

June 5, 1945.

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2,377,324

COMBINATION HOIST, JACK AND WIRE STRETCHER

Filed May 26, 1944

5 Sheets-Sheet 1

FIG. 1

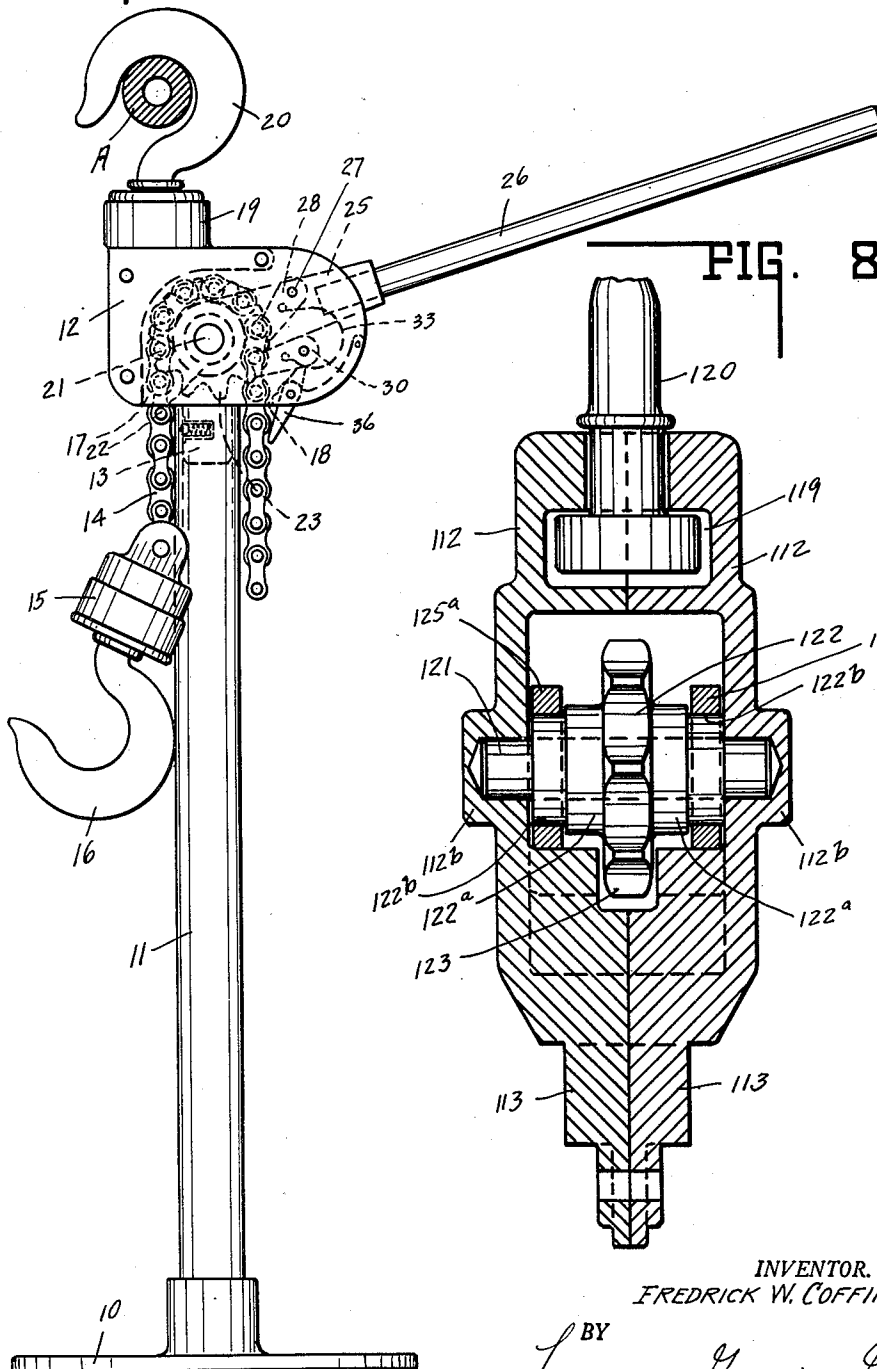
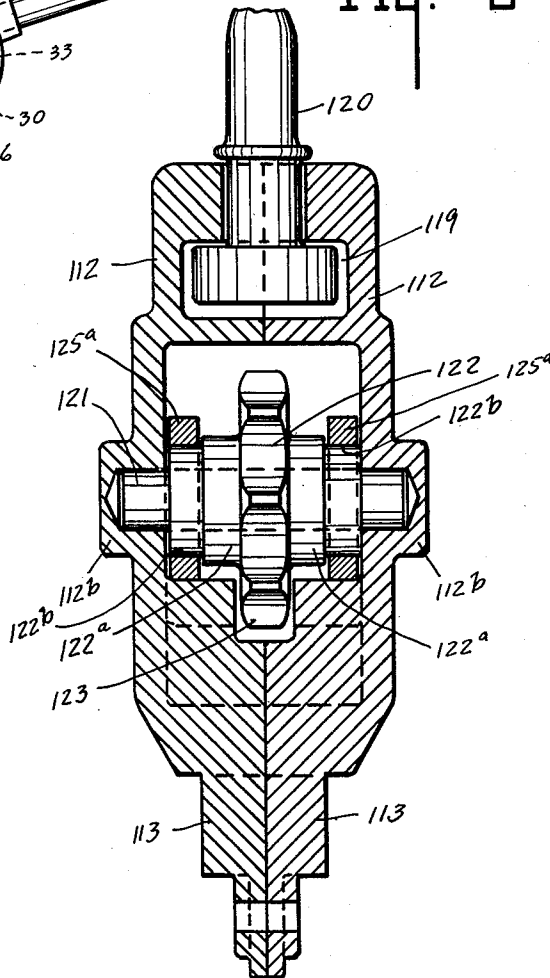


FIG. 8



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FIG. 2

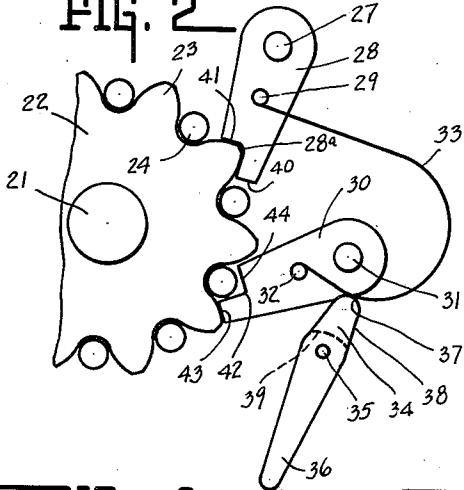


FIG. 3

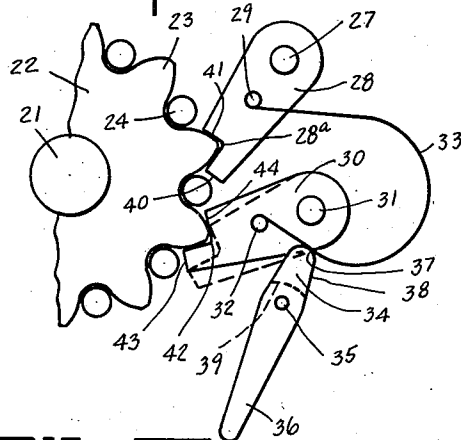


FIG. 4

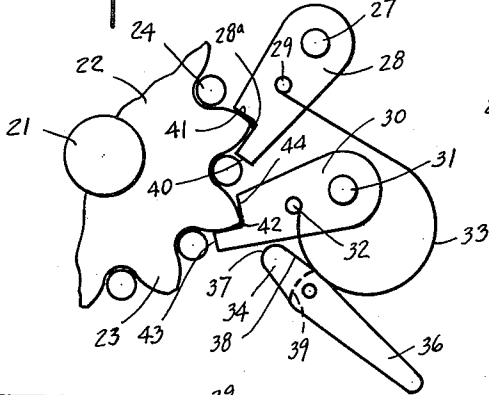


FIG. 5

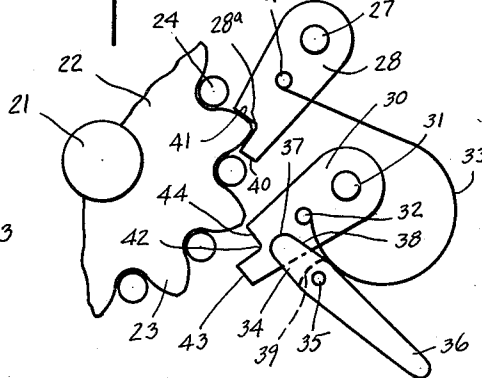


FIG. 6

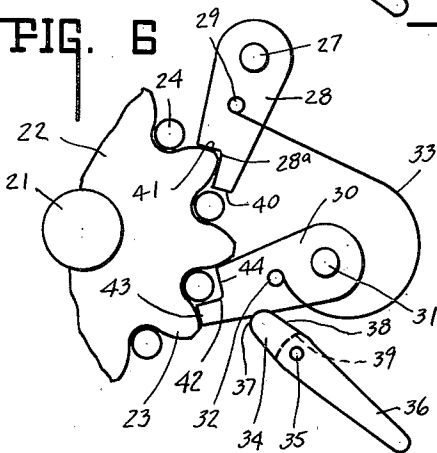
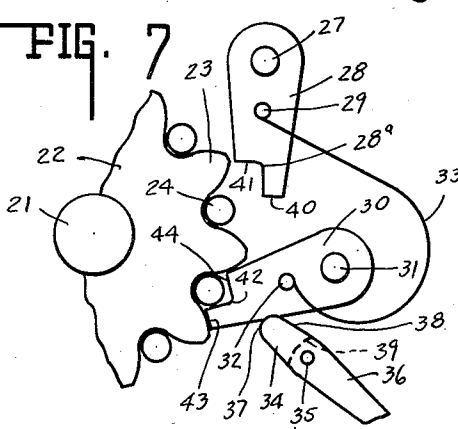


FIG. 7



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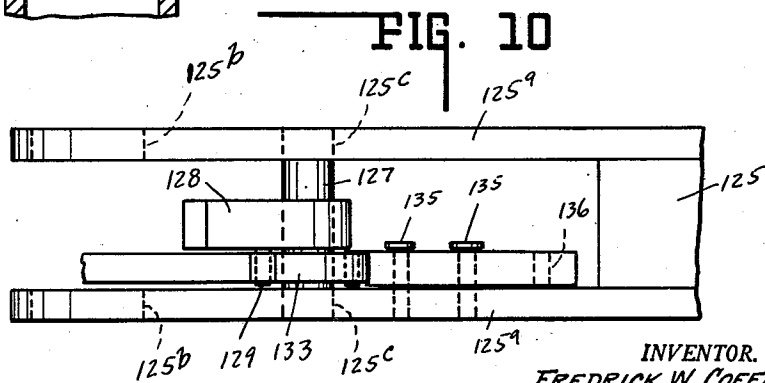
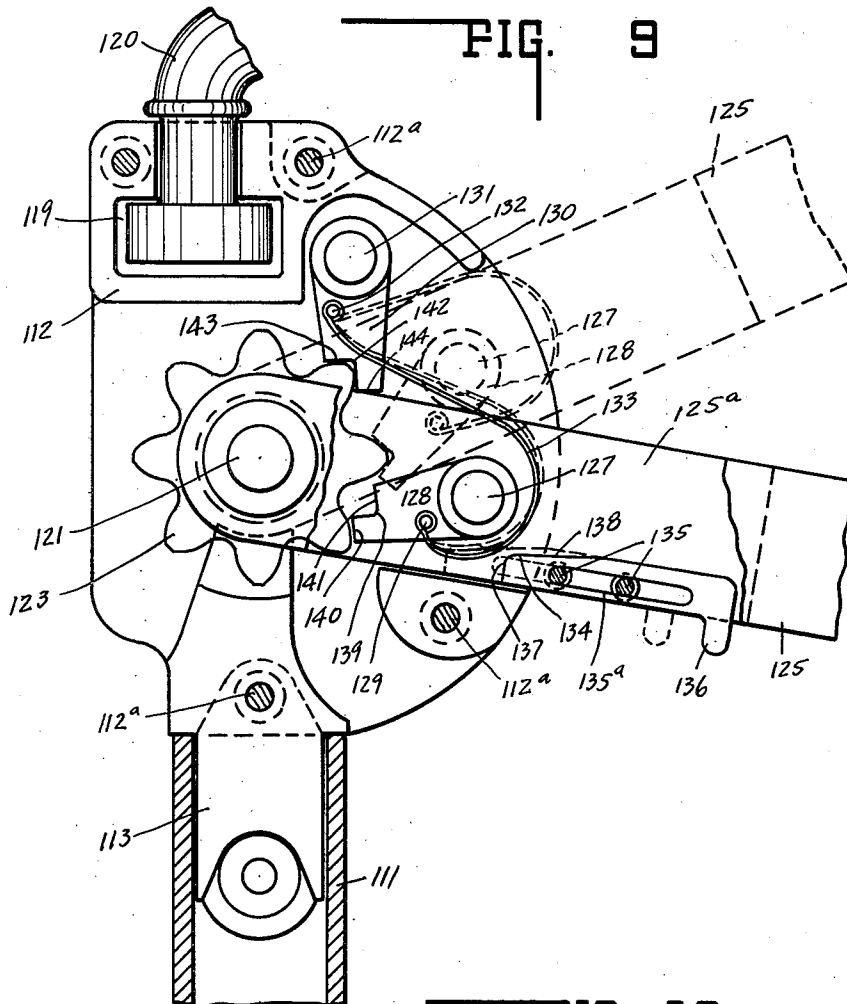
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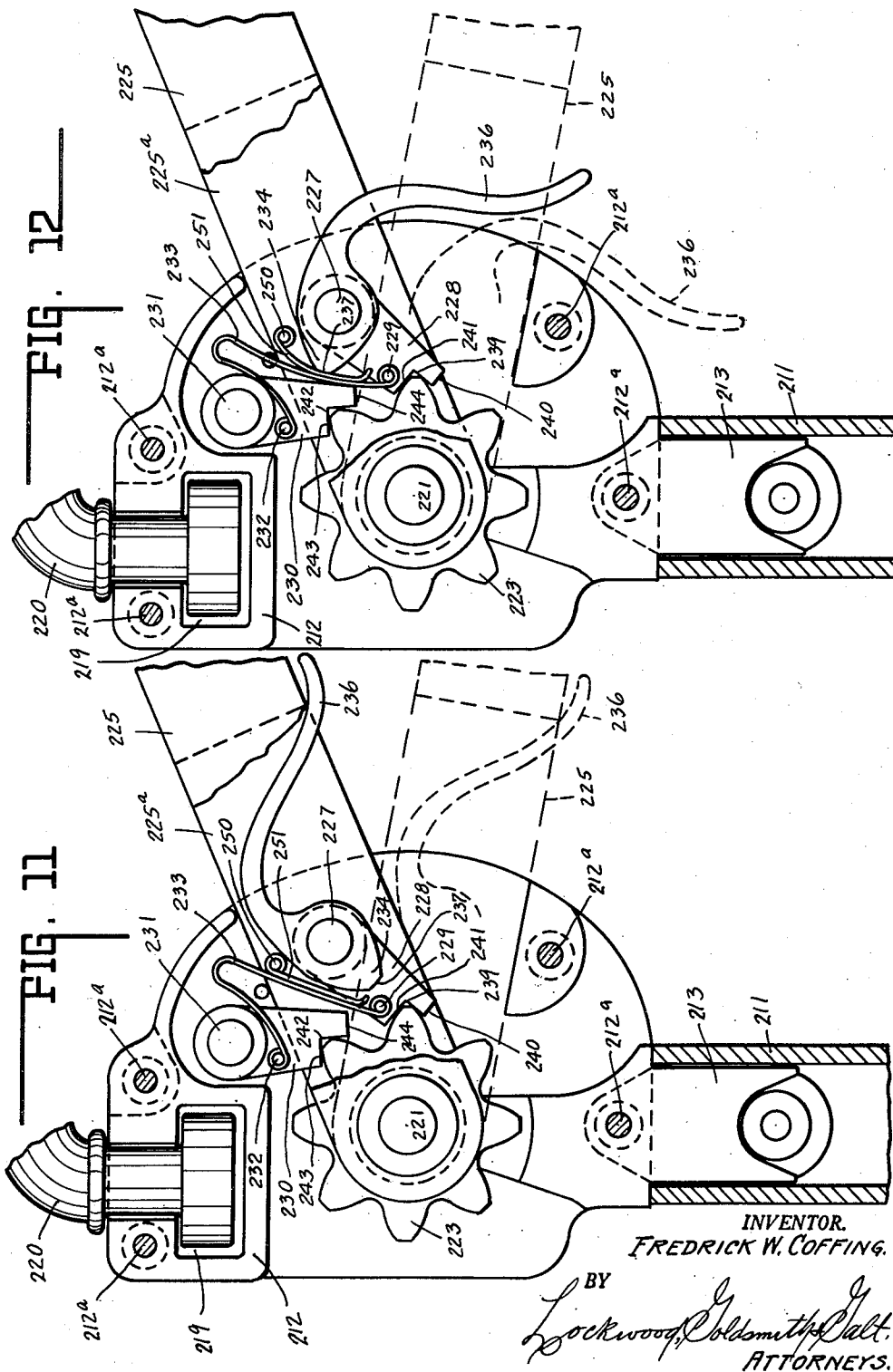
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COMBINATION HOIST, JACK AND WIRE STRETCHER

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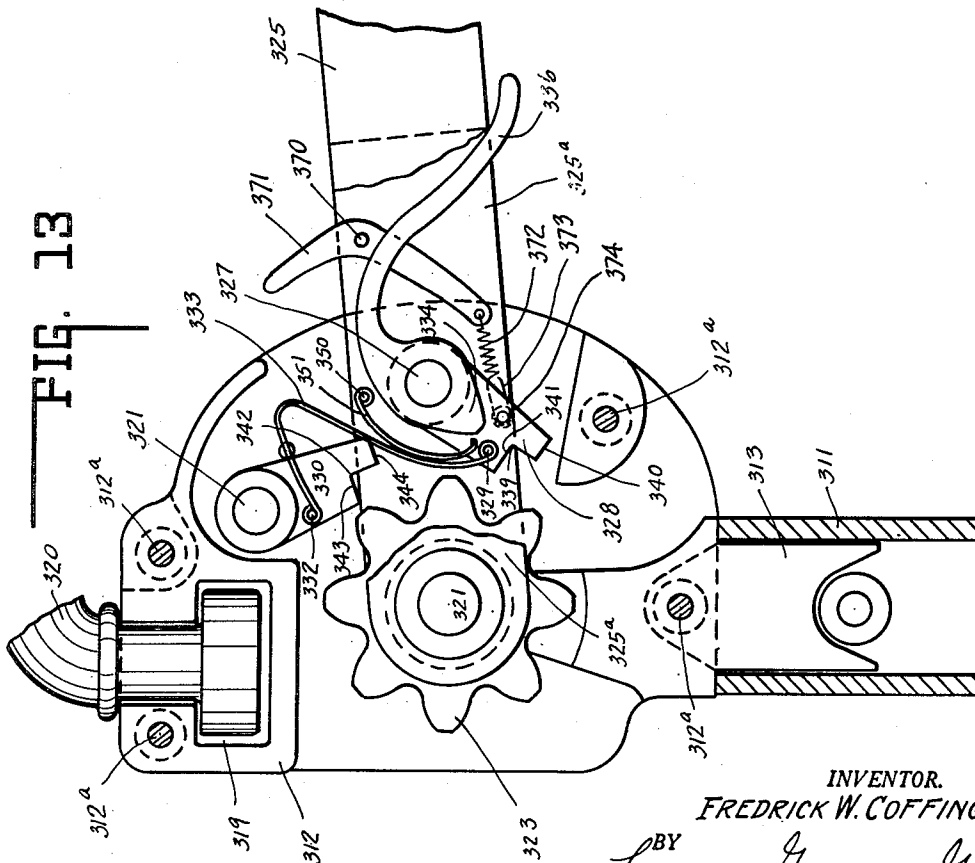
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COMBINATION HOIST, JACK AND WIRE STRETCHER

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UNITED STATES PATENT OFFICE

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COMBINATION HOIST, JACK, AND WIRE
STRETCHER

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Application May 26, 1944, Serial No. 537,406

18 Claims. (Cl. 74—156)

This invention relates to a combination hoist, jack and wire stretcher.

The chief object of this invention is to produce a tool of general utility, which can be used as a jack for lifting purposes, can be used as a load binder, that is for tightening flexible elements about a load, can be used as a fence stretcher, can be used as a hoist and also can be used for the assembling of treads for the so-called caterpillar and comparable types of tractors, among the many purposes.

Another object of this invention is to produce a construction which is simple and which is composed of a minimum number of parts and which is positive in its action in raising and lowering loads, tightening and lessening fences, etc., all as will appear more fully hereinafter.

The chief feature of the present invention consists in the simplified form of construction utilized in producing a tool of this universal character and which simplicity is characterized by utilizing the sprocket gear (with which is associated the sprocket chain or lifting element) with a pair of pivoted pawls suitably constrained to the gear engagement and a lever arm carrying one of the pawls and oscillatable therewith, thereby eliminating the requirement for the inclusion of a ratchet.

Another feature of the invention consists in providing a control manually shiftable from one position to another and vice-versa to insure raising or lowering of the load as desired, depending upon the position of the aforesaid manually movable member.

Another feature of the invention consists in providing each pawl with dual contact faces and so associating the pawls with the gear that on one stroke of the handle one face of each pawl is operatively associated with the gear teeth, and on the next stroke of the handle the other face of said pawls are associated with the gear teeth, it being understood that each oscillation of the handle produces gear rotation equal to one-half the length of one link of the sprocket chain.

Still a further feature of the invention resides in utilizing a single spring for simultaneously constraining the two pawls toward gear engagement and which spring may have the further function of constraining the manually movable control member in one of its two controlling positions.

Other objects and features of the invention will be set forth more fully hereinafter.

The full nature of the invention will be under-

stood from the accompanying drawings and the following description and claims:

In the drawings

Fig. 1 is a side elevational view of a unitary embodiment of the invention when used as a jack.

Fig. 2 is a diagrammatic enlarged side elevation of a portion of the combined sprocket and ratchet, the actuating and control pawls and the reversing control shown in one load lifting position.

Fig. 3 is a similar view of the same parts in a second lifting position.

Figs. 4 to 7, inclusive, are similar views of the same parts in successive positions when the device is utilized for lowering.

Fig. 8 is a transverse sectional view through the body, sprocket and shaft of the hoist proper, and of a second embodiment of the invention and the preferred form.

Fig. 9 is an elevational view of half of the hoist body, the several parts supported thereby, the actuating end of the handle and a central section of the top of the tubular standard, the chain being omitted for clearness. This figure also illustrates the preferred form of the invention. A part of the handle is broken away.

Fig. 10 is a plan view of the operating lever, pawl carried thereby and the manual control member. In this form same is carried by the handle.

Fig. 11 is a view similar to Fig. 9 and of a modified form of the invention, parts being positioned for load lowering purposes.

Fig. 12 is a similar view of the same parts but positioned for load elevating purposes.

Fig. 13 is a view similar to Figs. 11 and 12 and of a free chain embodiment of a form of the invention illustrated in said figures.

In Fig. 1 of the drawings 10 indicates a base to which may be detachably or rigidly secured standard 11 in the form of a pipe column. The hoist body 12 is provided with a lug 13 nestable in the upper end of said column.

A chain 14 of successive link and pintle type is connected at one end to socket 15 in which is rotatably supported a hook 16. The chain enters the body at 17 and leaves at 18 or vice versa for load elevation or lowering.

The body is also provided with socket 19 in which is rotatably mounted hook 20 arranged for support from member A. Naturally, when the base and standard are utilized hook 20 is not utilized and vice versa.

For load binding, wire stretching and the like

both hooks are used and brought together by chain movement by means shown more fully in Figs. 2 to 7, inclusive. In the several figures 21 indicates the main shaft of the device suitably supported at opposite ends by the housing 12. Rigid with the shaft is the combination sprocket gear and ratchet member 22 having teeth 23 and the roots therebetween seat the sleeves 24 of the sprocket chain 14. The side links of said chain straddle said gear.

To one side of the sprocket and rotatable on shaft 21 is a handle lever 25, the free end of which projects beyond the housing as at 26. Pivotaly supported at 27 on said handle on the side adjacent the sprocket is a pawl 28. This pawl mounts a spring anchorage in the form of pin 29 eccentric or offset from pivot 27. As the handle is oscillated up and down naturally pawl 28 follows therewith.

Beneath pawl 28 is a second or holding pawl 30 pivoted at 31 upon the housing. Said pawl carries spring anchorage 32 in the form of a pin. A partially curled spring 33 is connected at opposite ends to said pins and hence imposes constraint upon both pawls as hereinafter set forth.

Adjacent and immediately beneath pawl 30 is a reversing or control member 34 pivoted at 35 upon the housing. This shaft 35 may extend through the housing and have rigid therewith the manually shiftable member 36. Herein, however, member 36 projects from the housing and is an extension of member 34. The latter has end bearing 37 and side bearing 38. To clear pawl 30 member 34 may be cut away as at 39. These bearing surfaces are provided for spring contact. Note in Figs. 2 to 7 that the spring contacts bearing face 37 at all times when load elevation is being effected and that face 38 contacts spring 33 intermittently when load lowering is being effected, see Figs. 4 to 7.

As previously set forth the chain links are at opposite sides of the gear and the link connections of the chain seat in the roots between the adjacent teeth of said sprocket gear. Each pawl at its gear engaging end is notched and thus provides two surfaces. Herein pawl 28 is notched at 28a providing faces 40 and 41 and pawl 30 is notched at 42 providing faces 43 and 44.

For load elevation member 36 is actuated to have bearing face 37 of member 34 contact spring 33. With handle elevated, see Fig. 2, face 41 of pawl 28 engages a gear tooth and face 43 of pawl 30 engages another gear tooth. Pulling down on the handle 25 then moves the gear 22 clockwise half a tooth or so and the tooth previously engaged by the pawl 30 passes on and the intervening tooth then carries pawl 30 counterclockwise, see dotted line, Fig. 3, until the camming tooth is juxtapositioned for engagement by face 44 of pawl 30, which holds the sprocket and load.

The handle is then raised, pawl 28 ratcheting over the previously engaged tooth, that is the one previously engaged by face 41. However, after ratcheting the face 40 of pawl 28 engages the same tooth. Then the handle is again lowered until pawl 30 ratchets on the gear so that face 43 now engages same to hold the load and gear. Then the handle is raised and pawl 28 ratchets on the next oncoming tooth until face 41 of pawl 28 engages that tooth whereupon the cycle is repeated.

In this operation spring 33 always bears on face 37 of member 34. The pawls are of such width that they engage the sprocket teeth between the said bars of the chain links.

To lower, the load member 36 is actuated to tilt member 34 counterclockwise to the position shown in Figs. 4 to 7, inclusive. Member 34, accordingly, is thus positioned "over-center," as it were, and face 38 thereof is now effective under certain circumstances.

With parts as shown in Fig. 4, clockwise downward movement of the handle advances the sprocket clockwise to cam the pawl 30 out of gear engagement. When this occurs (see Fig. 5), the handle is raised with the load lowering and gear rotating counterclockwise, the handle carrying the load. When the handle is thus re-elevated, pawl 30 reengages the gear and holds the load, while in continued handle elevation pawl 28 is free of the gear. Then handle lowering lowers pawl 28 to engage the next adjacent or intermediate tooth, see Fig. 7.

Note that the successive engagements of the pawls are as follows 41 and 44, 41 only, 43 and 41, 43 only, 40 and 43, 40 only, 40 and 44, 44 only, and then back to 41 and 44. In raising and lowering, the advance in each case is by the effective arcuate distance of but half a tooth. Note also that in Figs. 6 and 7 the spring 33 has no contact with member 34. This is the time that face 43 of pawl 30 is effective upon the gear. In raising and lowering, successive faces of each pawl are successively engaged with the gear teeth.

As illustrated in Figs. 8 to 10, inclusive, the hoist body 112 is parted and suitably secured together at 112a. Socket 119 mounts suspension hook 120. Lug 113 is suitably supported by the hoist body and nests in the upper end of tubular standard 111, the lower end of the body resting upon the upper end of the standard. Lug 113 may be used for reeving purposes.

Shaft 121 has its opposite ends rotatably supported in socket type bearings 112b formed in the body. Rigid with shaft 121 is the sprocket gear and ratchet member 122. Projecting from each side is hub portion 122a and same is reduced at each end as at 122b.

Straddling the gear and rotatable on portions 122b are the arms 125a of handle 125, each arm being apertured at 125b for such mounting. Herein apertures 125c in said arms mount shaft 127 upon which pawl 128 is rotatably mounted. While Fig. 10 illustrates the arms 125a as integral, it is obvious that the arms must be initially separable to mount therein the gear and hubs. The arm separation may be made where desired and in the manner desired since it is purely a mechanical design problem.

Another modification herein illustrated is that sprocket moving pawl 128 herein is positioned below the load holding pawl 130 mounted on shaft 131 suitably seated in body socket seats. Pawl 130 mounts pin 132 and lever supported pawl 128 mounts pin 129, said pins mounting the ends of a partially curled spring 133.

A further modification herein resides in the manually operable control member 134, having end face 137 and side face 138, now being carried by the lever 125 and slidably, instead of rotatably, mounted. Member 134 includes elongated slot 135a in which ride two, headed, spaced pins 135 secured to an arm 125a as shown. The member 134 includes an angular extension 136, which is exposed for member shifting. When projected toward the sprocket, the hoist is conditioned for load elevation. When retracted the hoist is conditioned for load lowering.

In view of the detailed description of the operation previously given for the previous embodiment

ment no further explanation of the operation of the form illustrated in Figs. 8 to 10 is believed necessary except to state that load holding, load lowering and load raising is effected in the manner previously described and the two latter by oscillation of lever 125, each oscillation effecting chain movement equal to one-half the length of one link thereof. The housing in each embodiment limits the maximum travel of the handle in each direction.

In Figs. 11 and 12 there is illustrated a still further modified form of the invention. Herein numerals of the two hundred series indicate parts similar or comparable to parts in Figs. 9 and 10 designated by corresponding numerals of the one hundred series.

In Figs. 11 and 12 there is illustrated the handle lever 225. The housing pivotally supports at 231 the pawl 230 notched as at 242 to provide faces 243 and 244. Pawl 230 mounts pin 232 to which is connected one end of spring 233. The other end is anchored at pin 229 carried by pawl 228 pivotally supported at 227 on lever 225 aforesaid.

Lever 225 is pivotally supported on the shaft 221 mounting sprocket gear 223. Pawl 228 is notched as at 239 to provide faces 240 and 241. Herein lever 225 mounts pin 250 adjacent pivot 227 and mounted on said pin is leaf spring 251.

Coaxial with pivot 227 is a cam member 234 having the camming portion 237 and the tail portion 236, which is the finger engageable portion. Herein, as in Figs. 9 and 10, this control member 234 is carried by the handle, but instead of being slidable relatively thereon, it is tiltable thereon and in that respect is similar to the first form of the invention.

Operation of the form illustrated in Figs. 11 and 12 is basically similar to that form illustrated in Figs. 9 and 10, with this exception, that the cam or control member herein, indirectly through spring 251, contacts spring 233 and effects proper control thereof.

Herein spring 251 preferably contacts spring 233 and so may be utilized to reenforce same. However, when the actuating portion 236 is depressed relative to handle 225, cam face 237 bows or bends spring 251 to further load spring 233 and, in effect, changes its shape for the same purpose that face 137 engages spring 133, see dotted lines Fig. 9, and face 137 engages spring 33, see Figs. 2 and 3.

In the form of the invention illustrated in Fig. 13 there is incorporated a "free chain" addition. In this form, the handle 325 pivotally supports at 370 a member 371, which is normally inactive. When there is no load on the chain this member 371 may be tilted counter-clockwise to tension the spring 372, having one end connected to the member 371 and having at its opposite end an elongated loop 373 slidably associated with and embracing the headed pin 374 carried by the lower pawl 328 to retract the same from the sprocket.

The handle 325 is neutrally positioned so that the upper pawl 330 is out of sprocket engagement. If the pawl 330 is not then out of sprocket engagement, because the handle is not neutrally positioned, the tilting of the pawl 328 counter-clockwise will, through the spring 333, tilt the pawl 330 out of such sprocket engagement. When the pawls are so disengaged, the chain may be pulled freely in either direction for quick adjustment. Upon release of member 371, it returns to inactive position and spring 333 again tilts both pawls successively towards sprocket engagement.

While the chain direction control member 336 is shown having its manually engageable end exposed below the handle 325 and the manually engaged end of the free chain control member 371 is shown exposed above the handle 325. Both of these ends may be exposed at either side of the handle, that is above or below the same, or they may be reversely positioned from that illustrated in Fig. 3 by suitable changes in the mechanical design of the two members, all being equivalents of the present disclosure.

While the invention has been illustrated and described in great detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character.

The several modifications described herein as well as others which will readily suggest themselves to persons skilled in this art, all are considered to be within the broad scope of the invention, reference being had to the appended claims.

The invention claimed is:

1. In combination a sprocket gear, a sprocket chain having successive openings therethrough for gear tooth exposure beyond the chain, a pair of pawls arranged for engagement with the chain exposed portion of the gear teeth, the pawls engaging different but closely adjacent teeth, a lever for oscillating one pawl relative to the gear, and means operatively interconnecting the pawls for the purpose described.

2. In combination a sprocket gear having teeth, a sprocket chain in engagement therewith, a pair of pawls arranged for engagement with certain of the chain engaged gear teeth, a handle for oscillating one pawl for gear movement, and a single spring interconnecting the pawls for the purpose described.

3. Structure as defined by claim 2 wherein the chain comprises links at opposite sides of the gear and pivotal connections between links, the pivotal connection between the links being seatable in the roots between the gear teeth.

4. In combination a sprocket gear, a sprocket chain thereon, a pair of sprocket engaging pawls, an operating lever, one of the pawls being pivoted on the lever and oscillatable therewith, and means constraining the pawls toward sprocket engagement, the pawls having selective sprocket engagement.

5. Structure as defined by claim 4 wherein each pawl has a notched end for selective dual engagement with the sprocket.

6. Structure as defined by claim 4 wherein each pawl has a notched end for selective dual engagement with the sprocket, the dual engagements of each pawl alternating with those of the other pawl.

7. Structure as defined by claim 2 wherein the chain comprises links at opposite sides of the gear and pivotal connections between links, the pivotal connection between the links being seatable in the roots between the gear teeth, each pawl having a notched end for link pivotal connection clearance and for selective dual engagement with the sprocket.

8. Structure as defined by claim 2 wherein the chain comprises links at opposite sides of the gear and pivotal connections between links, the pivotal connection between the links being seatable in the roots between the gear teeth, each pawl having a notched end for link pivotal connection clearance and for selective dual engagement with the sprocket, the dual engagements of each pawl alternating those of the other pawl.

9. Structure as defined by claim 2 wherein the chain comprises links at opposite sides of the gear and pivotal connections between links, the pivotal connection between the links being seatable in the roots between the gear teeth, each pawl having a notched end for link pivotal connection clearance and for selective dual engagement with the sprocket, the dual engagements of each pawl alternating those of the other pawl, the pawls engaging alternate teeth on the sprocket, and effecting movement thereof approximately equal to half a chain link for each oscillation of the handle.

10. Structure as defined by claim 1 characterized by the addition of manually shiftable means effective upon the interconnecting means for selective load raising or lowering operation of the pawls in lever oscillation.

11. Structure as defined by claim 1 characterized by the addition of manually shiftable means effective upon the interconnecting means for selective load raising or lowering operation of the pawls in lever oscillation, each pawl having a notched end for chain clearance, each oscillation of the lever effecting sprocket movement of approximately half a chain link in the load raising or lowering direction contingent upon manually shiftable means positioning.

12. In combination a sprocket gear having teeth, a sprocket chain in engagement therewith, a pair of pawls arranged for engagement with certain of the chain engaged teeth, a handle for oscillating one pawl for gear movement, spring means interconnecting the pawls for the purpose

described, and manually shiftable means for selectively controlling chain advance or retraction in handle oscillation and operatively associated with said spring means.

13. Structure as defined by claim 12 wherein said manually shiftable means includes an auxiliary spring.

14. Structure as defined by claim 12 wherein the manually shiftable means includes a pivoted cam and an auxiliary spring.

15. Structure as defined by claim 12 wherein the manually shiftable means includes a cam pivoted upon the handle in juxtaposition to the spring means for selective operative engagement therewith.

16. Structure as defined by claim 12 wherein the manually shiftable means includes a cam pivoted upon the handle and an auxiliary spring interposed between the manual shiftable means and spring means.

17. Structure as defined by claim 12 wherein the manually shiftable means includes a cam pivoted upon the handle and an auxiliary spring interposed between the manual shiftable means and spring means, the auxiliary means being carried by the handle and bearing at all times upon the spring means.

18. Structure as defined by claim 4 wherein there is provided manually operable means normally movable to free chain position for holding the pawls from sprocket tooth engagement to permit free chain movement when there is no load on the chain.

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