June 11, 1929. N. K. SMITH 1,716,905

WELL APPARATUS

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Fig. 1.

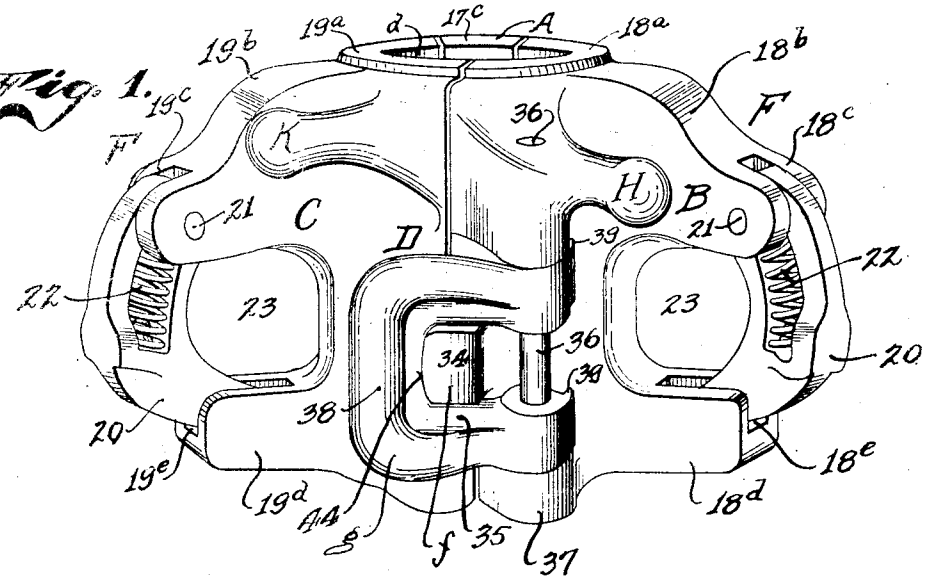
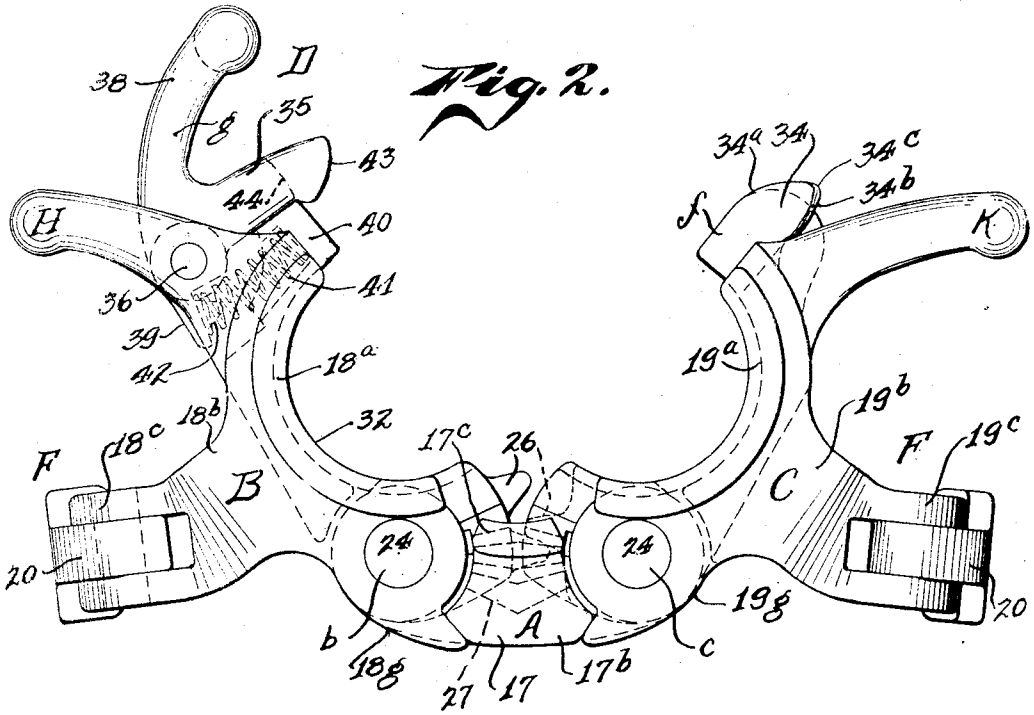


Fig. 2.



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Fig. 3.

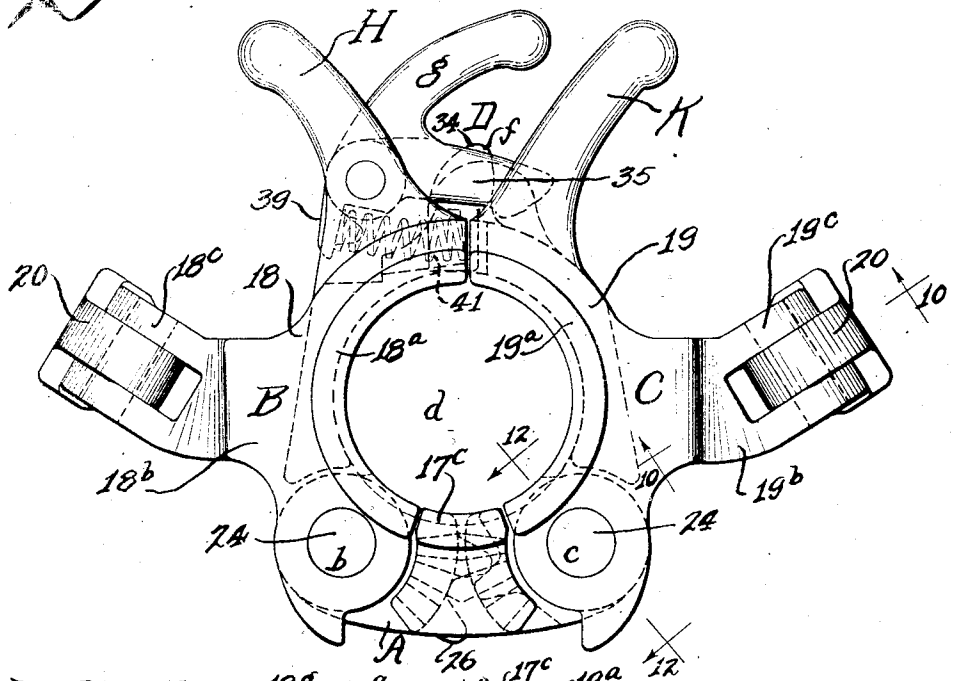
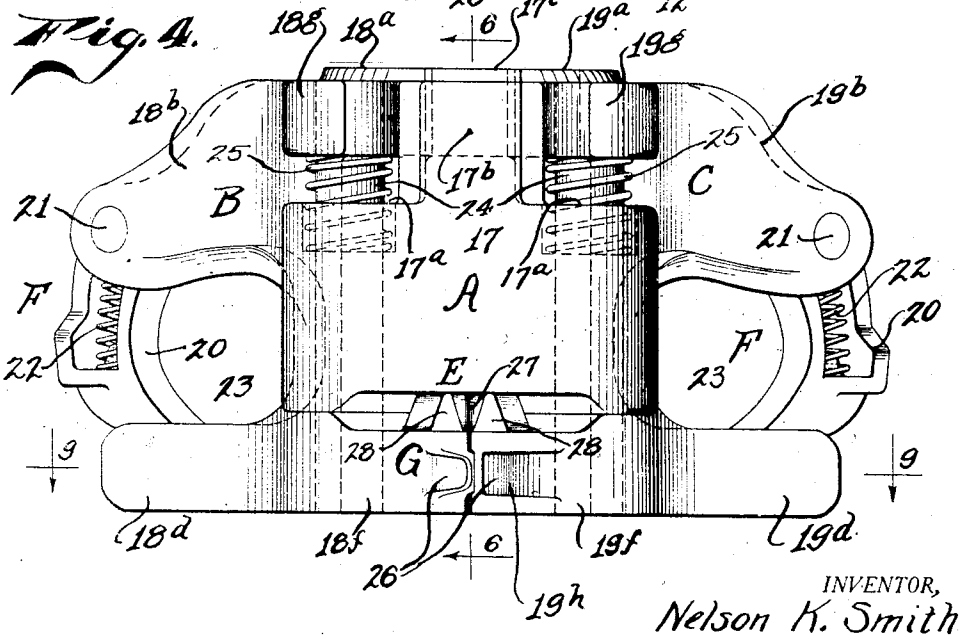


Fig. 4.



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Fig. 5.

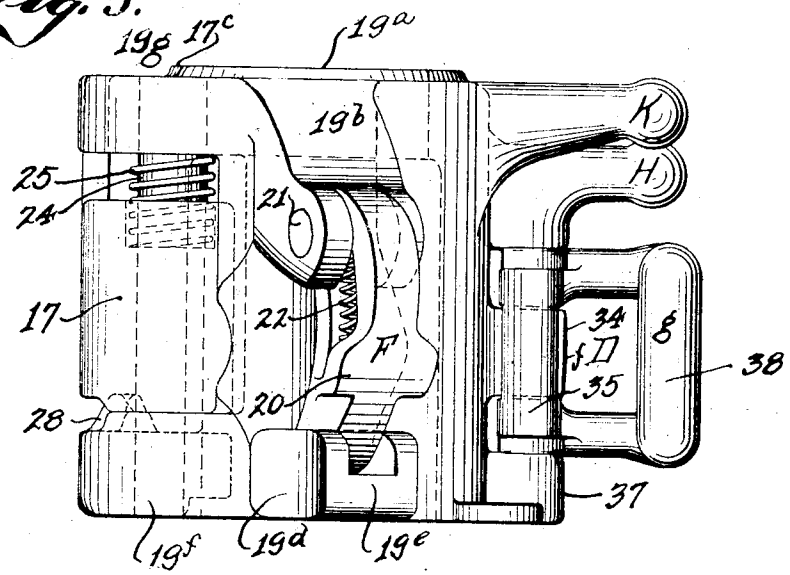
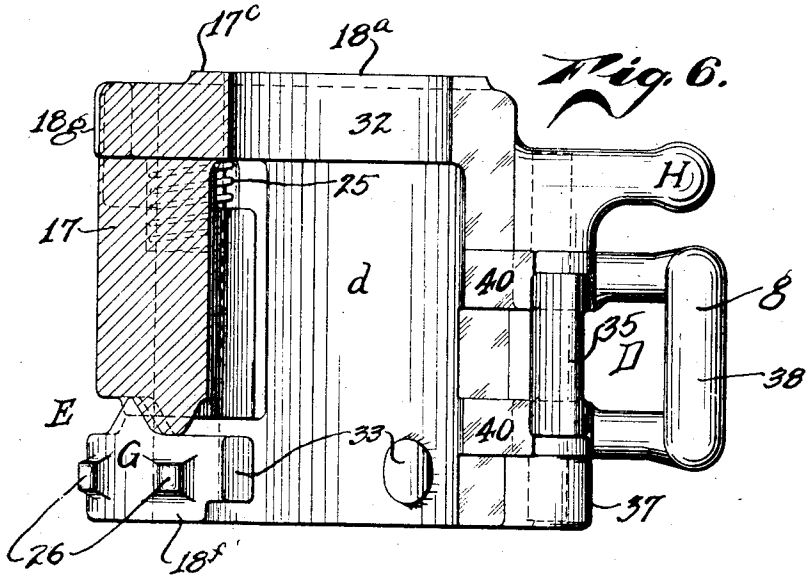


Fig. 6.



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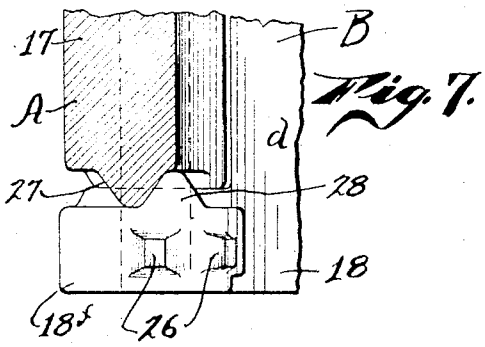


Fig. 7.

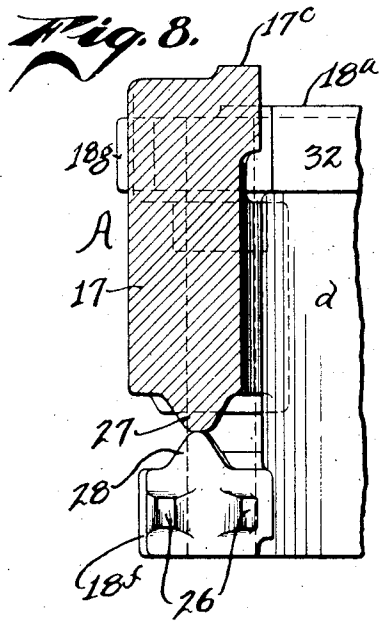


Fig. 8.

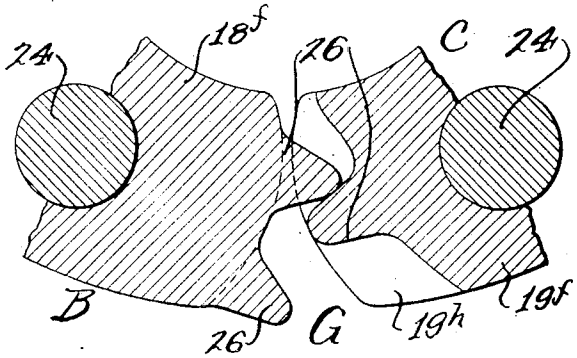


Fig. 9.

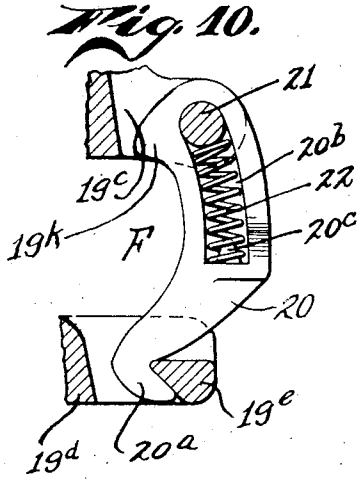


Fig. 10.

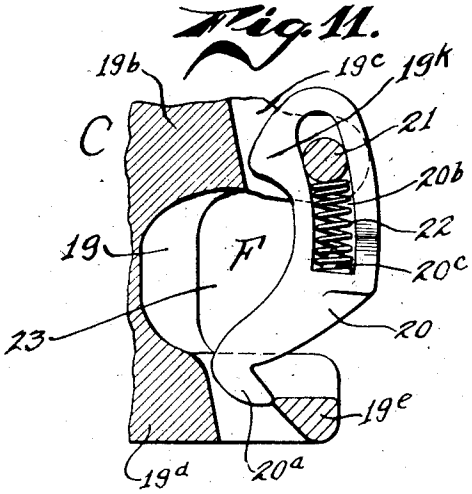


Fig. 11.

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WELL APPARATUS

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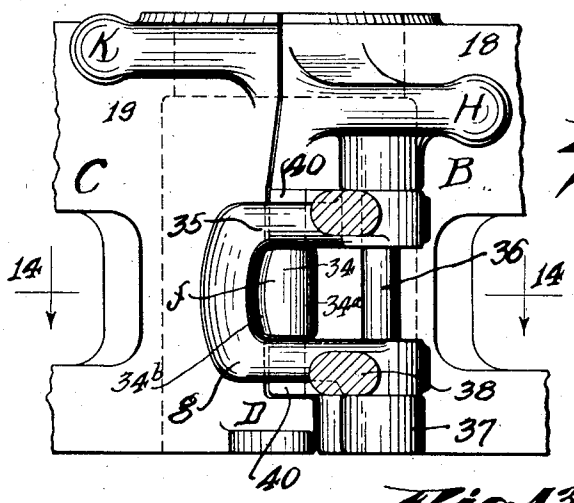


Fig. 13.

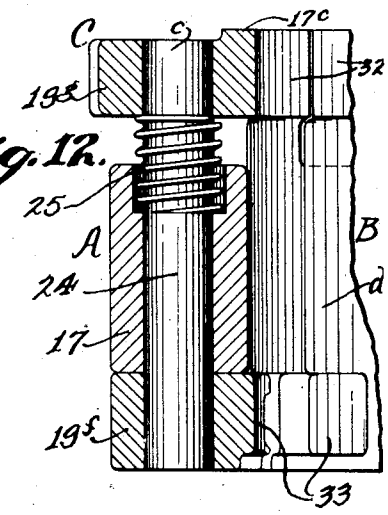


Fig. 12.

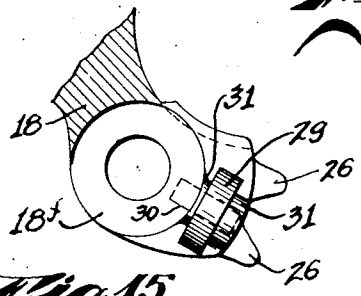


Fig. 15

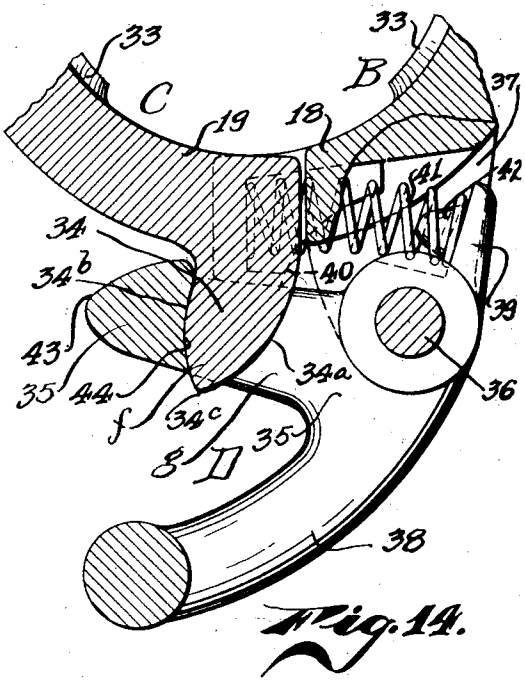


Fig. 14.

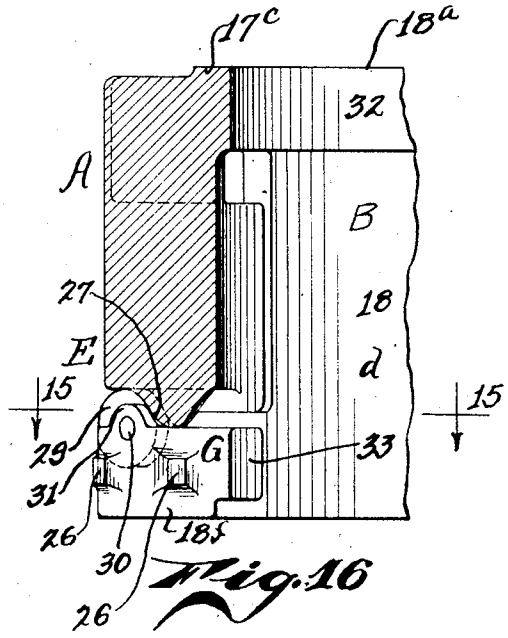


Fig. 16

INVENTOR,
Nelson K. Smith;
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ATTORNEYS.

Patented June 11, 1929. 1,716,905

UNITED STATES PATENT OFFICE.

NELSON K. SMITH, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO BYRON JACKSON PUMP CO., OF WEST BERKELEY, CALIFORNIA, A CORPORATION OF DELAWARE.

WELL APPARATUS.

Application filed July 25, 1925. Serial No. 46,108.

This invention relates to well apparatus for operating and handling appliances used in and about well rigs or derricks, and the invention more particularly applies to elevators for handling tubing, casing, drill pipe, sucker rods and the like. The invention has among its objects the provision of an improved apparatus or an improved device of the general character stated which will be superior in point of relative inexpensiveness and simplicity of construction taken in conjunction with positiveness, convenience, reliability and safety in operation, durability or length of life and compactness in form, and which will be further generally superior in point of efficiency and serviceability.

With above and other objects in view, the invention consists in the novel and useful provision, formation, construction, combination, association, inter-relation and mode of operation of parts, members and features, all as hereinafter described, shown in the drawings, and finally pointed out in claims.

In the drawings:

Figure 1 is a front perspective view of an improved elevator constructed and organized to embody the invention, the parts being shown in closed relation;

Figure 2 is a top plan view of the same, reversed front for back, the parts being shown in open position;

Figure 3 is a view similar to Figure 2 with the parts in closed position;

Figure 4 is a rear elevation of the improved elevator, with the parts in closed position;

Figure 5 is a side elevation of the improved elevator with the parts in closed position;

Figure 6 is a vertical sectional view of the improved elevator, taken upon the line 6—6, Figure 4, and looking in the direction of the appended arrows;

Figure 7 is a fragmentary vertical elevation showing a portion of the construction disclosed in Figure 6, the parts shown corresponding in position to open relation of the elevator members;

Figure 8 is a view similar to Figure 7, showing a position of parts assumed during the opening or closing of the elevator;

Figure 9 is an enlarged detail fragmentary transverse sectional view taken upon the line 9—9, Figure 4, and looking in the direction of the appended arrows;

Figure 10 is a detail fragmentary vertical sectional view taken upon the line 10—10, Figure 3, and looking in the direction of the appended arrows;

Figure 11 is a view similar to Figure 10 showing the parts in slightly altered position or relation;

Figure 12 is a detail fragmentary vertical sectional view taken upon the line 12—12, Figure 3, and looking in the direction of the appended arrows;

Figure 13 is a fragmentary front elevation of the elevator shown in the other figures, parts being sectioned for clearness of illustration;

Figure 14 is an enlarged detail fragmentary transverse sectional view, taken upon the line 14—14, Figure 13, and looking in the direction of the appended arrows;

Figure 15 is a detail fragmentary sectional view taken upon the line 15—15, Figure 16, and looking in the direction of the appended arrows, parts being in elevation; and

Figure 16 is a detail fragmentary vertical sectional view similar to Figure 6 showing a modified form of construction.

Corresponding parts in all the figures are designated by the same reference characters.

Referring with particularity to the drawings, I have shown therein a well elevator which comprises in the main relatively movable members A, B and C. The device is articulated to provide for relative movement as among these members, as at *b* and *c*, so that the device may be opened and closed, it being shown in closed condition in Figures 1, 3 and 4, for instance, and in open condition in Figure 2. When in closed condition the three members surround and produce an internal space *d* within which the tubing, piping, casing, sucker rod or the like is received and accommodated, and means D are provided for holding the members in such closed condition or relation, such means being hereinafter referred to as latch means E designates releasable locking means operating in conjunction with the three members A, B and C, for retaining the device in either open or closed condition. The latch means D are positive latch means requiring a manual operation to unlatch or unlock the members, whereas the locking means E operate automatically responsive to the weight of the pipe or other load or work, to maintain a locked condition, and operate automatically in the relative movement of the members to open condition to yieldingly

maintain the members in open condition. F designates in each instance suspension means adapted to cooperate with bails, links or the like, for suspending the entire device when in service, and such suspension means are associated with or built into the members B and C. G designates means for operatively associating the members B and C whereby the movement of one of the same is responsive to movement of the other of same, or, whereby said members are coordinated in movement. It will be understood that the members B and C swing relative to each other and to the member A at the zones of articulation or axes *b* and *c*, and the member A moves substantially vertically in accommodating the action of the locking means E, during the swinging movements of the members B and C.

In more particular definition, the member A comprises a body or vertical wall member 17 disposed centrally as between the members B and C, and all of said members conform in assemblage to a general curvature adapting them to surround the work, and produce, when the elevator is closed, the intermediate or central opening or space *d*. This plate or body 17 is cut away at the lateral top portions producing top shoulders 17^a and an upper intermediate terminal portion 17^b having a short curved top surface 17^c upon which the work, or a part thereof such as the collar of tubing or casing, or a tool joint, in part rests when the elevator device is closed. The members B and C likewise consist of longitudinally curved jaws 18 and 19 having curved top portions 18^a and 19^a upon which the work may similarly rest when the elevator is closed, and such top surfaces 18^a and 19^a with the top surface 17^c of the body 17 comprise a substantially continuous circular formation when the elevator is closed. From the jaws 18 and 19 respectively project oppositely directed lateral arms 18^b and 19^b which are bifurcated at their extremities as at 18^c and 19^c, and these bifurcated arms are included within the suspension means F which further include retaining fingers 20 which cooperate with said arms 18^b and 19^b and also with supplemental arms or projections 18^d and 19^d which project from the jaws 18 and 19 at the lower portions thereof, whereas the arms 18^b and 19^b project from the upper portions of the jaws 18 and 19. As clearly shown in Figures 10 and 11 these retaining fingers are longitudinally curved and provided with hooked lower terminal portions 20^a which co-engage with catch heads 18^e and 19^e which bridge the space between lateral furcations of said arms 18^d and 19^d, when said retaining fingers 20 are in lowered or operative positions. The upper portions of said fingers are longitudinally slotted, as at 20^b and pins 21 are passed through such slots and through the furcations of the terminal portions 18^c and 19^c of the arms 18^b and 19^b, said pins permanently retaining the fingers 20 in position. Coil compression springs 22 are disposed within the slotted portions 20^b of the fingers 20, between centering projections 20^c and the pins 21, tending to hold the fingers 20 in downwardly projected positions so that the hooked portions 20^c thereof may be engaged with the catch heads 18^e and 19^e by merely pressing such hooked portions 20^a inwardly over the upper surface of the catch heads. The links when thus retained and suspending the device hold the fingers 20 engaged with the catch heads 18^e and 19^e so that they cannot become displaced until the links are somewhat lowered. Curved noses 19^k on the fingers 20 overlying the links produce this result. The under surfaces of such catch heads are downwardly and outwardly inclined, and it will be obvious that by exerting upward and inward pressure upon such fingers 20, when the links are slightly lowered, the springs 22 will be compressed and the fingers 20 may then be swung outwardly with the links, opening up the spaces between the arms 18^b and 18^d on the one hand and 19^b and 19^d on the other hand, so that the links or bails (not shown) may be removed from such spaces; and these spaces 23 may be formed to receive and accommodate the links in close fit by properly curving and conforming the presented surfaces of the jaws 18 and 19, and the arms projecting therefrom, in conjunction with the longitudinal curvature of the fingers 20.

The jaws 18 and 19 are connected with the member A or the body 17 thereof, at the axes *b* and *c*, by vertical hinge pins 24 which are passed freely through the lateral portions of the body 17 of the member A and through the shoulders 17^a thereof, and are received at the bottoms of the jaws 18 and 19 in knuckles 18^f and 19^f and at the tops in knuckles 18^g and 19^g, in which knuckles they are suitably fixed or pinned. Coil compression springs 25 are disposed between the upper knuckles 18^g and 19^g and the shoulders 17^a, whereby relative vertical play of the member A and the members B and C is yieldingly opposed. The hinge pins 24 are disposed substantially in vertical planes which cut the centers of suspending stresses of the suspension means F, and which planes are substantially parallel with the central fore and aft vertical plane cutting the space *d* between the jaws, so that but little bending stress is exerted upon the hinge pins when the load or work is supported by the elevator.

The means G for operatively associating the members B and C comprise spaced teeth or projections 26 upon the knuckles 18^f and 19^f, the tooth or teeth on the knuckle 19^f being formed in a horizontal slotted portion 19^h

of the knuckle, so that relative vertical play of the knuckles and the members B and C which carry them is prevented; and, obviously, as one jaw swings upon its hinge pin 24 the other jaw must oppositely swing upon its hinge pin.

The locking means E comprise a depending lug 27 upon a lower portion of the body 17 of the member A, substantially central thereof, and two cooperating upstanding lugs 28 upon the respective knuckles 18^f and 19^f, at the tops thereof, such knuckles being chambered away at the tops and such body 17 being centrally chambered away at the bottom to accommodate such lugs. These lugs have curved surfaces whereby the lugs 28 may freely ride under the lug 27, in either direction, as the jaws 18 and 19 open and close, causing the member A to rise and fall. When the jaws are in open condition the lugs 28 are disposed forward of the lug 27, and vice versa, and when in either position they releasably lock the jaws against further swinging movement, subject to control by the member A. When the jaws are closed about the work, however, and the lugs 28 are disposed rearwardly of the lug 27, the weight of the load or work, in part transferred to the top surface 17^c of the member A, holds that member in depressed position, and positively locks the jaws from opening. It will be understood that the accommodation of such locking means E, in action, and the rise and fall of the member A, is permitted by the spaces between the shoulders 17^a and the upper knuckles 18^g and 19^g, such rises of the member A being yieldingly opposed by the coil springs 25. Of course gravity will restore the member A to lowered position irrespective of the action of the springs 25; and gravity likewise will lower the fingers 20 of the suspension means F, irrespective of the action of the springs 22.

In Figures 15 and 16 modified locking means E are shown, the construction and inter-relation of parts and features being the same as just described, save and except that in substitution for the lugs 28 I provide antifriction devices such as rollers 29 which are mounted on short shafts or axles 30 supported by journal plugs 31 formed upon the knuckles 18^f and 19^f, which knuckles are suitably chambered out to house the rollers, such rollers projecting above the knuckles and freely turning in their cooperation with the lug 27. This modified form of locking means in its construction and action responds to the disclosure of a prior application for U. S. patent filed by me March 24, 1925, Serial No. 17,901.

Intrusions such as upper ribs 32 and lower studs 33, or the like, may be provided upon the inner walls of the members A, B and C to bear against the pipe, tubing, casing, sucker rod or other work, and suitably center the work in an elevator and permit mud and detritus to escape from the elevator, as likewise disclosed in the previous application just identified.

Hand holds or grips H and K are provided upon the jaws 18 and 19, at the forward portions and adjacent the tops thereof, and ranging outwardly therefrom, one of the same, as K, being slightly higher than the other thereof, so that the hands of an operator grasping the same in manipulating the jaws may overlap in part for convenience.

The latching means D are associated with the two members B and C at the forward portions thereof, and comprise a fixed member *f* upon the member C and a swinging member *g* upon the member B. The said latch means is more particularly and clearly shown in Figures 1, 2, 13 and 14. The fixed member *f* comprises an outwardly tapering nose 34 having a horizontally curved surface portion 34^a presented toward the member *g*, as it approaches the member *f*, and having its opposite vertical surface portion reversely curved, as at 34^b, the terminal portion of such nose being likewise abruptly curved as at 34^c. The member *g* comprises a stirrup-shaped latch 35 which is mounted fast at its extremities upon a pintle or hinge pin 36 which is mounted at its upper end to turn in the shank of the handle H, and similarly mounted at its lower end in a lug 37 projecting forwardly from the member B. The extremities of such stirrup-shape latch are likewise joined with or formed integral with the extremities of a stirrup-shaped hand-hold or handle 38 by which the latch 35 may be swung manually, such handle being disposed in the main forwardly of the latch. The joined extremities of the latch 35 and handle 38 are provided with common inward projections 39. The jaw 18 at its outer edge is provided with projecting heads 40 adapted to embrace and receive between them the nose 34 upon the jaw 19, and said heads 40 are chambered out to accommodate and receive the ends of coil compression springs 41 which at their other ends are received by centering projections or studs 42 upon the projections 39 upon the combined latch 35 and handle member 38. It results therefore that the latch is normally urged by the springs 41 into position to engage and ride over the nose 34, such latch being curved in its central portion, as at 43, to engage with and ride over the nose 34, and being curved at its inner central portion, as at 44, to engage with said nose and when overlying the same in locking contact, having a curvature at such inner portion complementary to the curvature 34^b upon the nose. These co-acting curved surface portions 34^b and 44 are formed to provide an inter-locked engagement in a curvature eccentric to the axis of the pintle 36, the latch in effect pass-

ing beyond center to effect a positive interengagement with the nose. This likewise draws the jaws 18 and 19 tightly together, and the jaws are prevented from relative vertical play by the straddling of the nose 34 by the heads 40, and also by engagement of the latch with the nose, which engagement is at top, front edge and bottom of said nose, the upper and lower limbs of the stirrup-shaped latch engaging the nose in substantially close fit. Also the surface portion 34^b of the nose is slightly vertically curved, so that tight inter-locking engagement is effected even if the jaws swing slightly in a vertical plane, or rock vertically upon their hinge pins 24.

It is obvious that in order to disengage the latch 35 from the nose 34 it is only necessary to pull upon the handle member 38 and compress the springs 41, whereupon the latch is free from the nose and the jaws may then be relatively separated to open up the elevator; but this cannot be done until the load or work has been raised to take its pressure off the central member A, inasmuch as this member must rise to free the jaws from locked condition at E and permit their movement in a horizontal plane. The elevator when closed is therefore positively locked by the central member A and by the latch means D; and when the elevator is open the jaws are releasably locked in open position by the member A and with the locking means E.

The mode of operation and method of use of the device will be readily understood from the foregoing description in which reference has been made in detail to the action and operation of the various parts and features, and such understanding will be further gleaned from an inspection of the drawings.

Having thus disclosed my invention, I claim and desire to secure by Letters Patent:

1. In a well tubing elevator, a pair of jaws, an intermediate member, hinge pins secured on said jaws and slidably extending through said intermediate member, to permit vertical movement of said intermediate member, interengaging means on said jaws for causing said jaws to open or close together, cam lugs on said jaws, a cam lug on said intermediate member for riding over the cam lugs on said jaws and for engaging said cam lugs on opposite sides when the jaws are opened or closed, for releasably holding said jaws open or closed and a part on said intermediate member to be engaged by the work when embraced by the jaws to prevent upward movement of said member and escapement of the lug on said member over the lugs on said jaws for positively locking said jaws closed upon the work.

2. In a well tubing elevator, a pair of jaws, an intermediate member to which said jaws are slidably pivoted, interengaging means on said jaws for causing said jaws to open or close together, interengaging means on said jaws and said intermediate member for releasably holding said jaws open or closed, and a part on said intermediate member to be engaged by the work when embraced by the jaws for holding said intermediate member in position for causing said interengaging means on said member and said jaws to lock the jaws positively in closed position.

3. In a well tubing elevator, a pair of jaws, a pair of spaced knuckles on each jaw, a hinge pin secured at its ends in each pair of said knuckles, an intermediate member formed with knuckles through which said pins slidably extend, said knuckles on said intermediate member being of shorter length than the distance between the knuckles on said jaws, cam lugs on said jaws, a cam lug on said intermediate member for riding over said cam lugs on said jaws and for engaging the opposite sides of said cam lugs when the jaws are open or closed, springs surrounding said pins respectively between one of the knuckles of each jaw and the knuckles of said intermediate member, for yieldably holding the intermediate member in position with its cam lug at one side or the other of said jaw lugs and said jaws open or closed, and interengaging means on said jaws for causing said jaws to open or close together.

In testimony whereof, I have signed my name to this specification.

NELSON K. SMITH.