

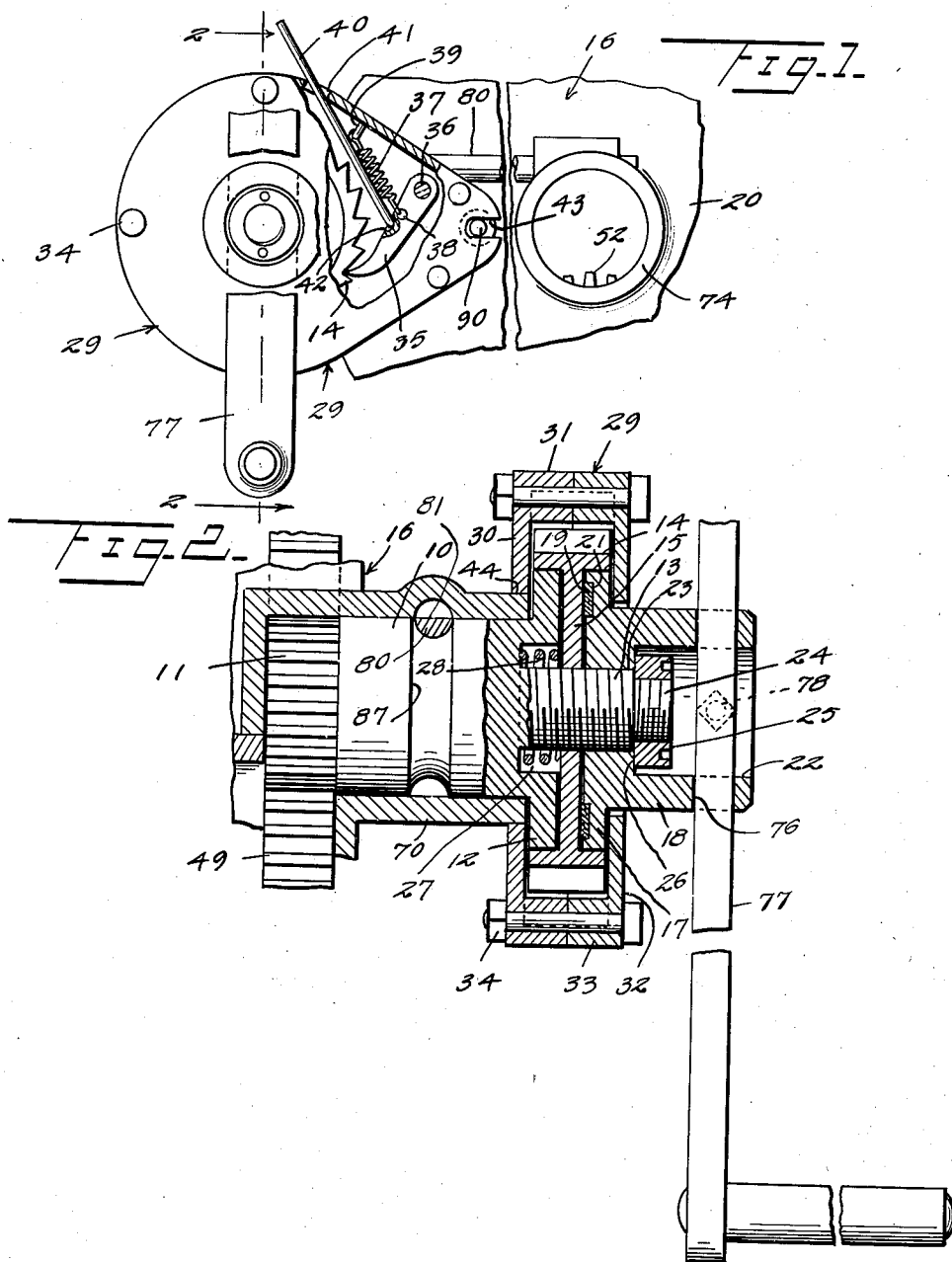
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SAFETY BRAKE FOR WINCHES

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SAFETY BRAKE FOR WINCHES

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2 Claims. (Cl. 254—187)

This invention relates to winches and to an improved means for automatically locking a winch against unwinding.

An object of this invention is to provide an attachment for a winch structure similar to that embodied in my Patent No. 2,083,489 or the structure embodied in my copending application filed March 25, 1940, Serial No. 325,905, the attachment being so constructed that the winch structure may be freely operated to wind the cable on the winding drum or to unwind the cable from the drum, the device being of such a construction that when the manual operator is rotated to unwind the cable from the drum, the attachment will automatically lock the drum against unwinding in the event the hand operator is either held against rotation or is released from the hand of the operator.

Another object of this invention is to provide an attachment of this kind including a driving element and a driven element and an improved means of coupling these elements together so that the driven elements may readily be held against rotation relative to the driving element.

A further object of this invention is to provide an attachment of this kind which may be used with either the winch structure similar to that embodied in my copending application or in my prior patent or may be used as an attachment for a scaffold raising and lowering winch.

A still further object of this invention is to provide an attachment of this kind which can be easily and quickly coupled with a winch structure and which will provide an automatic coupling and braking means for the winch so that the winding drum forming part of the winch will automatically be held against rotation without requiring the use of two hands in operating the winch.

At the present time in winch structures provided for raising or lowering scaffolding, the winch structures embody the use of a pivoted dog and ratchet for locking the winding drum against rotation in the direction of unwinding the cable thereon but it not infrequently occurs that the latching dog becomes disengaged from the ratchet and thereby permits the free unwinding of the drum and lowering of the scaffolding. It is, therefore, a still further object of this invention to provide an attachment of this kind which may be engaged with a winch forming part of a scaffold raising, lowering and supporting means which is so constructed that the operator of the device may raise or lower the scaffolding with the use of only one hand and in the lowering of the

scaffolding, the lowering operation is readily controlled by the braking element forming part of the attachment.

To the foregoing objects and to others which may hereinafter appear, the invention consists of the novel construction, combination and arrangement of parts as will be more specifically referred to and illustrated in the accompanying drawing wherein are shown embodiments of the invention, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawing:

Figure 1 is a detail front elevation partly broken away and in section of a brake attachment for use with a winch structure similar to that embodied in my copending application filed of even date herewith, and

Figure 2 is an enlarged sectional view taken on the line 2—2 of Figure 1.

Referring to the drawing, the numeral 16 designates generally a gear housing similar to that embodied in my copending application within which a driven gear 49 is rotatably mounted. The gear 49 forms part of a gear train, the specific details of which are more clearly set forth in my copending application. The gear housing 16 is formed with a pair of laterally projecting housings 70 and 74 which are carried by the outer wall 20 thereof.

In order to provide a means whereby the gear 49 may be held against rotation when the winch drum associated with the housing 16 is under a load, I have provided an attachment including an operating or stub shaft 10 which is adapted to rotatably engage within either the housing 70 or the housing 74. The stub shaft 10 has formed on the inner end thereof an operating gear 11 which is adapted to mesh with the gear 49 or with the smaller gear 52 which is carried by the winch structure. The shaft 10 at its outer end is provided with an annular flange 12 and is also provided with an axial threaded shaft 13, the threads of which are formed on a right hand pitch. A ratchet member comprising a toothed annulus 14 and an annular plate 15 rotatably engages on the threaded shaft 13 and the plate 15 abuts against the flange 12. A braking member comprising an annular plate 17 and a hub 18 is threaded onto the shaft 13 and is provided on its inner face thereof with a brake lining 19 which is countersunk in a recess 21 formed in the inner face of the plate 17.

The hub 18 is provided with an axial bore 22

which is substantially larger in diameter than the threaded bore 23 thereof and the threaded shaft 13 is provided with a reduced threaded stud 24 which is formed with left hand threads and upon which a holding nut 25 is threaded. The nut 25 engages in the bore 22 and is adapted to abut against the shoulder 26 formed at the inner end of the bore 22. An operating crank 77 is adjustably secured to the hub 18 by means of an adjusting set screw 78 and the hub 18 is formed with a transversely disposed opening 76 through which the crank 77 engages.

The shaft 10 at its outer portion is formed with an annular chamber and an expanding spring 28 engages in the chamber 27 and at one end engages against ratchet plate 15 and at the other end engages against the inner end of the chamber 27. The spring 28 is adapted to constantly hold the ratchet plate 15 against the brake lining 19 so that when a torsional strain is applied to the shaft 10, the plate 15 will effect reverse rotation of the hub 18 on the threaded shaft 13 and thus cause the plate 15 to frictionally engage against the plate 17.

A housing generally designated as 29 is disposed about the ratchet 14 and the housing 29 comprises an inner wall 30 formed with an outwardly projecting flange 31, an outer wall 32 formed with an inwardly projecting flange 33 confronting the flange 31. The housing 29 is of substantially egg shaped or ovoid configuration and the two parts of the housing comprising the inner wall 30 and the flange 31 and the outer wall 32 with the flange 33 are secured together by fastening devices 34 in the form of bolts or the like. A spring pressed pawl 35 is rockably mounted on a shaft 36 carried by the housing 29 and the pawl 35 is adapted to be yieldably held against the ratchet 14 by means of a contracting spring 37. One end of the spring 37 mounted in an opening 38 formed in the pawl 35 and the other end of the spring 37 engages a pin or eye 39 which is carried by the housing 29. The pawl 35 may be disengaged from the ratchet 14 by means of a pin 40 which is adapted to be extended through an opening 41 formed in the housing 29, the inner end of the releasing pin 40 engaging in a recess 42 formed in the pawl 35.

The pawl 35 is adapted to hold the ratchet 14 against rotation in one direction, the direction being a counterclockwise direction as viewed in Figure 1.

The housing 29 on the small or inner end thereof is provided with an inwardly opening slot 43 within which a pin 90 carried by the housing 16 is adapted so as to hold the housing 29 against rotation. The pin 91 corresponds to the outwardly projecting pin 89 carried by the boss 90 on the housing of my copending application aforesaid. The inner wall 30 of the housing 29 is provided with an opening 44 within which the outer end of the bushing 70 or 74 loosely engages.

In the use and operation of this attachment the operating shaft 10 is adapted to be locked in the housing 70 by means of a locking member 80 which engages in an annular groove 87 formed in the shaft 10. The housing 29 is engaged with the holding pin 90 carried by the housing 16 so that the housing 29 will be held against rotation relative to the housing 16. The pawl 35 is constantly held against the ratchet 14 by the spring 37 and when the crank 77 is rotated to wind the cable on the drum, the pawl 35 will ride over the teeth of the ratchet 14. When the crank 77 is rotated in a clockwise direction, the hub 18 will

be threaded inwardly on the right hand threaded stub shaft 13 so as to force the plate 17 against the intermediate plate 15 which is thereby pressed against the inner plate 12.

The endwise movement of the hub 18 will effect a compression of the spring 28 so that when the torsional strain on the hub 18 is relieved, the spring 28 will yieldably hold the intermediate plate 15 against the brake lining 19 carried by the plate 17. The load on the gear 49 during the rotation of the crank 77 will effect a counterclockwise torsional strain on the shaft 10 and in the event the crank 77 is released by the operator so that under normal conditions the counterclockwise torsional strain will have a tendency to rotate the shaft 10 in a counterclockwise direction, the dog or pawl 35 will hold the ratchet 14 against counterclockwise rotation and the reversed torsional strain on the shaft 10 will effect a winding or threading of the hub 18 on the threaded shaft 13 until the plate 15 is locked between the plates 12 and 17. The spring 28 will yieldably hold the plate 15 in contact with the brake lining 19. As the plate 15 is held against reverse rotation by the pawl, the shaft 10 will thus be held against reverse rotation by reason of the locking plate 15 between plates 12 and 17.

The clockwise rotation of the crank 77 will thread the hub 18 forwardly on the right hand threaded stub shaft 13 so as to clamp the intermediate plate 15 between the two plates or flanges 17 and 12. At this time, the pawl is riding over the ratchet and in the event the handle or crank 77 is released, the braking members comprising the two annular flanges or plates 12 and 17 and the plate 15 will remain in their locked or gripping position. As the torsional strain on the shaft 10 is a counterclockwise strain, the shaft 13 will be urged in a counterclockwise direction which will tend to turn the shaft 13 inwardly of the hub 18. In order to permit the shaft 10 to rotate in a counterclockwise direction with the pawl engaging the ratchet, it is necessary to rotate the crank 77 in the same direction to unthread the hub 18 from the shaft 13 and release the outer braking element 17 from the stationary or locked intermediate braking element 15. The spring 28 will provide a drag or frictional contact between the intermediate plate 18 and the outer plate 17 so that if the crank 17 is not rotated at a great enough speed, the counterclockwise rotation of the shaft 10 will draw the hub 18 inwardly so that the braking elements 12, 15 and 17 will be tightly engaged with each other.

As the intermediate braking element 15 is locked against counterclockwise rotation by the pawl, the shaft 10 will thus be locked against counterclockwise rotation. It will thus be seen that in order to permit counterclockwise rotation of the shaft 10 with the pawl 65 in locked position, it is necessary for the crank 77 to be rotated at a sufficient speed to maintain the plate 17 in a released position. With the plate 17 in a released position and frictionally engaging the plate 15 under the pressure of the spring 28, if the crank 77 is released, this frictional contact between the two plates 15 and 17 will be sufficient to cause the hub 18 to be threaded inwardly so as to lock the three braking elements or plates 12, 15 and 17 together.

An attachment of this kind has been constructed and applied to the winch structure embodied in my copending application and has been found

to entirely eliminate the possibility of the holding pawl, which is designated 66 in my copending application, from permitting the free rotation of the driven gear 49. With an attachment of this kind, the operator of the winch can readily control the unwinding of the drum associated with the winch irrespective of the load applied to the drum and at no time will this load be sufficient to pull the crank 77 out of the hand of the operator. If the operator of the device desires to permit the safety attachment to automatically lock the two gears 11 and 49 against rotation, it is only necessary to release the crank 77 whereupon locking means hereinbefore described will automatically lock the shaft 10 against rotation.

The safety attachment hereinbefore described will permit the elimination of the brake structure including the brake shoe 91 and the brake drum 50 embodied in my copending application, in the event it is desired to form a winch structure without such a brake, as the safety attachment will permit the unwinding of the cable from the drum at any speed desired. As hereinbefore described, the reversed rotation of the operating shaft 10 may be permitted by the operator holding the crank 77 in one hand so that the hub 18 will be threaded inwardly on the shaft 13 against the tension of the spring 28. In the event it is desired to permit free rotation of the operating shaft 10 the pin 40 may be inserted in the housing 29 so as to disengage the pawl 35 from the ratchet 14. At this time the ratchet 14 is permitted free rotation in either direction so that the load applied to the shaft 10 will rotate the shaft in a counterclockwise direction and the braking structure hereinbefore described will be ineffective.

This safety attachment has been applied to a winch structure forming part of a scaffold raising and lowering means and has been found more effective as a safety device than the conventional pawl and ratchet at present in use. With the use of this safety attachment on a scaffold winch where the winch is attached to the scaffold, the winch structure may be operated with the use of only one hand and it is not necessary for the operator to hold the locking pawl with the other hand as is at present the case.

I claim:

1. In combination, a winch having a gear housing at one end and a pair of cylindrical bushings carried by one end of said housing, a housing having an opening in a wall thereof in which one of said bushings is adapted to removably engage, a winch operator shaft journaled in said second housing and projecting laterally thereof through said opening for engagement in a selected bushing, an operating element carried by said shaft, a laterally projecting pin carried by said gear housing between said bushings, said second housing having a slot to receive said pin for holding said second housing against rotation relative to

— said gear housing, a braking element fixed to said shaft and disposed in said second housing, a second brake element threadably engaging said shaft and disposed in said second housing, an intermediate brake element between said first and second brake elements and loose relative to said shaft, a spring about said shaft constantly urging said intermediate brake element into contacting relation with said second brake element, an abutment fixed relative to said shaft and limiting the endwise movement of said second brake element in one direction, a ratchet fixed to said intermediate brake element, a spring-pressed pawl pivotally carried by said second housing for holding said ratchet against rotation in one direction, and a crank fixed to said second brake element, rotation of said crank in a direction to thread said second brake element inwardly on said shaft locking all of said brake elements together, and rotation of said crank in the opposite direction to unthread said second brake element releasing said brake elements whereby said shaft may simultaneously rotate in said opposite direction in proportion to the rotation of said crank in said opposite direction.

2. A portable winch operating attachment for extension into the winch at selected points of the latter, said attachment comprising a stationary housing, a rotatable shaft mounted in and extended from one side of the housing, said shaft being formed at its outer end with a gear, at its inner end with an annular chamber and at its inner end with an annular flange arranged in the housing and constituting an outer braking element, a second shaft integral with the base of, extended from and surrounded in spaced relation by the wall of said chamber, said second shaft being provided with peripheral right hand threads, a hollow hub extending into the housing from the other side thereof and threadably engaging at its inner end with said second shaft, said hub being formed at its inner end with a second outer braking element arranged in the housing and aligned with the said other braking element, means arranged within the hub and engaging with said second shaft for retaining the hub thereon, an intermediate braking element interposed between the other braking elements and loosely mounted on said second shaft, a ratchet carried by said intermediate element and encompassing the said other elements, a spring pressed pawl pivotally carried by said housing engaging said ratchet for holding said ratchet against rotation in one direction, resilient means mounted in said chamber bearing against said intermediate element for holding the latter and one of the said other elements in contacting relation, and means carried by the hub for rotating said hub in opposite directions to provide for the locking and releasing of said braking elements relative to said first shaft.

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