United States Patent [19]

Newell

[11] 3,881,361

[45] May 6, 1975

[54] **ROPE PULLEY HOIST WITH IMPROVED HOLDING MEANS**

[76] Inventor: **E. Strohm Newell,** 2350 6th Ave., San Diego, Calif. 92101

[22] Filed: **July 13, 1973**

[21] Appl. No.: **379,143**

[52] **U.S. Cl.** **74/230.24;** 74/142; 74/230.5; 74/229; 254/191

[51] **Int. Cl.** **F16d 69/00;** F16h 55/38

[58] **Field of Search** 74/142, 230.24, 229, 230.5; 254/167, 191

[56] **References Cited**

UNITED STATES PATENTS

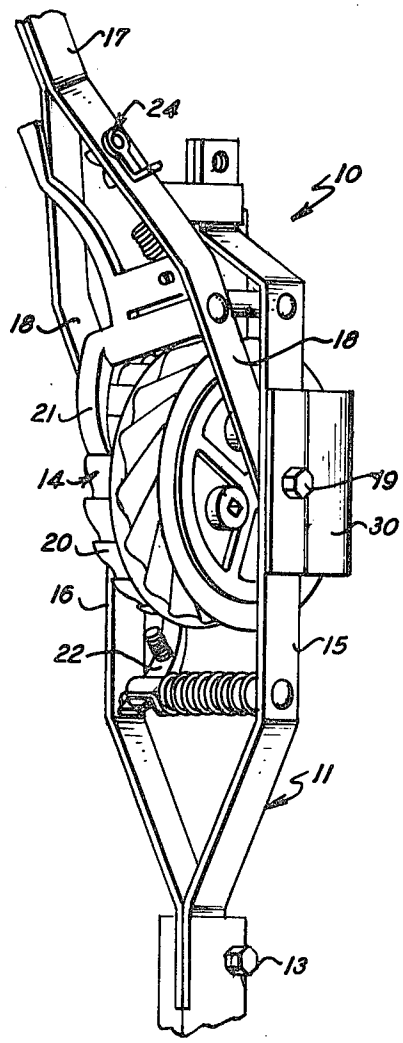
2,773,668	12/1956	Robins et al.	254/167
2,802,366	8/1957	Borner	254/191
2,894,610	7/1959	Harrington	254/167
3,003,359	10/1961	Maasdam	74/142
3,313,526	4/1967	Owens	254/191
3,376,756	4/1968	Yasue	254/167

Primary Examiner—Samuel Scott
Assistant Examiner—Allan R. Burke
Attorney, Agent, or Firm—Markva & Smith

[57] **ABSTRACT**

A pulley member is rotatably mounted on a frame which is adapted for attachment to a fixed object. The pulley member has an annular groove to receive a rope line. The rope is pressed against the pulley member while it is rotating under a load. A rope stripping means is disposed a spaced distance around the periphery of the pulley member from the pressing means so that an unlimited length of rope may be used with the unit. The pressing means and the stripping means are disposed in fixed relationship with respect to each other and with respect to the pulley member. Ratchet teeth are carried by the pulley member so that it may be driven by a swingable operating lever pivotally mounted on the frame. A feeding pawl is pivoted to the operating lever and engages the ratchet teeth to rotate the pulley member when the operating lever is swung in one direction. A holding pawl is pivotally mounted and resiliently biased toward active engagement with the ratchet teeth.

11 Claims, 8 Drawing Figures



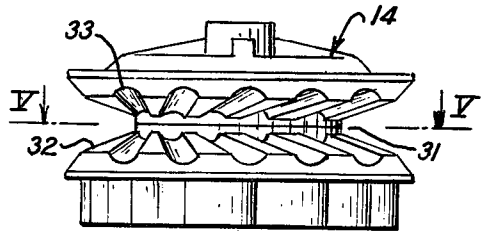


Fig-3

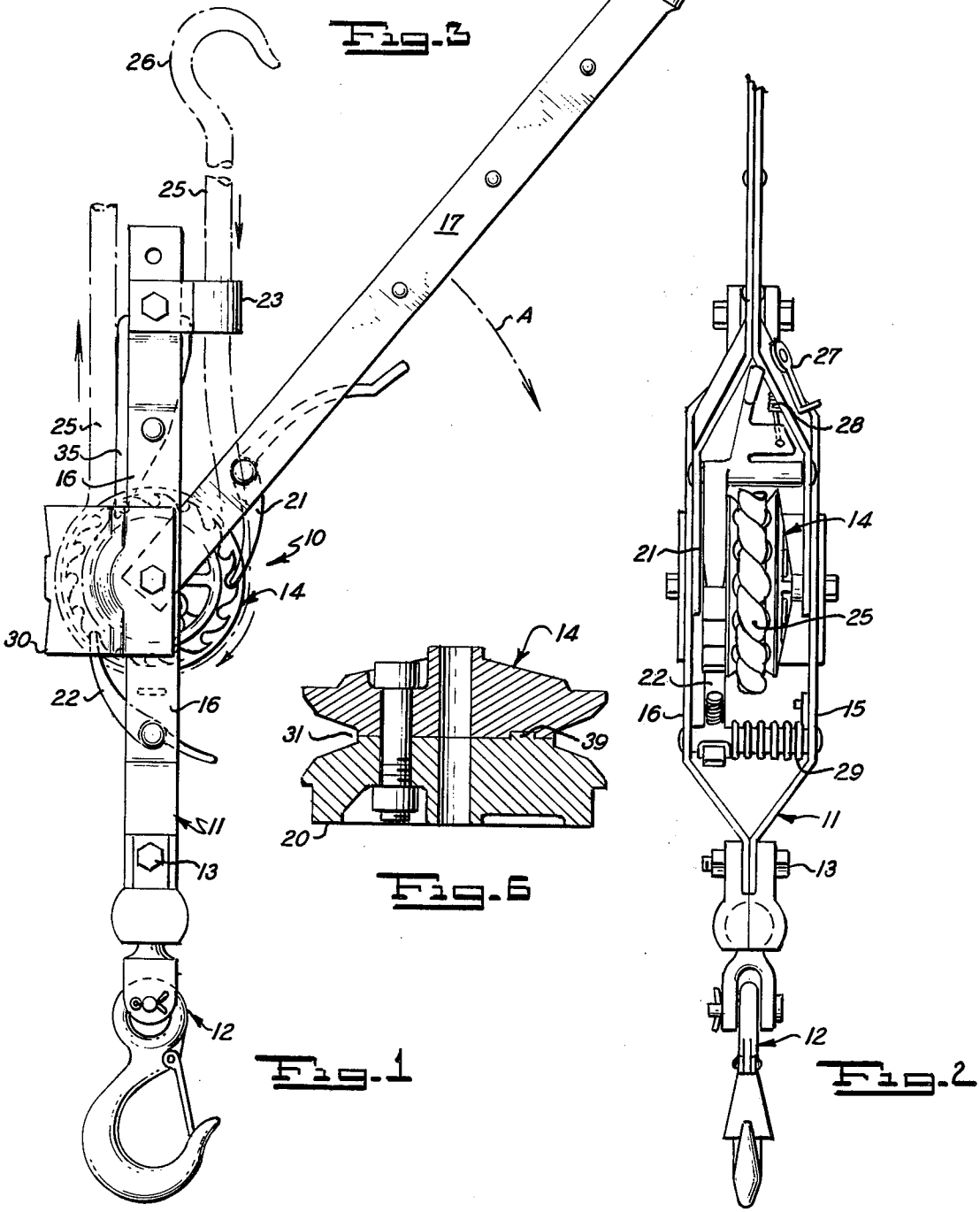


Fig-1

Fig-2

Fig-6

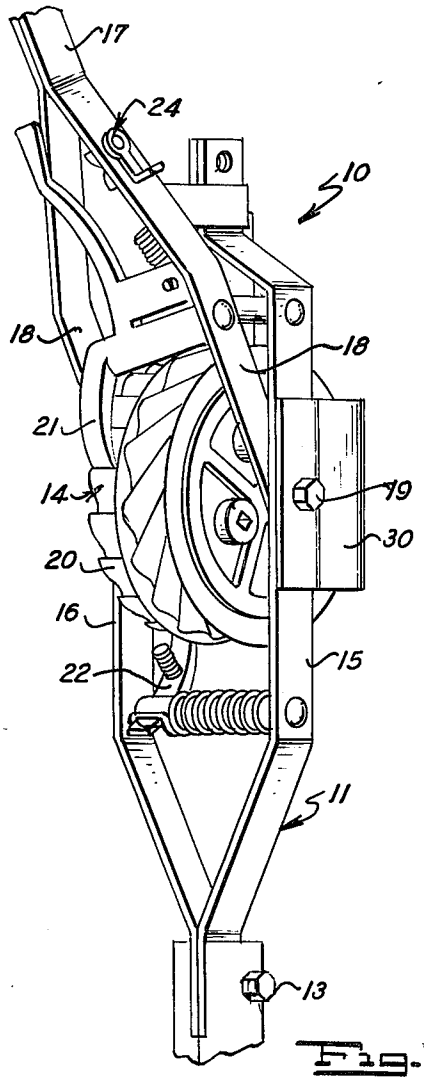


Fig. 7

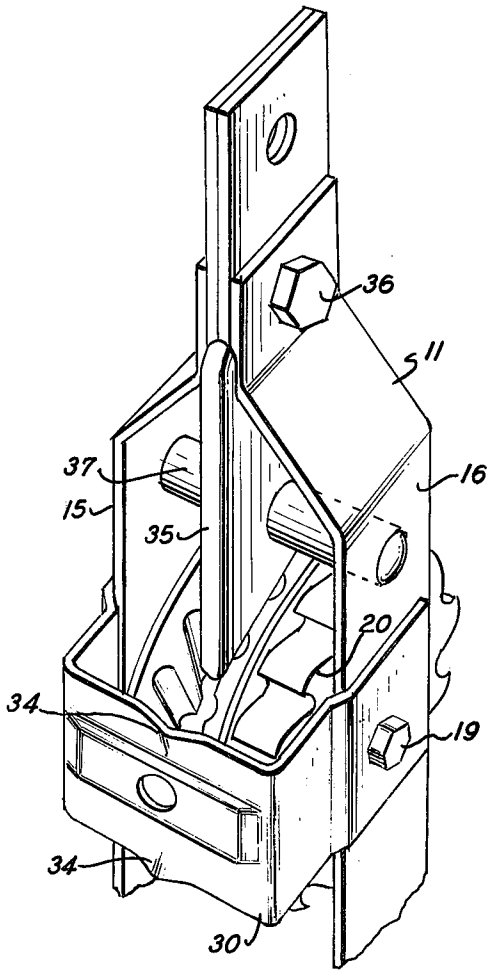


Fig. 8

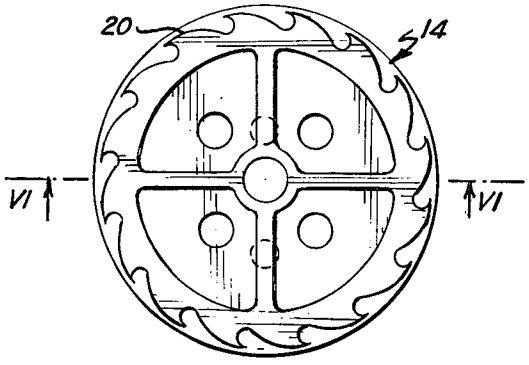


Fig. 4

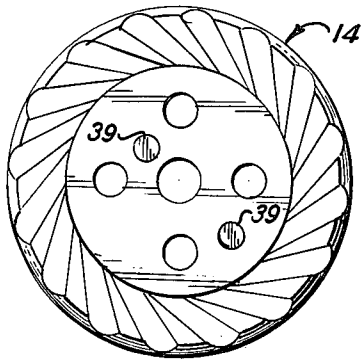


Fig. 5

ROPE PULLEY HOIST WITH IMPROVED HOLDING MEANS

BACKGROUND OF THE INVENTION

This invention relates to improvements in power units or pulling devices of the type in which pawl and ratchet mechanisms are used in conjunction with a rotatably mounted member. The pawl and ratchet mechanisms are operated by an oscillatory lever.

There are numerous types of power units or pulling unit devices of the type in which the improvement of the present invention is directed. The general construction of such a power unit is disclosed in U.S. Pat. No. 3,003,359. A cable winding drum is used in which one end of the cable is attached to the drum and has an attaching member located at its end to effectuate the desired pulling operation.

This type of pulling device may be used as a hoist, a winch or a puller such as is used in shops, garages, loading docks, material yards, telephone lines, construction sites and the like. However, prior art power units have limitations. The length of the pull is limited by the amount of cable which may be stored on the cable winding drum. This, of course, limits the length of lift or pull with respect to the device. For example, a number of the available pulling devices are limited to a maximum of lifting a 20 foot pole about 20 feet. Once this has been accomplished, another device has to be attached and the lift continued again.

A further limitation exists where there is the possibility of electrical danger, such as in working on utility poles, high tension lines and the like. That is, the present prior art cable winding devices are conductors and therefore dangerous. Additionally, cable cannot be tied easily around, over or directly tied to objects because of its construction. Furthermore, the handling of cable is much more dangerous to the operator especially if the cable becomes frayed.

PURPOSE OF THE INVENTION

The primary object of this invention is to provide a rope pulling device or power unit which can be used with an unlimited length of rope so that long distances can be pulled with a single device.

A further object of this invention is to provide a rope pulling device or power unit which can be used safely on utility poles, high tension wires and the like.

A further object of this invention is to provide a rope pulling device or power unit which does not require a line storage operation such as found on prior art pulling devices or power units of the type being improved herein.

Another object of this invention is to overcome the disadvantages associated with the cable pulling units of the prior art.

SUMMARY OF THE INVENTION

These objects and other advantages are achieved through the use of the rope pulling device as disclosed herein. The power unit has a frame for attachment to a fixed object and includes a pulley member rotatably mounted on the frame and having an annular groove to receive a rope line. Means is provided for pressing a rope line against the pulley member while it is rotating under a load. Rope stripping means is disposed a spaced distance around the periphery of the pulley member from the pressing means so that an unlimited length of rope may be used with the unit. The pressing means and the stripping means are disposed in fixed relationship with respect to each other and the pulley member to accomplish the desired results.

A particular feature of this invention is directed to the pulley member which has a plurality of ribs and troughs disposed transversely to the circumference of the annular groove at regular intervals along the surface thereof. A further feature of the invention includes the construction of the pulley member having means disposed within the annular groove to enhance the gripping action on the rope used with the power unit.

A further feature of the invention is directed to a specific structure of a rope stripper member disposed adjacent the pulley member and extending into the annular groove to cause the rope to be disengaged from the annular groove of the pulley member after it has been pressed against the pulley member by the pressing means. The free end of the rope is left to be coiled at some point away from the power unit itself. That is, the rope is freely disposed within the annular groove where it is maintained during lowering and raising operations by a rope holding member or pressing means.

Another feature of the invention is directed to the use of a rope holding member fixedly disposed adjacent the pulley member to hold a rope in pressing contact with the annular groove of the pulley member. In a specific embodiment of this invention, the rope holding member includes a bar portion which extends in a direction parallel to the axis of rotation of the pulley member. The bar portion is located a fixed, effective distance from the periphery of the pulley member so that a rope disposed in the annular groove will be pressed into positive engagement with the pulley member when the power unit is loaded and in a pulling condition. Guide means is disposed on the rope holding member to direct the rope into the annular groove at a point located between the rope holding member and the annular groove.

BRIEF DESCRIPTION OF DRAWINGS

Other objects of this invention will appear in the following description and appended claims, reference being made to the accompanying drawings forming a part of the specification wherein like reference characters designate corresponding parts in the several views.

FIG. 1 is a side elevational view of a power unit made in accordance with this invention,

FIG. 2 is a plan view of the unit as shown in FIG. 1,

FIG. 3 is a plan view of a pulley member made in accordance with this invention,

FIG. 4 is a side elevational view of the pulley of FIG. 3,

FIG. 5 is a cross-sectional view of the pulley along line V—V of FIG. 3,

FIG. 6 is a cross-sectional view along line VI—VI of FIG. 4,

FIG. 7 is a fragmentary perspective view of the unit of FIG. 1, and

FIG. 8 is another fragmentary perspective view of the unit of FIG. 1.

DESCRIPTION OF SPECIFIC EMBODIMENTS

The general construction of the power unit is disclosed in the prior U.S. Pat. No. 3,003,359. The basic improvement in this power unit is that it may now be used in conjunction with an unlimited length of rope

rather than a cable which must be stored on a winding drum.

More specifically, referring to the drawings, the power unit, generally designated **10**, includes a rigid frame or yoke **11** having spaced parallel arms **15** and **16**. A hook mechanism **12** is fixedly attached to one end of the frame **11** by the fastening member **13**.

A swingable operating handle or lever **17** includes spaced arm extensions **18** which are pivotally mounted at the longitudinal centers of the spaced parallel arms **15** and **16**. The spaced arm extensions **18** are engaged inwardly of the frame sides **15** and **16** and are pivotally fixed by the tranverse bolt **19**.

A pulley member, generally designated **14**, is rotatably mounted between the spaced frame arms **15** and **16** on the transverse axis of the transverse bolt **19**. The pulley member **14** includes ratchet teeth **20** which are disposed on one side thereof for coaction with feed pawl **21** and holding pawl **22**. A guide element **23** is fixedly mounted on the frame **11** to direct the rope **25** into the pulley member **14** as shown in FIG. **1**.

The driving or feed pawl **21** is pivotally mounted between the arm extension **18** and is positioned for coaction with the ratchet teeth **20** as shown. An activating mechanism, generally designated **24**, is mounted on the frame **11** and is used to render the feed pawl **21** active and inactive with respect to the ratchet teeth **20**. Further, the activating mechanism **24** is used to facilitate the coaction between the feed pawl **21** and holding pawl **22** during the step-by-step retrograde movement of the pulley member **14**. The activating mechanism **24** includes an operating lever **27** and a coil spring **28** which operate in the same manner as the configuration disclosed in U.S. Pat. No. 3,003,359.

The holding pawl **22** is rotatably mounted between the parallel arms or sides **15** and **16** of the frame **11** and is positioned for coaction with the ratchet teeth **20** as shown. The holding pawl **22** is biased toward engagement with the ratchet teeth **20** by the torsional spring **29**. The construction of the feed pawl **21** and the holding pawl **22** and the mechanisms associated therewith are fully described in the U.S. Pat. No. 3,003,359 and the teachings associated with that disclosure are incorporated by reference herewith.

The improvement associated with this specific type of power unit is in the combination of a specially constructed pulley member, pressing means and rope stripping means. The pulley member **14** is usable with the single strand of rope **25** which carries a hook **26** at its end. A generally U-shaped bracket member **30** is fixedly mounted on the parallel arms **15** and **16** of the frame **11**. The bracket member **30** includes a bar portion that extends in a direction parallel to the axis of rotation of the pulley member **14**. The bar portion of the bracket **30** is disposed a fixed, effective distance from the periphery of the pulley member **14** so that positive engagement of the rope **25** with the pulley member **14** is ensured as it moves past the bracket bar portion.

The pulley member **14** includes an annular groove **31** which has inclined lateral surfaces as shown. A plurality of ribs **32** and troughs **33** is disposed transversely to the circumference of the annular groove **31** and at regular intervals along the lateral surface thereof. A particular feature of this type of groove configuration is that the ribs and troughs mate with the braids of the rope **25** as shown in FIG. **2**. Therefore, in this particular embodiment, the rope **25** is in a non-frictional engagement within the annular groove **31** of the pulley member **14**. With the non-frictional engagement, the pulley member **14** acts alone to lift the load on rope **25**. The configuration of the groove **31** constitutes means to enhance the gripping action on the rope **25** while the power unit **10** is in operation. In a frictional gripping action, the bracket or rope holding member **30** may be used to maintain positive engagement between the pulley member **14** and the rope **25** when the load is being pulled through the action of the handle **17**.

Another feature of the invention includes the use of guide means **34** which are for directing the rope **25** into the annular groove **31** of the pulley member **14**. The guide means **34** is an indentation outwardly along the edge of the bracket **30**. Once the rope **25** engages the groove **31**, positive engagement of the rope is insured by the rope holding member **30** which is fixedly disposed adjacent the pulley member **14**. This positive engagement is especially useful when the load is being let down so that the rope **25** does not fly out of engagement with the pulley member **14**. In other words, the rope line **25** is maintained in the annular groove **31** while having a load thereon when the pulley member **14** is rotating in either a clockwise or counter clockwise direction.

While the power unit **10** is under load and the operating handle **17** is pulled in the direction shown by arrow A, the rope **25** becomes firmly embedded or tightly wedged in place between the lateral surfaces thereof. A wedge-shaped stripper member **35** is fixedly attached to the frame **11** by the bolt **36** and fixed rod **37** which is mounted between arms **15** and **16**. The stripper member **35** constitutes the means for stripping the rope **25** which has been firmly wedged within the annular groove **31** while the power unit **10** is loaded. This function is shown in FIG. **1**. The stripper member **35** is disposed a spaced distance around the periphery of the pulley member **14** from the pressing or holding member **30** so that an unlimited length of rope **25** may be used with the unit **10**.

The rope stripper member **35** is disposed adjacent the pulley member **14** and extends into the annular groove **31** by an amount sufficient to cause the rope **25** to be disengaged from the annular groove **31** after it has been pressued against the pulley member **14** by the rope holding member **30**. As shown, the pressing means **30** and the stripping means **35** are disposed in fixed relationship with respect to each other and the rotatably mounted pulley member **14**.

The pulley member **14** is composed of two halves which are held together by bolts **38**. The halves of the pulley member **14** are set in fixed relationship with each other by the pins **39**. The ratchet teeth **20** are formed integrally as a one-piece unit on one-half of the pulley member **14** as shown.

ADVANTAGES OF THE INVENTION

The pulling device of the present invention does not get back-lash as is associated with the prior art cable pulling devices. This overcomes a basic problem associated with such cable pulling power units. Further, rope can be used on utility poles and high-tension lines and the like because it is a nonconductor. Rope can be easily tied to objects, over, around and the like while cable has to be hooked to something such as a fastening device. All of the basic advantages associated with the use of rope over cable are attendant the power unit of this

invention which has been heretofore unavailable in the prior art. That is, rope is much better, easier to handle and more practical than cable in a myriad of applications. Long distances ca be pulled such as pulling wire from pole to pole, bringing a vehicle up an incline, such as a snowmobile, or out of the water, such as a boat, and many other uses.

While the power unit has been shown and described in detail, it is obvious that this invention is not to be considered as being limited to the exact form disclosed, and that changes in detail and construction may be made therein within the scope of the invention, without departing from the spirit thereof.

Having thus set forth and disclosed the nature of this invention, what is claimed is:

1. A power unit useful for pulling a load with a rope line, comprising:

a. a frame for attachment to a fixed object,

b. a pulley member rotatably mounted on said frame and having an annular groove to receive a single strand of rope line,

c. means for pressing said rope line in contact against the pulley member during rotation of the pulley member whereby the rope line is maintained in the annular groove while having a load thereon when the pulley member is rotating in either a clockwise or counter clockwise direction,

d. means for stripping said rope from the pulley member while the power unit is loaded,

e. said rope stripping means being disposed a spaced distance around the periphery of the pulley member from the pressing means so that an unlimited length of rope may be used with said unit,

f. said pressing means and said stripping means being disposed in a fixed relationship with respect to each other and the pulley member,

g. ratchet teeth carried by said pulley member for driving same,

h. a swingable operating lever pivotally mounted on the frame,

i. a feeding pawl pivoted to the operating lever and engageable with the ratchet teeth to rotate the pulley member when the operating lever is swung in one direction, and

j. a holding pawl pivotally mounted and resiliently biased toward active engagement with the ratchet teeth.

2. A power unit as defined in claim **1** wherein the pulley member has a plurality of ribs and troughs disposed transversely to the circumference of the annular groove and at regular intervals along the surface thereof.

3. A power unit as defined in claim **1** wherein the annular groove has inclined lateral surfaces and a plurality of ribs and troughs disposed transversely to the circumference of the annular groove and at regular intervals along said inclined lateral surfaces.

4. A power unit as defined in claim **1** wherein the pulley member includes means disposed within the annular groove to enhance the gripping action on the rope.

5. A power unit as defined in claim **1** wherein said stripping means includes a rope stripper member disposed adjacent the pulley member and extending into the annular groove by an amount sufficient to cause the rope to be disengaged from the annular groove after it has been pressed against the pulley member by said pressing means.

6. A power unit as defined in claim **1** wherein said stripping means includes a stripper member fixedly mounted on said frame and extending into the annular groove of the pulley member by an amount sufficient to cause the rope to be disengaged from the annular groove.

7. A power unit as defined in claim **1** wherein said pressing means includes a rope holding member fixedly disposed adjacent the pulley member to hold a rope in pressing contact with said annular groove.

8. A power unit as defined in claim **1** wherein the pulley member has a plurality of ribs and troughs disposed transversely to the circumference of the annular groove and at regular intervals along the surface thereof,

said pressing means includes a rope holding member fixedly disposed adjacent the pulley member to hold a rope in pressing contact with said annular groove,

said stripping means includes a rope stripper member disposed adjacent the pulley member and extending into the annular groove by an amount sufficient to cause the rope to be disengaged from the annular groove after it has been pressed against the pulley member by said pressing means.

9. A power unit useful for pulling, comprising:

a. a frame for attachment to a fixed object,

b. a pulley member rotatably mounted on said frame and having an annular groove to receive a single strand of rope line,

c. means for pressing said rope line against the pulley member,

d. said pressing means including a bar portion which extends in a direction parallel to the axis of rotation of the pulley member,

e. said bar portion being disposed a fixed, effective distance from the periphery of the pulley member to press a rope into positive engagement with the annular groove as the pulley member rotates past said bar portion,

f. means for stripping said rope from the pulley member while the power unit is loaded,

g. said rope stripping means being disposed a spaced distance around the periphery of the pulley member from the pressing means so that an unlimited length of rope may be used with said unit,

h. said pressing means and said stripping means being disposed in a fixed relationship with respect to each other and the pulley member,

i. ratchet teeth carried by said pulley member for driving same,

j. a swingable operating lever pivotally mounted on the frame,

k. a feeding pawl pivoted to the operating lever and engageable with the ratchet teeth to rotate the pulley member when the operating lever is swung in one direction, and

l. the holding pawl pivotally mounted and resiliently biased toward active engagement with the ratchet teeth.

10. A power unit useful for pulling, comprising:

a. a frame for attachment to a fixed object,

b. a pulley member rotatably mounted on said frame and having an annular groove to receive a single strand of rope line,

c. means for pressing said rope line against the pulley member,

d. said pressing means including a generally U-shaped bracket member fixedly mounted on said frame and having a bar portion which extends in a direction parallel to the axis of rotation of the pulley member,

e. said bar portion being disposed a fixed, effective distance from the periphery of the pulley member to press a rope into positive engagement with the annular groove as the pulley member rotates past said bar portion,

f. means for stripping said rope from the pulley member while the power unit is loaded,

g. said rope stripping means being disposed a spaced distance around the periphery of the pulley member from the pressing means so that an unlimited length of rope may be used with said unit,

h. said pressing means and said stripping means being disposed in a fixed relationship with respect to each other and the pulley member,

i. ratchet teeth carried by said pulley member for driving same,

j. a swingable operating lever pivotally mounted on the frame,

k. a feeding pawl pivoted to the operating lever and engageable with the ratchet teeth to rotate the pulley member when the operating lever is swung in one direction, and

l. the holding pawl pivotally mounted and resiliently biased toward active engagement with the ratchet teeth.

11. A power unit as defined in claim **10** wherein said bracket member includes guide means for directing a rope into the annular groove at a point located between said bar portion and said pulley member.

* * * * *