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WEATHERPROOF WINCH WITH RATCHET AND CLUTCH FEATURES

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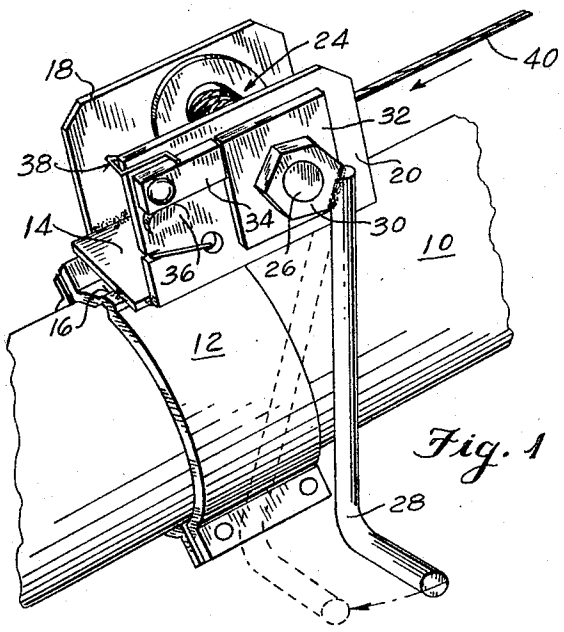


Fig. 1

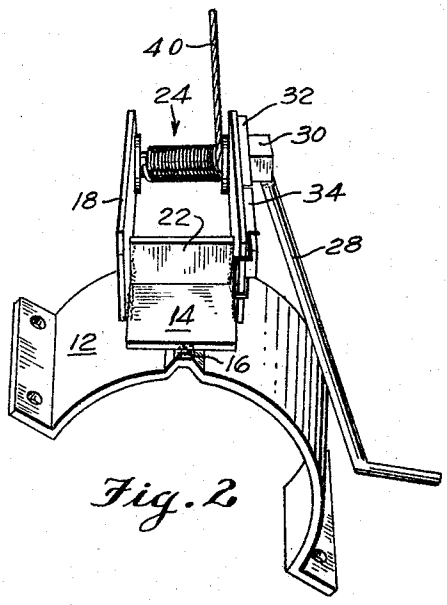


Fig. 2

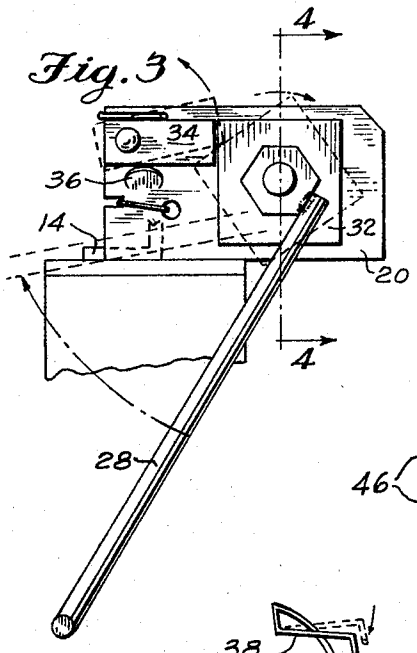


Fig. 3

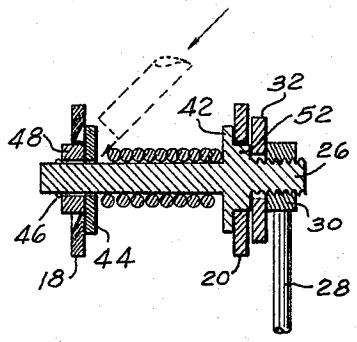


Fig. 4

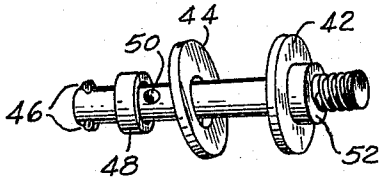


Fig. 5

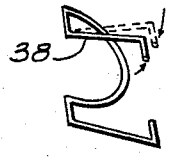


Fig. 6

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WEATHERPROOF WINCH WITH RATCHET AND CLUTCH FEATURES

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This invention has to do with winches or the like, and aims to provide a device of this kind which has various advantages over prior known constructions. It is especially suited for outdoor use, as on farm machines, grain loaders and the like, in which applications its resistance to weathering, corrosion, rusting, and like deterioration are especially valuable. However, the same construction can of course be employed efficiently in more protected or less arduous environments.

One of the problems of previously known winches of this kind has been the difficulty of galvanizing or electroplating all of the exposed surfaces. If the surfaces are so treated before assembly and then welded in assembled relation, the welding, fluxing and the like deteriorate the plating or leave unplated weld material exposed. Also, such a welded assembly could not readily be flushed to remove flux acids from between winch spool flanges and bracket walls and like places, leading to early deterioration of the parts. Moreover, the welded assembly was needlessly wasteful of assembly labor. Attempts to zinc plate or treat the parts after assembly were unsuccessful because, again, critical regions of the assembly could not be reached for such treatments.

The present invention provides a winch construction which eliminates final assembly welding, and permits every exposed surface to be plated or treated before assembly, with consequent long and trouble-free life. The plated parts are maintained in assembled relation partly by the connection of the winch crank to the spool or spindle, and partly, in the case of a loose spool flange, by the winch cable itself. The construction also lends itself to the provision of a novel crank and ratchet arrangement which allows ratchet-release solely and automatically by retrograde crank rotation; these parts also are readily pre-treated for weather resistance as mentioned above.

The various special features and advantages of the invention will best be comprehended from the following specification of a preferred form, shown in the accompanying drawings, in which:

FIG. 1 is a perspective view, with parts shown in an alternate position, of a winch in accordance with the invention.

FIG. 2 is an elevation of the winch and its support clamp, taken in the direction of view from the left side of FIG. 1.

FIG. 3 is a side elevational view of the invention, also showing parts in dash lines in an intermediate position.

FIG. 4 is a vertical section view taken along line 4—4 of FIG. 3.

FIG. 5 is a perspective view of a sub-assembly of the device prior to its assembly in the support bracket.

FIG. 6 is a detail perspective view of the ratchet spring of the device.

Referring first to FIGS. 1 and 2 of the drawings, numeral **10** designates a portion of a conventional auger housing tube forming part of a grain loader, conveyor or like machine to which the winch is secured as by a split clamp **12** or the like. Conveniently, the base plate

or web **14** of the winch bracket is welded to a formed-up channel section of one of the clamp halves as at **16**. The winch bracket also includes opposed parallel upstanding side walls **18** and **20** welded to the base plate **14**, which extends only part way between the side walls, and may be integral with a stiffening plate **22** also welded to those side walls. Elements **14** and **22** may in practice constitute a short section of angle iron.

The side walls **18** and **20** thus overhang the base plate **14**, and between them, in their region of overhang, is journalled a winch spool **24** having a threaded extension **26** to which is threaded a crank **28** economically formed as a crank handle welded to a nut **30**. Between the outer surface of side wall **20** and the nut **30** is loosely mounted a ratchet plate **32** cooperating with a pawl **34** pivoted on wall **20** for limited rotational movement away from a struck-up stop **36** and urged thereagainst by a spring **38** anchored to wall **20**. The winch cable **40** is threaded through a transverse hole in the spool spindle, axle or shaft and will therefore be wound upon the spool upon clockwise rotation of the crank **28**, in the direction indicated in FIG. 1 by the arcuate arrow and dashed lines.

The spool construction is best illustrated in FIGS. 4 and 5 of the drawings. The spindle has an integral annular flange **42** serving as one of the spool washers between which the cable is wound; the other washer **44** is loose about the spindle body as indicated graphically in FIG. 5, and is kept or captivated on the spindle by deformations **46** at the left end of the spindle in these figures. Between the deformations and washer **44** is a bearing ring **48** loosely fitting the spindle diameter, and received during assembly in an aperture in the side wall **18**. The parts are dimensioned so that after assembly, in the FIG. 4 condition, loose washer **44** will lie fairly closely against the inner surface of side wall **18**, and a transverse hole **50** (FIG. 5) receives the end of cable **40** which thus maintains the washer in that location. The aperture in wall **18** receiving ring **48** may be chamfered as shown in FIG. 4 to facilitate sliding the spindle and these parts into position, as suggested by the dash line position of the spindle and the direction arrow.

At its other (right-hand) end in FIGS. 4 and 5, the spindle has, beyond integral flange or "washer" **42**, a shoulder **52** of axial length slightly greater than the thickness of wall **20**, so that when nut **30** is made tight against the ratchet plate **32**, the spindle remains free to rotate in the side walls (except for the ratchet action), and ratchet plate **32** is thus held fixed with respect to the spindle for clockwise rotation therewith.

The operation of the device will be clear in view of the above. With the parts in the FIG. 1 condition and a load connected to cable **40**, clockwise rotation of crank **28** tightens the nut **30** on the threaded extension of the spool spindle, securing ratchet plate **32** tightly between shoulder **52** and the nut; the ratchet plate is rotated by the spindle rotation, and ratchets with reference to pawl **34**, which rises to pass each corner of the ratchet plate and then drops behind it to secure the spindle against counter-rotation and release of the cable tension; see FIG. 3.

When the cable tension is to be released, as when the cable load is to be slacked off or lowered, it is unnecessary to release the pawl **34** from plate **32**. The operator merely turns crank **28** counter-clockwise, and since the pawl **34** is restraining the ratchet plate **32** and the spindle

from rotation in the counter-clockwise direction, nut 30 is backed off slightly, releasing the clutch connection between plate 32 and the spindle shoulder 52. Under such conditions the spindle will start to rotate to lower the load, and such operation follows and is controlled by the retrograde rotation of the crank. When pressure against the ratchet plate 32 is released, rotation of the spindle relatively moves the threaded extension in the nut 30, thus tending to move the latter relatively into gripping engagement with the plate 32. Regardless of the pull on the cable, retrograde turning movement of the crank tends to keep it released from clamping engagement with the plate 32, and any tendency of this plate to be gripped by the nut 30 incident to the lowering of the load will simply retard or stop rotation of the spindle pending further turning movement of the crank. This operation is continued until the load is lowered to the desired extent whereupon movement of the crank will be stopped and very slight turning movement of the stem 26 will cause the nut 30 to grip the plate 32 and to grip the latter against the shoulder 52. In actual practice, it has been found that the lowering of the load can be perfectly controlled with little effort by retrograde turning movement of the crank and if the lowering of the load takes place in steps, it is not noticeable. In other words, the load is lowered steadily at a rate predetermined by retrograde rotation of the crank 28.

An important feature of the winch as described is the use of a sub-assembly (shown in FIG. 5 as a unit) all of whose parts may readily be acid treated, zinc plated or otherwise protected against corrosion prior to the making up of the sub-assembly. This applies even to the surfaces of the washers 42 and 44 which, when once assembled against side walls 18 and 20, could not be reached either for plating, coating or for the washing off of residual welding flux, acids and the like. Likewise, the parts of the winch bracket themselves can be treated on all surfaces before assembly, or as desired; hence all surfaces of the completed device are fully protected against the elements during use, and rusting, corrosion, seizing and like effects are not permitted to shorten the useful life of the winch. Use of the end of cable 40 as the assembly-securing means simplifies the device, and further reduces its cost and complexity.

While the invention has been described in rather specific and detailed terms to enable those skilled in the art to make and use the same, various modifications will occur to skilled workers, which are not to be considered as excluded from the invention except as may be required by the scope of the appended claims.

What is claimed is:

1. A winch box construction including a housing, a winch spool journalled in said housing and having a flange abutting an inner surface of a first housing wall, and a washer loose on said spool adjacent the inner surface of an opposite housing wall, cable means attached to said spool, said spool having a diametral aperture positioned immediately adjacent the inner surface of said washer and receiving said cable means which thereby acts as a stop holding said washer against said last-named housing wall.

2. A winch box in accordance with claim 1, said spool having a shoulder portion extending through said first housing wall, a ratchet plate loosely surrounding a reduced spool extension of said shoulder portion outside said first wall, a pawl engaging said ratchet plate, and a crank threaded on said spool extension, operable in one direction to tighten said ratchet plate against said shoulder to drive the winch in ratcheting direction, and to release said ratchet plate upon retrograde motion of said crank.

3. A cable winch assembly comprising a winch bracket providing spaced parallel walls apertured to receive between them a winch spool sub-assembly, said sub-assembly including a shaft, a first spool flange and bearing annulus integral with said shaft, and a second bearing annulus and second spool flange loosely captivated on said shaft; said shaft being transversely apertured inwardly of and immediately adjacent said second spool flange to receive a cable element in position to hold said second spool flange adjacent one of said bracket walls when said first spool flange is positioned adjacent the other of said walls.

4. A winch assembly in accordance with claim 3, in which said sub-assembly includes a threaded projection on one end of said shaft extending beyond a bracket wall, and an operating crank threaded on said projection.

5. A winch assembly in accordance with claim 3, in which said shaft has a projection extending beyond one bracket wall, and a crank connected to said projection.

6. A winch box comprising spaced rigid parallel walls, a winch spool having one end journaled with respect to one wall, said spool being provided toward its other end with an annular flange inwardly of and adjacent the other wall, said other wall having an axial opening, a shoulder of an axial length greater than the thickness of said other wall extending through said other wall and terminating in a shoulder surface lying slightly outwardly of said other wall, a ratchet plate loosely surrounding said other end of said spool adjacent and engageable with said shoulder surface, a pawl engaging said ratchet plate, and means mounted on said other end of said spool for turning the latter in one direction by clamping said ratchet plate between said means and said shoulder surface and being mounted for retrograde turning movement to release said clamping action from said ratchet plate for retrograde turning movement of said spool.

7. A winch box comprising spaced rigid parallel walls, a winch spool having one end journaled with respect to one wall, said spool being provided toward its other end with an annular flange inwardly of and adjacent the other wall, said other wall having an axial opening, a shoulder of an axial length greater than the thickness of said other wall extending through said other wall and terminating in a shoulder surface lying slightly outwardly of said other wall, a ratchet plate loosely surrounding said other end of said spool adjacent and engageable with said shoulder surface, a pawl engaging said ratchet plate, and crank having a nut fixed thereto and threaded on said other end of said spool whereby turning movement of said crank in one direction moves it axially of said spool to clamp said ratchet plate between said nut and said shoulder surface, slight retrograde turning movement of said crank relieving clamping pressure on said ratchet plate to free said spool for retrograde turning movement, which movement tends to thread said nut along said spool to re-establish said clamping engagement whereby, retrograde turning movement of said spool will take place in accordance with the rate of retrograde turning movement of said crank.

8. A winch box according to claim 7 wherein said one wall is provided with an opening so formed that said one end of said spool can be inserted therethrough from an angled position free of said other wall and then swung down into alignment with said opening in said other wall, whereupon said spool is endwise movable to insert said shoulder through said opening in said second wall, a bearing surrounding said one end of said spool when the latter is in axial alignment with the opening in said other wall, a loose washer arranged inwardly of said one wall, said spool being provided immediately adjacent the inner surface of said washer with an opening, and a cable having one end insertable through said last-named opening to maintain said washer in position adjacent said loose washer and to prevent axial movement of said spool away from said other plate.

9. Means to wind and unwind a line comprising, a frame having two spaced side members with at least one of said members having an aperture therein, a means to anchor said frame, a drum rotatably mounted on said frame and positioned between said side members, said drum having at least one axially aligned boss on the end thereof positioned in said aperture in said side member

of said frame, means rotatably securing the end of said drum opposite said boss to the other of said side members, a line means having a portion thereof wound on said drum, a ratchet plate having an aperture of a diameter less than the diameter of said boss positioned in abutting engagement with said boss, a crank means for rotating said drum having an arm portion, a handle on said arm portion, and an abutment portion positioned in abutment with said ratchet plate, a thread means extending through said aperture in said ratchet plate and operatively connecting said crank to said drum, said thread means maintaining a firm frictional engagement between said drum and said ratchet when said crank is rotated in one direction but decreasing the frictional engagement between said drum and said ratchet when the crank is rotated in the opposite direction, a pawl means on said frame in biased operative engagement with said ratchet plate, said means to wind and unwind a line constructed and adapted in use to wind line on said drum when said crank is rotated in one direction, hold line on said drum under tension when the crank is released and unwind line from said drum when said crank is rotated in the opposite direction without manual manipulation of the pawl.

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