Aug. 6, 1963 F. J. LOCK 3,100,031

PAWL ARRANGEMENT FOR HOIST

Filed Nov. 2, 1960

Fig. 1.

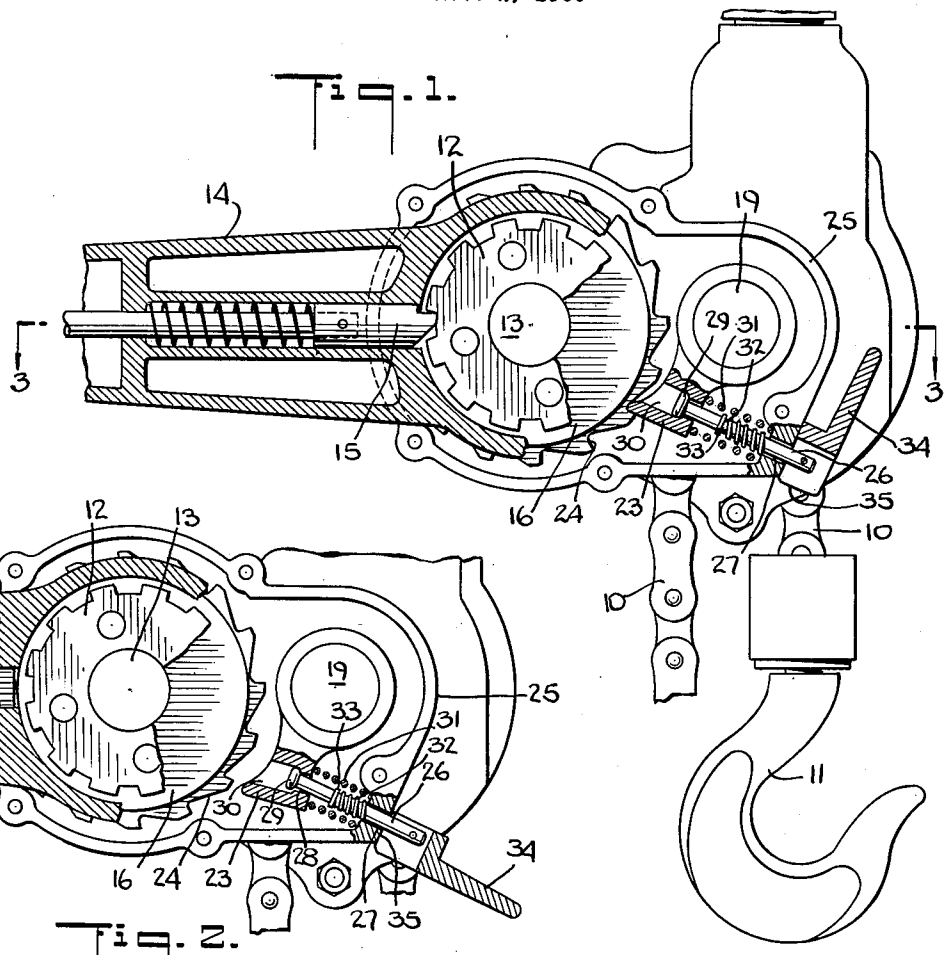
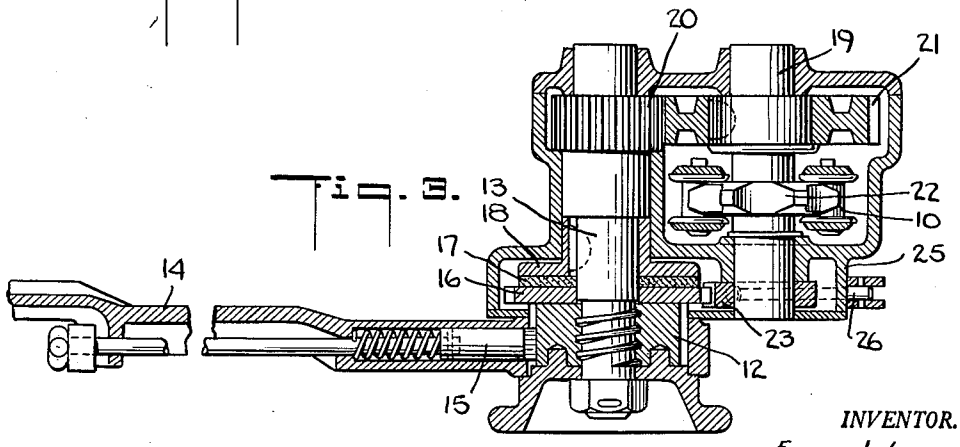


Fig. 2.

Fig. 3.



INVENTOR.
FRANK J. LOCK

BY

ATTORNEY

United States Patent Office

3,100,031

Patented Aug. 6, 1963

3,100,031

PAWL ARRANGEMENT FOR HOIST

Frank J. Lock, Philadelphia, Pa., assignor to The Yale and Towne Manufacturing Company, Stamford, Conn., a corporation of Connecticut

Filed Nov. 2, 1960, Ser. No. 66,796

1 Claim. (Cl. 188—82.7)

This invention relates to a chain hoist or puller of the type incorporating a one-way ratchet which is releasably connected to the load shaft of the hoist and cooperates with a pawl to prevent rotation of the load shaft in a direction to release a load.

In a hoist or puller of this type it is quite common to provide means for disengaging the pawl of the one-way ratchet to permit free rotation of the load shaft in both directions. This allows slack in the hoist chain to be taken up, or other adjustments in the length of the chain to be made quickly and easily by manually pulling either end of the hoist chain. Once the slack is taken up, or other adjustments in the length of the chain have been made, the pawl is released and lifting or pulling is effected by operation of the hoist through the usual operating lever or chain wheel.

The present invention is directed to a pawl arrangement whereby a pawl concealed within the hoist housing may be quickly and easily disengaged from the ratchet by means provided on the exterior of the casing. One purpose of the invention is to provide such a pawl arrangement which is simple and inexpensive, and which not only may be applied to new hoists, but may also be applied easily to existing hoists which do not include such an arrangement.

It is also a purpose of the invention to provide such an arrangement wherein the means on the exterior of the casing which are adapted to be actuated to release the pawl do not move with the pawl during normal operation of the ratchet, and, therefore, cannot interfere with the normal movement of the pawl in holding a load against dropping. To this end, the arrangement of the invention includes a pin which extends slidably through an opening in the hoist housing and has a lost motion connection with the pawl. This lost motion connection allows movement of the pawl relatively to the pin during normal operation of the ratchet without movement of the pin or movement of means on the exterior of the housing for withdrawing the pin. When it is desired to disengage the pawl, the pin is merely withdrawn a sufficient amount to first take up the lost motion and to then move the pawl away from the ratchet.

Other objects and advantages of the invention will become apparent from the following description, when read in conjunction with the accompanying drawings, wherein:

FIG. 1 is a partial sectional view of a hoist incorporating the pawl arrangement of the invention, and showing the pawl engaged with the one-way ratchet,

FIG. 2 is a partial sectional view similar to that of FIG. 1, but showing the pawl disengaged from the one-way ratchet, and

FIG. 3 is a sectional view taken on the line 3—3 of FIG. 1.

Referring to the drawings, the pawl arrangement of the invention is shown applied to a hoist or puller of the type disclosed in U.S. Patent No. 2,165,984.

In a hoist of this type, a load supported on one end of a lifting chain **10** by means of a load hook **11** is lifted when a brake hub member **12**, best shown in FIG. 3, threaded on a shaft **13**, is rotated relatively to the shaft in a clockwise direction, as viewed in FIG. 1. The brake hub **12** is conveniently rotated by means of a lever **14** which is connected to the brake hub **12** means of a reversible pawl **15**.

Because of the threaded engagement between the brake hub **12** and the shaft **13**, initial rotation of the brake hub **12** in a clockwise direction results in endwise movement of the brake hub **12** relatively to the shaft **13** to force a one-way ratchet **16** against a friction disc **17** and flange member **18** to bind the one-way ratchet **16** to the shaft **13**.

On continued rotation of the brake hub **12** in the clockwise direction, the one-way ratchet **16**, shaft **13**, friction disc **17**, flange member **18** and brake hub **12** rotate as a unit. This clockwise rotation of the shaft **13** results in counterclockwise rotation of a counter shaft **19** which is connected to the shaft **13** by means of a pinion **20** and a gear **21** secured respectively to shaft **13** and the counter shaft **19**. Counter shaft **19** has a sprocket **22** secured thereto over which the lifting chain **10** is trained, and counterclockwise rotation of the counter shaft **19**, therefore results in lifting of the load hook **11** and any load supported thereby. Reverse rotation of the counter shaft **19** and shaft **13** in a load lowering direction by a load supported by the load hook **11** is prevented by engagement of a pawl **23** with teeth **24** of the one-way ratchet **16**. The pawl **23** is conveniently mounted for pivotal movement on the end of the countershaft **19** within the housing **25** of the hoist.

When it is desired to lower a load carried by the load hook **11**, the pawl **15** of the lever **14** is reversed and the brake hub **12** rotated in a counterclockwise direction. This effects endwise movement of the brake hub **12** in a direction to relieve the braking action of the friction disc **17** on the one-way ratchet **16**. The shaft **13** and shaft **19**, therefore, slip relatively to the one-way ratchet **16** under the weight of the load on the hook **11** to lower the load. The ratchet **16** is held against rotation in a lowering direction by engagement of the pawl **23** with the teeth **24**. Such slippage of the shafts **13** and **19** and lowering of the load continues so long as the brake hub **12** is rotated in a lowering direction at a greater speed than that at which the shafts **13** and **19** are rotated by the load supported on the load hook **11**.

If rotation of the brake hub **12** in the lowering direction is stopped, slight continued rotation of the shafts **13** and **19** by the load again effects endwise movement of the brake hub **12** in a direction to bind the one-way ratchet **16** to the shaft **13** so that rotation of the shafts **13** and **19** in the lowering direction is stopped by engagement of the pawl **23** with the teeth **24** of the one-way ratchet **16**, and the load is safely held against dropping.

In accordance with the invention, a novel arrangement is provided for disengaging the pawl **23** from the one-way ratchet **16** so that when the reversible pawl **15** is disengaged from the brake hub **12**, and the pawl **23** is disengaged from the one-way ratchet **16**, as shown in FIG. 2, the shafts **13** and **19** may rotate freely in both directions and adjustments in the length of the chain **10** and the position of the load hook **11** may be made quickly and easily by manually pulling one end or the other of the chain **10**.

As best shown in FIGS. 1 and 2, this arrangement for disengaging the pawl **23** from the one-way ratchet **16** includes a simple pin or rod **26** which extends slidably through an opening **27** in the housing **25** and through an opening **28** in the end of the pawl **23**.

The pin **26** is provided with an enlarged head **29** at its extreme inner end which has a larger diameter than the opening **28** so that a pulling force applied to the pin **26** may be transmitted by the head **29** to the pawl **23**. The opening **28** in the pawl **23** communicates with an enlarged opening or bore **30** of sufficient diameter to allow free movement of the head **29** so that the pawl **23** may move relatively to the pin **26**. This arrangement

provides a lost motion connection between the pawl **23** and the pin **26** so that the pawl may pivot to ride over the teeth **24** of the one-way ratchet **16** without effecting movement of the pin **26** as the ratchet **16** rotates in a clockwise direction during lifting of a load. At the same time, the pawl **23** may be completely disengaged from the one-way ratchet **16** by withdrawing the pin **26** a sufficient amount to take up the lost motion and to pivot the pawl **23** completely away from the teeth **24** of the one-way ratchet **16**.

The pawl **23** is urged toward the one-way ratchet **26** by a coil spring **31** which surrounds the pin **26** and bears at one end against the pawl **23** and at the other end against the inner surface of the housing **25**. The pin **26** is similarly held in an inward position by means of a spring **32** so that it does not interfere with the normal movement of the pawl **23**. The spring **32** bears at one end against the inner surface of the housing **25** and at the other end against a split ring retainer **33** which is seated in a suitable annular groove provided in the surface of the pin **26**.

The pin **26** is adapted to be withdrawn to pivot the pawl **23** away from the one-way ratchet **16** against the force of the springs **31** and **32** by means of a toggle lever **34**. The toggle lever **34** is pivotally attached to the outer end of the pin **26** on the exterior of the housing **25**, and when the lever **34** is pivoted in a clockwise direction from the position shown in FIG. 1 to the position shown in FIG. 2, the pin **26** is withdrawn from the housing **25** to first take up the lost motion between it and the pawl **23** and then pivot the pawl **23** away from the one-way ratchet **16**, as shown in FIG. 2. When the lever **34** is pivoted to the position shown in FIG. 2, a flat surface **35** on the edge of the lever **34** engages the outer surface of the housing **25** so that the lever is held in this position by the compressed springs **31** and **32** and holds the pawl **23** away from the teeth **24** of the ratchet **16** until the lever **34** is again pivoted toward the position shown in FIG. 1.

From the preceding description, it can be seen that there is provided a very simple arrangement for disengaging a pawl from a one-way ratchet of a hoist. The arrangement may be applied to new hoists, or may be easily applied to existing hoists merely by modifying such hoist by drilling holes through the housing and the pawl to accommodate the pin for withdrawing the pawl. Because of the lost motion connection between the pin and the pawl, neither the pin nor the lever for actuating the pin are moved by the pawl during normal operation of the one-way ratchet. The pin and lever cannot, therefore,

interfere with the normal movement of the pawl by the one-way ratchet so as to prevent the pawl from properly engaging the one-way ratchet to hold the load.

While one embodiment of the invention has been shown and described, it will be appreciated that this is for the purpose of illustration and that changes and modifications can be made therein without departing from the spirit and scope of the invention.

I now claim.

In a hoist having a housing, a ratchet mounted for rotation in said housing, a pawl mounted in said housing for movement into and out of engagement with said ratchet, an opening through said housing, a bore extending through said pawl substantially in alignment with said opening through said housing, a pin extending through and freely slidable in said opening, said pin having an outer end portion extending outwardly of said housing and an inner end portion slidable through said bore in said pawl, said inner end portion of said pin having a head of larger diameter than said bore in said pawl and providing a lost motion connection between the inner end of said pin and said pawl so that said pawl while in engagement with said ratchet may move freely relatively to said pin, a toggle lever pivoted to the outer end of said pin for rotation while engaged with the outside of said housing so that pull may be applied to said pin to withdraw said pawl from said ratchet, a spring extending between the inside of said housing surrounding said opening and a shoulder on said pin and acting through the pin to press the toggle lever against the outside of the housing, the spring pressure being effective to hold said lever against rotation on its pivot while the pawl moves freely relatively to the pin, and a second spring about said pin and said first spring and pressing between the inside surface of said housing surrounding said opening and said pawl to urge said pawl toward the ratchet, the pressure of both said springs opposing movement of the toggle lever to withdraw said pawl and effective upon withdrawal of the pawl for holding said toggle lever against rotation on its pivot.

References Cited in the file of this patent

UNITED STATES PATENTS

390,845	De Lamarre	Oct. 9, 1888
1,025,088	Hess	Apr. 30, 1912
1,331,697	Detzel	Feb. 24, 1920
1,368,796	Haas	Feb. 15, 1921
1,974,333	Hirsch	Sept. 18, 1934