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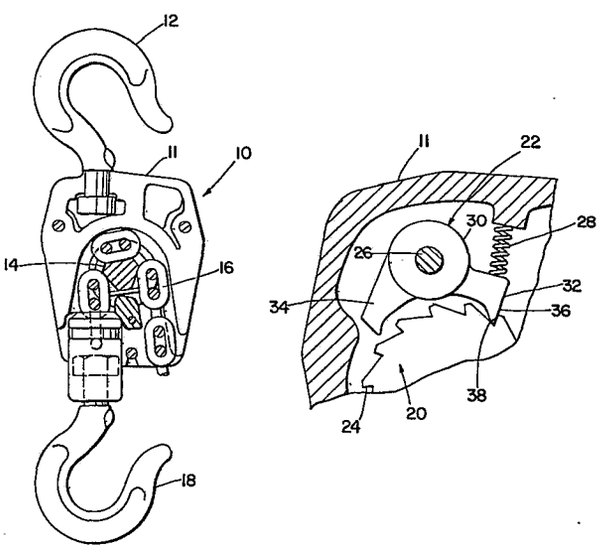
(54) Ratchet pawl.

(57) A rachet pawl (22) for a hoist (10) is self-camming into engagement with a ratchet wheel (20) of the hoist. The pawl includes a primary lobe (32) which engages the ratchet wheel teeth (24) and a secondary lobe (34) which rides on the ratchet wheel teeth to cam the primary lobe into position to engage the next ratchet wheel tooth. In a preferred embodment, the primary lobe is also spring biased into position to engage the ratchet wheel teeth.



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RATCHET PAWL

The present invention relates generally to hoists, and more particularly to an improved ratchet pawl for a hoist.

Hoists of the type employing Weston load brakes, such as that described in United States patent No. 3,138,231, include a ratchet wheel and a spring loaded pawl which engages teeth formed on the ratchet wheel to keep the load from lowering except when a cam member of the Weston brake releases the brake in response to rotation of an input member. The ratchet pawl is constantly spring-biased into engagement with the ratchet, and thus provides a high degree of reliability.

The object of the present invention is to provide an additional feature to such a hoist mechanism in the form of a ratchet pawl which is capable of engaging the ratchet wheel without the application of an external biasing force. Specifically, the ratchet pawl includes a secondary lobe which engages the ratchet wheel teeth to rotate the primary lobe of the pawl into engagement with the face of a ratchet wheel tooth. The primary and secondary lobes are arranged such that the hoist ratchets as usual in the up direction, while the primary lobe of the pawl is always put in position to engage the next ratchet wheel tooth in the down direction. In the preferred embodiment, a spring is still employed to bias the ratchet pawl into engagement with the ratchet wheel; however, it will be appreciated that the pawl will also function with no spring bias.

Other objects and advantages of the invention will be apparent from the following description when taken in connection with the accompanying drawings, wherein:

FIG. 1 is a sectional view of a ratchet lever hoist;

FIG. 2 is an enlarged fragmentary sectional view of a portion of the hoist of FIG. 1 incorporating the invention;

FIG. 3 is a fragmentary schematic representation of one operating position of the pawl and ratchet of the invention; and

FIG. 4 is a schematic representation similar to FIG. 3, but showing a second operating position.

Referring to FIG. 1, there is illustrated a ratchet lever hoist or puller 10, including a housing 11, a suspension hook 12 rotatably attached to the housing, an output sprocket 14 supported for rotation within the housing and operatively connected to the output of a Weston load brake assembly in a known manner, a load chain 16 received on the output sprocket 14, and a load hook 18 attached to the end of the chain.

Referring to FIG. 2, a portion of the load brake is shown, including a ratchet wheel 20 and a ratchet pawl 22. The operation of the ratchet wheel and ratchet pawl in a Weston load brake system is well known in the art, as described in United States Patent No. 3,138,231 and which is incorporated herein by reference, and will not be described herein in further detail. Essentially, in the load raising direction, in which the ratchet wheel 20 rotates clockwise as shown in FIGS. 2, 3 and 4, the pawl 22 skips over ratchet teeth 24, and the output sprocket is allowed to turn freely to raise the load. In the load lowering direction, or counterclockwise as shown, however, the pawl 22 engages the ratchet teeth to prevent movement of the output sprocket unless the ratchet wheel is released from the output sprocket by the action of the Weston brake in response to lowering movement of an input member of the brake (not shown).

FIG. 2 illustrates a preferred embodiment of the ratchet pawl of the invention, wherein the pawl 22 is mounted for rotation within the housing on a pin 26 which is secured to the housing, and is biased into engagement

with the ratchet wheel by means of a compression spring 28 acting between the pawl and the housing. The pawl 22 comprises a hub 30 which is received over the pin 26, a first arm or lobe 32 extending from one side of the hub, and a second arm or lobe 34 extending from the hub at an obtuse angle relative to the first lobe.

Referring particularly to FIGS. 3 and 4, the first lobe 32 is the active lobe of the ratchet pawl and includes a face 36 which engages a complementary face 38 on each ratchet tooth 24, and a first cam surface 42 which engages the tops of the teeth, as will be described in more detail below. The second lobe 34 serves as a camming member, including a second cam surface 44 which interacts with the top surface of each tooth to move the ratchet pawl 22 into a position wherein the face 36 on the pawl will engage the face 38 on the next tooth of the ratchet wheel 20 to prevent lowering the load without first disengaging the ratchet wheel by means of the load brake.

FIGS. 3 and 4 represent two critical relative positions of the ratchet wheel and ratchet pawl, with the ratchet pawl 22 operating independently of a biasing means such as spring 28. When the ratchet wheel 20 is turning in the load raising direction, or clockwise as shown here, and the wheel and the pawl are in the relative position shown in FIG. 3 the tooth designated 24a acting against the first cam surface 42 causes the pawl to rotate counterclockwise, moving the lobe 32 upward out of the way of the ratchet wheel teeth, and moving lobe 34 to a position between teeth as shown in FIG. 4. Further clockwise movement of the ratchet wheel will bring the tooth designated 24b into engagement with the cam surface 44 on the lobe 34, causing the pawl to rotate clockwise, moving the lobe 34 upward and out of the way of the teeth, and moving the lobe 32 to a position between teeth as shown in FIG. 3. Continued clockwise movement of the ratchet wheel causes the pawl 22 to rock back and forth

between the positions described above as the lobes 32 and 34 move alternately between positions out of the way of the ratchet teeth and positions between ratchet teeth.

When the ratchet wheel 20 is moved from the position of FIG. 3 in a counterclockwise or load lowering direction, the face 38 of the tooth designated 24c will contact the face 36 on lobe 32 to stop further rotation. If counterclockwise movement of the ratchet wheel starts when the wheel and pawl are in the FIG. 4 position, the cam surface 44 of lobe 34 will ride over the top of the tooth designated 24d to rotate the pawl to the FIG. 3 position to place the first lobe into position for the face 36 on the first lobe to contact the face 38 on the tooth designated 24e to stop further rotation.

It can be appreciated that in the embodiment illustrated in FIG. 2 the action of the pawl 22 relative to the ratchet wheel 20 will be as described above, except that the first lobe will always be biased toward the engagement position shown by means of the spring 28, in addition to the camming action described above.

I CLAIM:

1. In a hoist having a housing, a load member rotatably supported within said housing, a one-way ratchet wheel operatively attached to said load member, a plurality of ratchet teeth formed on said ratchet wheel, and a ratchet pawl pivotably mounted on said housing and engageable with said ratchet teeth; the improvement wherein said ratchet pawl comprises a first lobe having a tooth engaging surface formed thereon, a second lobe angularly displaced from the first lobe and having a cam follower surface formed thereon, said cam follower surface being engageable with the peripheral surfaces of said ratchet teeth and said engagement surface being engageable with radial engagement surfaces of said ratchet teeth, whereby upon rotation of said ratchet wheel in one direction engagement of said cam follower surface with said peripheral surfaces of said ratchet teeth rocks said ratchet pawl to a position wherein said engagement surface of said ratchet pawl engages the radial engagement surface of a ratchet tooth to prevent further rotation of said ratchet wheel in said one direction.

2. Apparatus as claimed in claim 1, in which said first lobe has a cam follower surface engagable with said peripheral ratchet tooth surfaces formed thereon, said cam follower surface alternately engaging said peripheral surfaces when said ratchet wheel is rotated in the opposite direction to rock said ratchet pawl back and forth about its axis to alternately move said first and second lobes out of the way of said ratchet teeth.

3. Apparatus as claimed in claims 1 or 2, including means biasing said ratchet pawl into a position wherein the engagement surface of said first lobe engages said radial engagement surface of a ratchet tooth when the ratchet wheel is rotated in said one direction.

4. Apparatus as claimed in claim 3, in which said biasing means comprises a spring acting between said housing and said first lobe.

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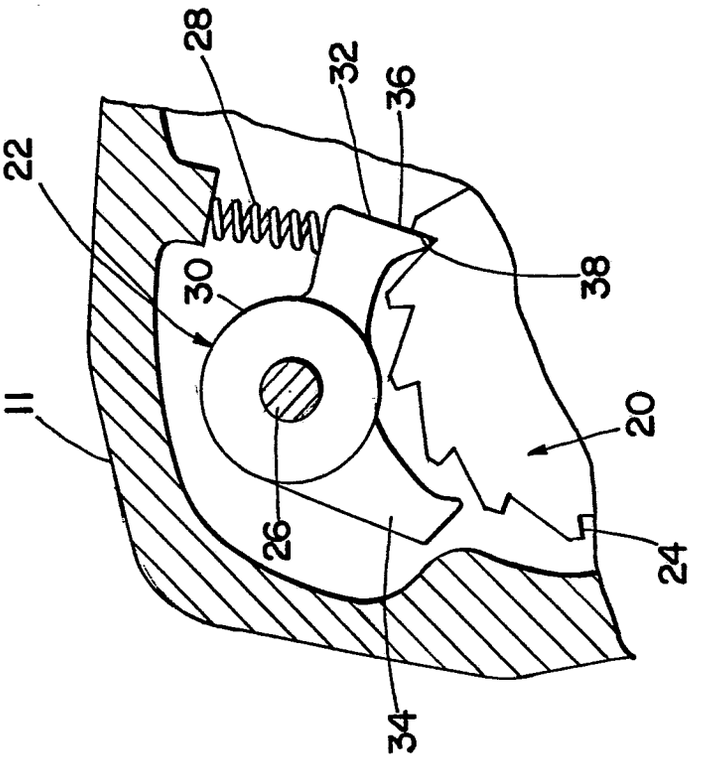

Fig. 2

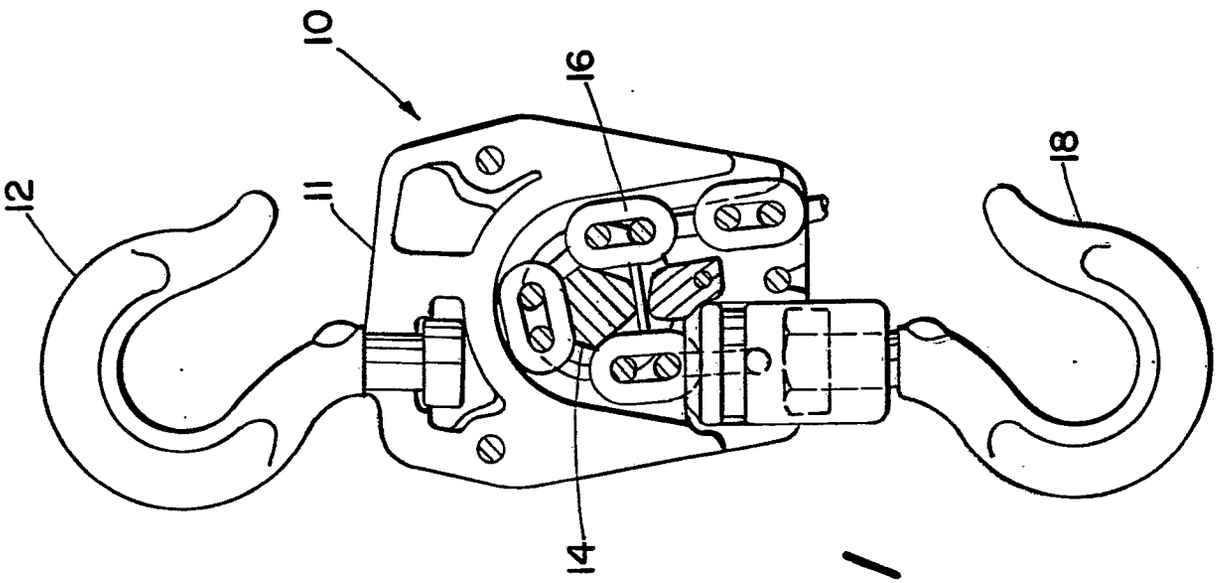

Fig. 1

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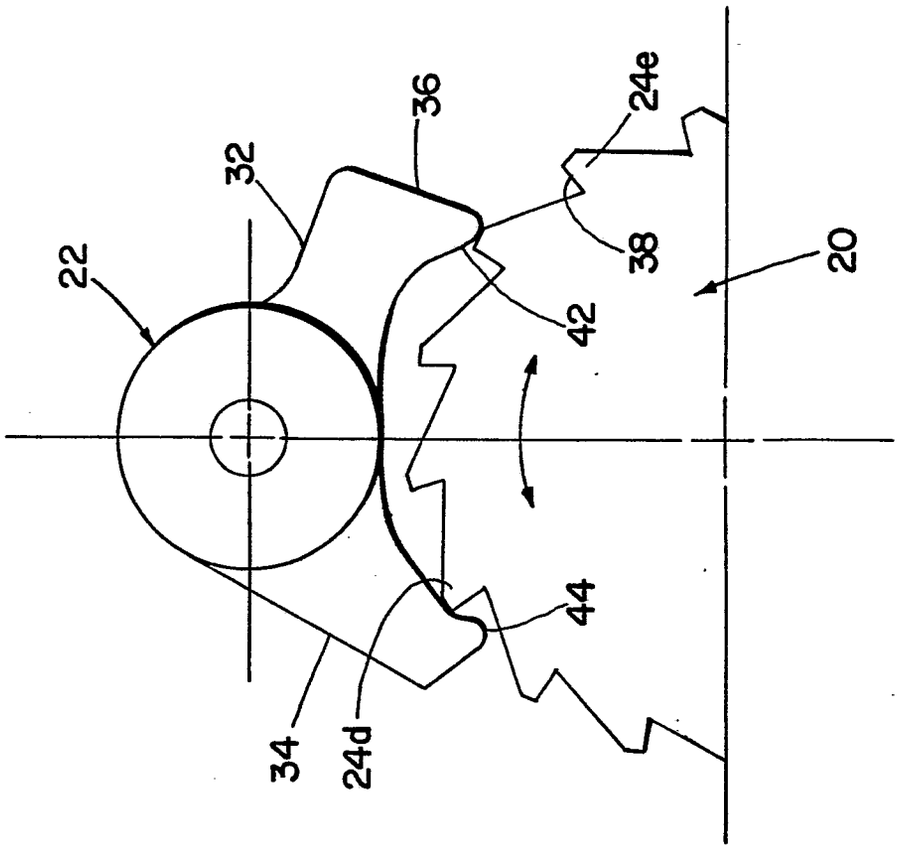

Fig. 4

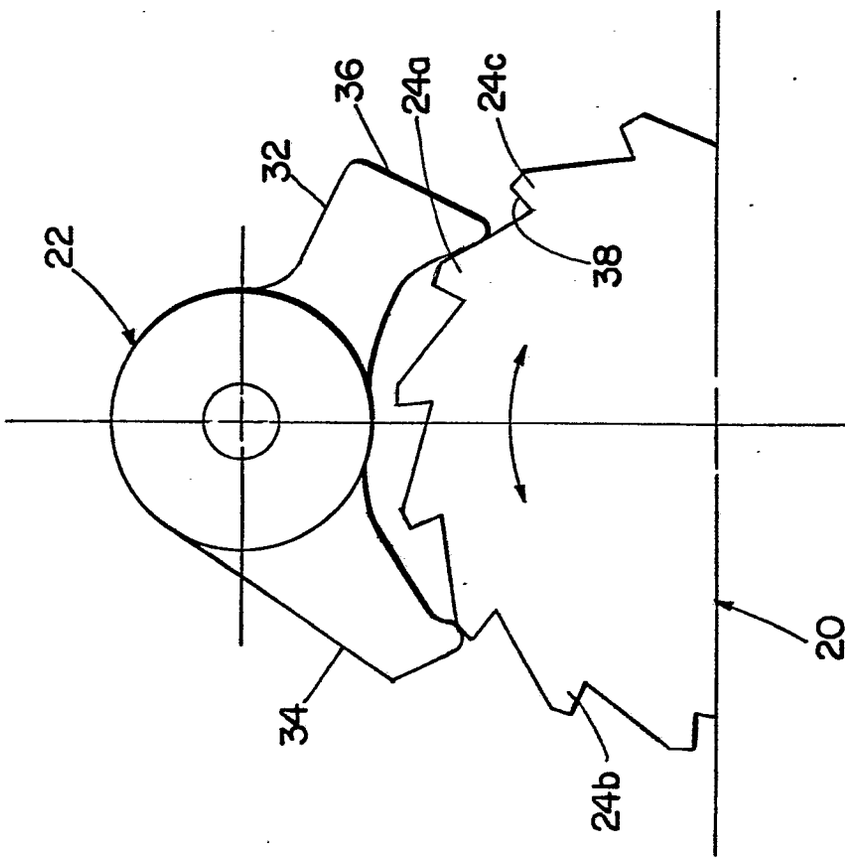

Fig. 3