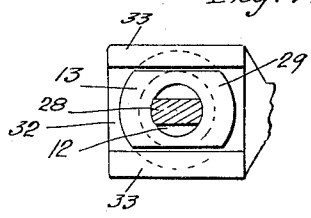


Fig. 7.

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HOISTING HOOK

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Fig. 8.

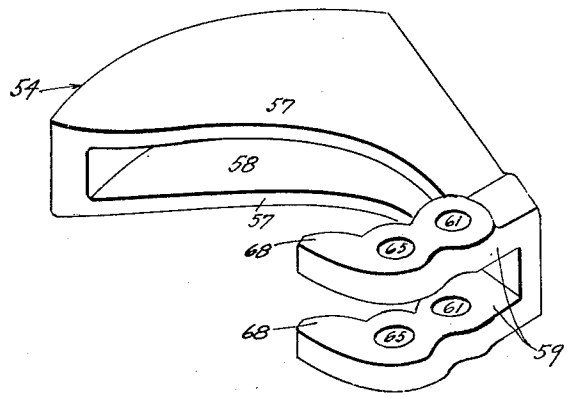
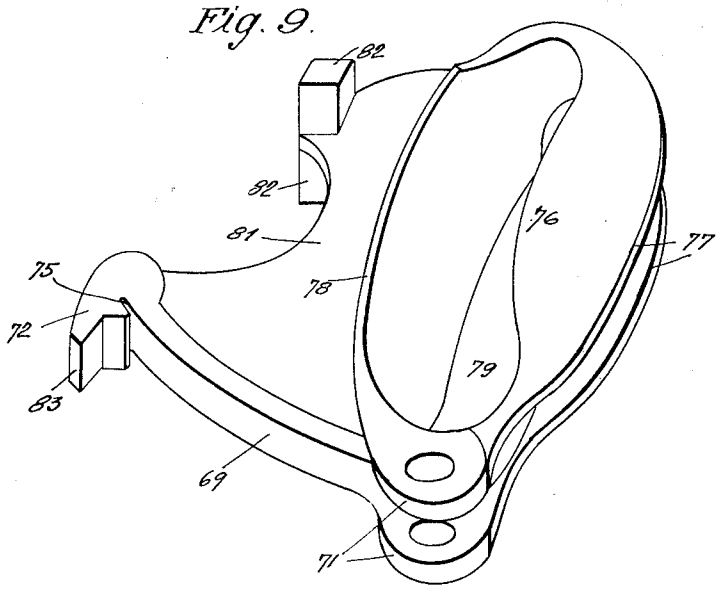


Fig. 9.



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Patented May 1, 1928. 1,667,957

UNITED STATES PATENT OFFICE.

EDWARD E. STEVENSON, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO D & B PUMP AND SUPPLY COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

HOISTING HOOK.

Application filed October 6, 1926. Serial No. 139,785.

This invention has to do generally with hoisting hooks and is more particularly concerned with "safety" hooks, that is, hooks having means for closing their throats after they have been applied to work. The invention is further characterized as being a safety hook of the automatically locking type, whereby the draft or imposition of load on the hook operates to project the throat-closing means into operative position and to hold it in that position as long as the load is applied.

While my invention may be embodied in a hook employed for any hoisting purpose, it is especially well adapted to embodiment in hooks utilized in handling pipe or sucker rod strings during oil well operations, and I will therefore describe my invention as applied to a hook intended for this particular use, though this is in no way to be considered as limitative.

During the installation or pulling of sucker rods, especially where the well is of any considerable depth, repeated applications and disengagement of the hook to the pipe or rod lengths is necessary, and it is essential that the application and disengagement operations consume as little time and involve as little labor as possible, and yet it is just as essential that there be no likelihood of accidental disengagement of the hook from the work, as is well understood to those skilled in the art.

It is therefore the general object of my invention to provide a hook which is of very high efficiency, especially when utilized in this particular field, in that it provides for easy, quick engagement with and disengagement from the work, and yet is positively and surely locked against accidental opening such as might otherwise occur due to the sudden relieving of the load or lateral displacement thereof, for instance.

In contradistinction to the usual automatically locking hooks wherein there is a movable member carried by the hook body, engageable by the work and operated by virtue of said engagement to swing the latch to closed position, I provide for the movement bodily of the bill end of the hook with respect to the supporting structure, this bodily movement as caused by the application of the load to said bill end operating to swing the latch to closed position and hold it therein. In order that the latch may be opened, it is necessasry that reverse bodily movement of the hook occur, and such is not possible unless the load be relieved therefrom.

As a further feature, in the preferred form of my invention, as soon as the load is relieved, the bill end or hook body automatically moves bodily in a direction to cause latch opening movement, though this provision is not limitative on the invention, as will be made apparent. However, in order positively to insure that the latch may not be swung accidentally to open position in the event that the load be intentionally or unintentionally relieved before hook disengagement is desired, I prefer to provide a releasable locking member so associated with the latch that the latter is held positively against movement to inoperative position. It then requires manual release of the locking member before the means for moving the hook body in a manner to swing the latch open becomes effective.

In certain situations I prefer to provide means whereby the automatically acting means may be manually assisted in moving the hook bodily in a manner to swing the latch open, and in other situations I desire to dispense with the automatic opening feature entirely. In either of these events I provide means for shifting the body member, the handle or lever by which the means is operated preferably being disposed in such a manner that the grip of the operator's hand when he grasps the hook handle in a manner to swing it clear of the work, naturally actuates said shifting means, thus calling for very little conscious effort. The same is true when the hook is being swung into work applying position, that is, (in the absence of the means for normally holding the hook open, as in my preferred form) as the operator grasps the hook handle to swing it toward the work, his naturally tightening grip serves to actuate the mechanism in a manner to open the hook. However, it will be understood my invention is not limited to this precise relationship between the hook handle and the actuating member of the opening mechanism.

As a still further feature, where it is desired that manual force be used as either the sole means for opening the hook or to

aid the automatically acting means, it is preferable, though not necessary, that said means be moved to operative position by the handle used to retract the latch-locking member, it following that initial movement of said handle frees the locking member and continued movement of the handle actuates or aids in actuating the hook-opening or latch-retracting mechanism. Thus, as the operator grips the handle of the hook to disengage it from work, he naturally includes the actuating handle in his grasp and as he naturally squeezes them together he first unlocks the latch and then retracts the latch to open the hook.

Where means is provided for automatically opening the hook after the load is relieved and the latch-lock is released, the same means serves normally to hold the hook in open condition. However, as soon as the load is applied thereto, the latch swings to closed position and the latch-lock moved to locking position, it therefore requiring release of said lock before the work can be removed from the hook, even though the load be somewhat relieved before an attempt is made to free it from the hook.

I have also provided an improved type of swivel joint in the hook-supporting structure, whereby the hook is free to swivel either before or after the imposition of load.

The hook, throughout, is of very sturdy, compact, and simple construction, these characteristics being of great importance, especially in view of the severe service conditions to which hooks of this character are exposed.

Other objects and features of novelty will be made apparent in the following detailed specification, reference being had to the accompanying drawings in which:

Fig. 1 is a side elevation of a hook embodying my invention and shown in closed condition;

Fig. 2 is a view of Fig. 1 as viewed from the right thereof;

Fig. 3 is a section on line 3—3 of Fig. 1;

Fig. 4 is a section, with parts shown in elevation, on line 4—4 of Fig. 2, the hook being shown in closed condition:

Fig. 5 is a view similar to Fig. 4, but showing the hook in open condition;

Fig. 6 is a section on line 6—6 of Fig. 4;

Fig. 7 is a fragmentary section on line 7—7 of Fig. 4;

Fig. 8 is a perspective of the throat-closing latch; and

Fig. 9 is a perspective of the unitary latch-lock and latch-retracting member.

I have shown a supporting structure 10 which includes a body member 11, pendant pin 12, nut 13 and a swivel joint generally indicated at 14 between body member 11 and pin 12 whereby said pin and parts supported thereby are capable of axial rotation.

Body member 11 has laterally extending trunnions 15 which preferably have annular grooves 16 adapted to take eye portions 17 of bail 18, the latter providing means by which detachable connection is made to the hoisting tackle.

Body member 11 also has a tubular axial hub 18^a, said hub having upper and lower bores 19 and 20, respectively, of substantially equal diameters and an intermediate bore 21 of relatively small diameter: said smaller bore being defined by annular flange 22 which provides an upwardly facing annular shoulder 23 and a downwardly facing annular and, preferably, conical shoulder 24. In order properly to balance the structure, the longitudinal axis A of pin 12, which axis may also be considered as the line of draft, is midway between trunnions 15 and intersects the common axis of said trunnions at substantially right angles.

Interposed between shoulder 23 and pin-head 25 is an anti-friction bearing 26 which provides for free rotation of pin 12 and parts supported thereby, whether or not a longitudinally directed load be applied to said pin or parts.

The pin 12 is threaded at 27 near its lower end to take nut 13, and terminates in a portion 28 which extends below nut 13 and preferably is of substantially rectangular cross-section, as shown in Fig. 7. Nut 13 has an enlarged head 29 which provides an upwardly facing shoulder 30, and is preferably elongated or flattened as shown in Fig. 7.

The hook body generally indicated at 31 is slotted through to provide a latch-receiving slot compartment 32, the side walls defining said slot being indicated at 33. The upper end of the body portion of the hook is provided with a tubular plunger or shank 34 which has sliding fit within bore 20, the movement of said plunger in an upward direction being limited by shoulder 24, and its extent of movement in a downward direction being determined by shoulder 30, which the downwardly facing shoulder 35 of the hook body or shank is adapted to engage when said body is in its lowermost position.

Preferably, though not necessarily, the width of slot 32 is such as just to take nut head 29, so said nut is held from rotation with respect to the hook body, and since, as will hereinafter be made apparent, pin 12 is also held from rotation with respect to said body when the hook is finally assembled, the nut and pin are held against relative rotation and there is therefore no possibility of accidental longitudinal movement between or relative displacement of said nut and pin.

In assembling the device, the portion 13^a of nut 13 is first slipped from beneath into position within the bore 36 of shank 34, said

shank is then thrust upwardly into bore 20, and pin 12 is pushed downwardly through bores 19, 21, 20, 36, and threaded through the nut (a tool such as a socket wrench being applied to head sockets 37, for this purpose) until there is a predetermined distance between shoulders 24 and 30, this distance determining the stroke or extent of longitudinal movement of the shank and hook body. It is apparent that with head 25 engaging with bearing 26, the distance between shoulders 24 and 30 may be varied by threading nut 13 along the pin, or vice-versa, to vary the length of the stroke of the hook body. A retention plug or cap 38 is preferably threaded into bore 19 above head 25.

In the preferred embodiment of my invention, I interpose a compression spring 41 in the bore 36 between upwardly facing shoulder 42 at the end of nut 13 and the downwardly facing shoulder 43 provided across said bore by the annular flange 44 at the end of the shank. It will be seen that at such times as pin 12 is free to rotate with respect to nut 13 (of course, the hook is not fully assembled at such times) the pin may be rotated to thread the nut up or down therealong and thereby regulate the effective strength of the spring, though the stroke of the body member is varied at the same time.

As will hereinafter be made apparent, my invention, considered in its broader aspects, is not limited to a structure wherein spring 41 or its equivalent is employed, for the hook is operative either with or without this spring, but where the spring is used, it is of such effective strength as normally to hold the hook body and plunger in elevated position (Fig. 5) though it yields immediately upon the imposition of load to the hook body and allows the descension thereof to bring shoulder 35 into contact with shoulder 30, the load imposed on the hook thereby being transmitted through head 29, pin 12, bearing 26 and flange 22 to the body member 11 of the supporting structure 10. In other words, spring 41 is not effective to support the load applied to the hook but is merely effective to yieldably hold said hook in elevated, open position when no load is applied to said hook.

The bill 45 preferably has an elongated tip 46, the work-taking aperture being indicated at 47 and the throat or way leading to said aperture being indicated at 48.

Hook handle or grip 49 is preferably integral with the body portion of the hook, said handle being in the form of a bar of channel cross section joined at top and bottom to the body member. The forward edges 50 of the channel flanges and the opposed edges 51 of body member walls 33 define a hand hole 52, it being noted that, in effect, slot 32 and the narrower channel 53 of the hand grip 49 open to hole 52 centrally and to one another at their ends, as clearly shown in Figs. 4 and 5.

Adapted to swing pivotally through slot 32 from the projected or hook-closing position of Fig. 4 to the retracted or open position of Fig. 5, is a latch member generally designated at 54, the member being adapted to close throat 48 when it is in projected position. As will be noted, member 54 is an arm of substantially L-shape (Fig. 4) the arcuate, throat closing portion 55 extending angularly from the straight arm portion 56, said portions 55 and 56 being connected by the spaced, strengthening flanges or webs 57 which are substantially of triangular shape. There is thus defined a recess 58 which opens towards slot 32.

At the upper end of arm portion 56 are the spaced angularly extending ears or arms 59 into which flanges 57 merge, said ears being spaced to take terminal 28 of pin 12 between them. A transversely extending pivot pin 60 extends through ear apertures 61 and a horizontally elongated aperture 62 in terminal 28, said pivot pin preferably having tight fit in the ears and being thrust to place during assembly of the hook through over-size apertures 63 in side walls 33.

Member 54 is thus mounted for pivotal movement about pin 60, arm portion 55 preferably being struck about said pin as a center, as is also wall 64 of slot 32. The latch, when in the extended or projected position of Fig. 4, is so located that arm portion 55 effectively closes throat 48, and when swung in a counterclockwise direction from the position of Fig. 4 to that of Fig. 5, it lies within slot 32, arm portion 55 then being cleared from the throat.

Ears 59 extend beyond apertures 61 and are apertured at 65 to take a pivot pin 66 which extends between and is terminally held at 67 in the side walls 33 of hook body 31. While pivot pin 60 lies substantially in the line of draft of axis a, pin 66 is offset with respect to said line of draft or axis (or, out of vertical alinement with pin 60) throughout vertical or bodily movement of the hook body, it being noted that pin 66 moves in a path substantially parallel to said axis. The lost motion connection between pin 60 and terminal 28 provided by the elongation of aperture 62 allows the necessary horizontal component of movement of ears 59 during pivotal movement of ears 59 or member 54. Of course, the requisite lost motion may be supplied at any other suitable point without departing from the spirit and scope of the invention.

Integral with and at an angle to ears 59 are cam lugs or noses 68. While these noses are not essential to the invention in certain of its embodiments, they are requisite in other embodiments, but I will delay dis-

cussion of their function until a later point in the specification.

It will be seen that by virtue of the pivotal connection of member 54 with the stationary supporting structure and the movable hook body and the vertical disalinement of one of the pivot connections with respect to the other, relative longitudinal movement between hook member and supporting structure serves to swing the latch member about pin 60 to and from closing position. Thus, downward vertical movement of the hook member serves to swing the latch towards its closing or projected position and upward vertical movement of said hook member serves to retract the latch or swing it out of throat 48 into slot 32. It thus follows, assuming the hook be open, as in Fig. 5, and that a load be applied to bill 45, that said load over-powers spring 41, and the consequent downward movement of the hook body serves to swing the latch into the closed position of Fig. 4 and as long as the load is applied to resist subsequent opening movement thereof.

However, it is desirable that positive locking means be provided for holding the latch against accidental retraction, especially in the event the load is suddenly relieved at a time when disengagement of the hook from the work is not desired. For this purpose I have provided a locking arm 69 pivotally mounted on pin 70 and extending from slot 32 into the channel of handle 49. At one end, arm 69 carries spaced ears 71 whereby pivotal connection is made to pin 70, and at the other end carries a locking nose or dog 72 which is of a thickness to be taken within recess 58: the latch and arm 69 being adapted to swing pivotally into and out of telescopic relation with one another as shown in Figs. 4 and 5. Normally tending to rotate arm 69 in a counter-clockwise direction, as viewed in Fig. 4, and hence into locking position ahead of arm 54, is a spring 73 which extends between ears 71, said spring bearing at one end 74 against the web 49^a of handle 49, and being entered at its other end in a slot 75 in arm 69.

As a means for swinging arm 69 against the action of spring 73 and hence retracting locking nose 72 from its position in front of locking arm 55, I provide a handle or grip 76 having spaced flanges 77 adapted to receive between them the spring 73 and being adapted to engage web 49^a to limit the clockwise or retractive movement of arm 69. Grip 76 is accessible through hand-hole 52 and is movable towards web 49^a against the action of spring 73. A hand-guard flange 78 extends from handle 76 but in spaced relation thereto, and, with said handle defines hand-hole 79 which is accessible through hand-hole 52. This guard flange is adapted to engage the defining walls 80 of hand-hold 52, (Fig. 6) to limit the counterclockwise or spring-urged movement of arm 69.

Under certain conditions, it is desirable that the hook body be moved upwardly to open it either solely by manually operated means or, where such upward movement is automatically accomplished upon relief of the load and unlocking of the latch, that the automatically acting means be aided by manually operated means, it being understood that in either case the manually operated means is preferably held inoperative until the latch-locking nose 72, or its equivalent, has been retracted or cleared from the path of latch 54.

While this is not essential to the invention, considered in its broader aspects, it is convenient that the manually operated means for raising the hook and hence swinging the latch to retracted position be actuated by the member which is employed for retracting the latch lock, it then being possible by a continuous movement of said unitary actuating member, first, to unlock the latch, and then to shift the hook in a latch-opening direction. To this end I have provided a web 81 between flange 78 and arm 69, and projecting from opposite sides of this web are the actuating or cam lugs 82. Web 81 is adapted to extend between noses 68, while lugs 82 project beyond said web sufficiently to be in line with said noses. However, with the latch in projected or locking position (Fig. 4) lugs 82 are appreciably spaced from noses 68 so handle 76 may be actuated to retract or clear nose 72 from the path of arm 54 before lugs 82 engage noses 68. Continued movement of handle 76 after lugs 82 engage noses 68 acts to swing latch 54 to a retracted position, thus raising the hook body, or this movement may be considered as raising the hook body and thereby swinging the latch to retracted position. In the absence of spring 41 handle 76 may thus be depended upon solely for lifting and opening the hook, and, where the spring is used, it may be actuated to aid said spring in its hook lifting and opening action.

It will be noted that handle 76 is naturally and easily swung in a clockwise direction to unlock the latch and, under certain conditions, to open the hook by the natural action of the operator as he takes grips 49 and 76 in his grasp to swing the hook towards or away from work W, grips 76 and 49 being, in effect, squeezed together naturally as the operator takes firm hold. It will also be noted that handle flanges 77 close those portions of openings 52 which extend between the handle 76 and the forward edges of the channel flanges of handle or grip 49 when arm 69 is in locking position, so there is no danger of an operator's hand or extraneous objects being thrust into such openings.

In describing the operation of the hook, it will first be assumed that spring 41 is in use and is approximately of such strength that it just holds the hook body in the elevated position of Fig. 5, this position being considered normal when the spring is used, it being seen that latch 54 is held retracted and throat 48 therefore fully opened so the hook may be readily applied to work. At this time, spring 73 holds arm 69 and the elements carried thereby in the dotted line position of Fig. 5, the forward end 83 of nose 72 engaging the inner face 84 of arm portion 55, and lugs 82 being spaced from cam noses 68.

When the hook is now applied to the work and the work-load is imposed upon bill 45, the hook body moves downwardly with respect to supporting structure 10 against the action of spring 41 and until shoulder 35 engages shoulder 30, the swivel connection 14 in the supporting structure allowing continued axial rotation of the hook in spite of the imposition of load. As the hook body descends, pin 66 is lowered, of course, with respect to pin 60 and latch 54 is thus swung pivotally to the closed position of Fig. 4, the lost motion connection provided by slot 62 compensating for the variable distance between the two pivot pins. As soon as the latch has moved to fully projected position, which is determined by the contact of shoulder 35 with shoulder 30, nose 72, beneath which arm portion 55 has been dragged as the latch moved to projected position, is swung by spring 73 into locking position, that is, into opposition with the end shoulder 85 of arm portion 55.

The latch is thus locked in projected position so that even though the load be relieved from the hook, spring 41 remains incompetent to lift the hook and thereby retract the latch. Of course, as long as the load is applied to the hook, the load acts to hold said hook down and thereby to hold the latch projected.

As soon as the load is relieved and hook disengagement is desired, handle 76 is actuated in a manner first to clear nose 72 from shoulder 85, whereupon spring 41 becomes effective to raise the hook body and thereby shift pin 66 in a manner to swing latch 54 into retracted position, opening the hook throat. Of course, the spring 41 may be aided by continued actuation of handle 76, such actuation bringing lugs 82 into operative engagement with noses 68 after nose 72 has cleared the latch, the force exerted by the lugs against the noses 68 serving to open the latch or raise the hook, as described above.

With the throat 48 open, the hook is again in normal condition and may be free from the work, being thereafter held open and ready to receive new work without further effort on the part of the operator.

It will thus be seen that the hook body is movable to cause an automatic latching thereof upon application of work thereto, and is also movable automatically in a manner positively to move the latch to retracted position.

In some situations it may be desirable to eliminate spring 41. When such is the case, the normal condition of the hook will be that shown in Fig. 4, since the hook will be held by gravity with shoulder 35 in engagement with shoulder 30, and consequently latch 54 will normally be locked closed, as in that figure.

When it is then desired to apply the hook to work, the operator actuates handle 76 in a manner first to clear nose 72 from latch 54 and then to operatively engage lugs 82 with noses 68, in the manner above described, to move the hook bodily and thus open the latch. When the latch is fully opened, the parts will be in the condition of Fig. 5, lugs 82 being still in engagement with noses 68. The hook is then engaged with the work, and handle 76 is released. If the hook be capable of dropping after its application and before the actual imposition of load thereon, gravity will move said hook to the position of Fig. 4, the latch thus closing automatically and being automatically locked in closed position. Then, when the load is applied to the hook, latch-opening movement is resisted by virtue of said load. Or, if the hook be not capable of gravitating until the load is applied thereto, the subsequent application of said load moves the hook downwardly with the effect outlined above.

It will be noted that spring 41 is not designed to support the work load, for were it so to do, descension of the hook body would be checked before the latch were fully closed, and there might then be the possibility that either the work could free itself from the hook by passage through the partially closed throat or that the latch movement would not be sufficient to allow the projection of nose 72 into locking position.

It will be understood the drawings and description are to be considered merely as illustrative of and not restrictive on the broader claims appended hereto, for various changes in design, structure and arrangement may be made without departing from the spirit and scope of said claims.

I claim:

1. In a hook, a supporting structure, a hook body movable with respect to the supporting structure, a latch movable with respect to the supporting structure to and from hook-closing position, and connections between said latch, supporting structure and hook body whereby movement of said body

in one direction with respect to the supporting structure moves said latch towards its hook-closing position.

2. In a hook, a supporting structure, a hook body movable with respect to the supporting structure, a latch movable with respect to the supporting structure to and from hook-closing position, and connections between said latch, supporting structure and hook body whereby movement of said body in one direction with respect to the supporting structure retracts said latch from its hook-closing position.

3. In a hook, a supporting structure, a hook body movable with respect to the supporting structure, and a latch movable with respect to the movable structure to hook-closing position by virtue of such movement of the hook body.

4. In a hook, a supporting structure, a hook body movable with respect to the supporting structure, and a latch movable with respect to the supporting structure and adapted to close the hook, said latch being movable from hook-closing position by virtue of such movement of the hook body.

5. In a hook, a supporting structure, a hook body movable with respect to the supporting structure, and a latch movable with respect to the movable structure to and from hook-closing position by virtue of movement in opposite directions of the hook body with respect to the supporting structure.

6. In a hook, a supporting structure, a hook body movable with respect to the supporting structure, a latch movable with respect to the movable structure to and from hook-closing position, and connections between said latch, supporting structure and hook body whereby movement of said body in one direction with respect to the supporting structure moves said latch towards its hook-closing position, and whereby movement of said body in the opposite direction with respect to the supporting structure retracts said latch from its hook-closing position.

7. In a hook, a supporting structure, a hook body movable with respect to the supporting structure, a latch movable with respect to the supporting structure to hook-closing position by virtue of such movement of the hook body, and yieldable means resisting hook-closing movement of the latch.

8. In a hook, a supporting structure, a hook body movable with respect to the supporting structure, a latch movable with respect to the supporting structure to and from hook-closing position, connections between said latch, supporting structure and hook body whereby movement of said body in one direction with respect to the supporting structure moves said latch towards its hook-closing position, and means yieldably resisting movement of the body in said one direction and thereby yieldably holding the latch from movement towards its hook-closing position.

9. In a hook, a supporting structure, a hook body movable with respect to the supporting member by virtue of load imposition thereon, a latch movable with respect to the supporting structure and adapted to be moved to hook-closing position by virtue of such movement of the hook body, and means adapted to act automatically to move the latch from hook-closing position when the load is relieved therefrom.

10. In a hook, a supporting structure, a hook body movable with respect to the supporting structure by virtue of load imposition thereon, a latch movable with respect to the supporting structure and adapted to be moved to hook-closing position by virtue of such movement of the hook body, releasable means for locking the latch in hook-closing position, and means adapted to act automatically to move the latch from hook-closing position when the load is relieved therefrom and after said locking means is released.

11. In a hook, a supporting structure, a hook body movable with respect to said structure approximately in the direction of the line of draft, and a hook-closing latch pivotally connected at one point to the supporting structure and pivotally connected at another point to the hook body, said first mentioned point being substantially in the line of draft and the second mentioned point being offset with respect to said line during movement of the hook body.

12. In a hook, a supporting structure, a hook body movable vertically with respect to said structure, and a hook-closing latch pivotally connected at one point to the supporting structure and pivotally connected at another point to the body member, said second mentioned point being out of vertical alinement with said first mentioned point during movement of the hook body.

13. In a hook, a supporting structure embodying a pendant pin, a hook body having a tubular shank taking said pin in its bore and movable with the body member longitudinally with respect to said pin, means for limiting the extent of such longitudinal movement, and a hook-closing latch pivotally connected at one point to said pin and at another point to said body whereby longitudinal movement of the body member imparts pivotal movement to the latch.

14. In a hook, a supporting structure embodying a pendant pin, a hook body having a tubular shank taking said pin in its bore and movable with the body member longitudinally with respect to said pin, a nut threaded on said pin beneath the shank and

adapted to limit the extent of such longitudinal movement in one direction, and a hook-closing latch pivoted to said pin at a point below the nut and pivoted to said body member at a point out of vertical alinement with said first mentioned point.

15. In a hook, a supporting structure embodying a pendant pin, a hook body having a tubular shank taking said pin in its bore and movable with the body member longitudinally with respect to said pin, a nut threaded on said pin beneath the shank and adapted to limit the extent of such longitudinal movement in one direction, a hook-closing latch pivoted to said pin at a point below the nut and pivoted to said body member at a point out of vertical alinement with said first mentioned point, and a spring about said pin and extending between said nut and an opposed shoulder on the shank, said spring being adapted yieldingly to resist longitudinal movement of said body in said one direction.

16. In a hook, a supporting structure, a hook body movable with respect to the supporting member by virtue of load imposition thereon, a latch adapted to be moved to hook-closing position by virtue of such movement of the hook body, means adapted to act automatically to move the latch from hook-closing position when the load is relieved therefrom, and manually operated means adapted to assist the automatically operating means in moving the said latch from hook-closing position.

17. In a hook, a supporting structure embodying a pendant pin, a hook body having a tubular shank taking said pin in its bore and movable with the body member longitudinally with respect to said pin, means for limiting the extent of such longitudinal movement, a hook-closing latch pivotally connected at one point to said pin and at another part to said body whereby longitudinal movement of the body member imparts pivotal movement to the latch, and a movable locking member on the body and adapted to engage the latch in a manner to prevent its pivotal movement in one direction and thereby to prevent longitudinal movement of the body in one direction.

18. In a hook, a supporting structure, and a hook body supported by said structure, said body being movable both about and along a vertical axis, and a latch movable to hook-closing position by virtue of movement of the hook body along said axis.

19. In a hook, a supporting structure, and a hook body supported by said structure, said body being movable both about and along a vertical axis, and a movable latch adapted to close the hook, said latch being movable from hook-closing position by virtue of movement of the hook body along said axis.

20. In a hook, a supporting structure, and a hook body supported by said structure, said body being movable both about and along a vertical axis, and a latch movable to and from hook-closing position by virtue of movement of the hook body in opposite directions along said axis.

21. In a hook, a supporting structure, a hook body movable with respect to said structure approximately in the direction of the line of draft, a hook-closing latch mounted on the supporting structure and movable thereon transversely of the line of draft to and from hook-closing position, and interconnecting means between the hook body and latch whereby movement of the hook body under draft moves the latch transversely to hook-closing position and movement of the hook body in the opposite direction moves the latch transversely away from hook-closing position.

22. In a hook, a supporting structure, a hook body movable with respect to said structure approximately in the direction of the line of draft, a hook-closing latch mounted on the supporting structure and movable thereon transversely of the line of draft to and from hook-closing position, interconnecting means between the hook body and latch whereby movement of the hook body under draft moves the latch transversely to hook-closing position and movement of the hook body in the opposite direction moves the latch transversely away from hook-closing position, and a spring acting yieldably to hold the hook body against movement under draft.

23. In a hook, a supporting structure, a hook body movable with respect to said structure approximately in the direction of the line of draft, a hook-closing latch mounted on the supporting structure and movable thereon transversely of the line of draft to and from hook-closing position, interconnecting means between the hook body and latch whereby movement of the hook body under draft moves the latch transversely to hook-closing position and movement of the hook body in the opposite direction moves the latch transversely away from hook-closing position, and a movable locking member on the body and adapted to engage the latch releasably in a manner to prevent transverse movement of the latch in one direction and thereby to prevent movement of the hook body in one direction.

In witness that I claim the foregoing I have hereunto subscribed my name this 24th day of September, 1926.

EDWARD E. STEVENSON.

CERTIFICATE OF CORRECTION.

Patent No. 1,667,957. Granted May 1, 1928, to

EDWARD E. STEVENSON.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 6, lines 17, 30, and 37, claims 3, 5, and 6, for the word "movable" read "supporting"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of June, A. D. 1928.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.