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T. C. SMITH ET AL

1,820,094

WINCH ROPE WINDER

Filed Oct. 27, 1928

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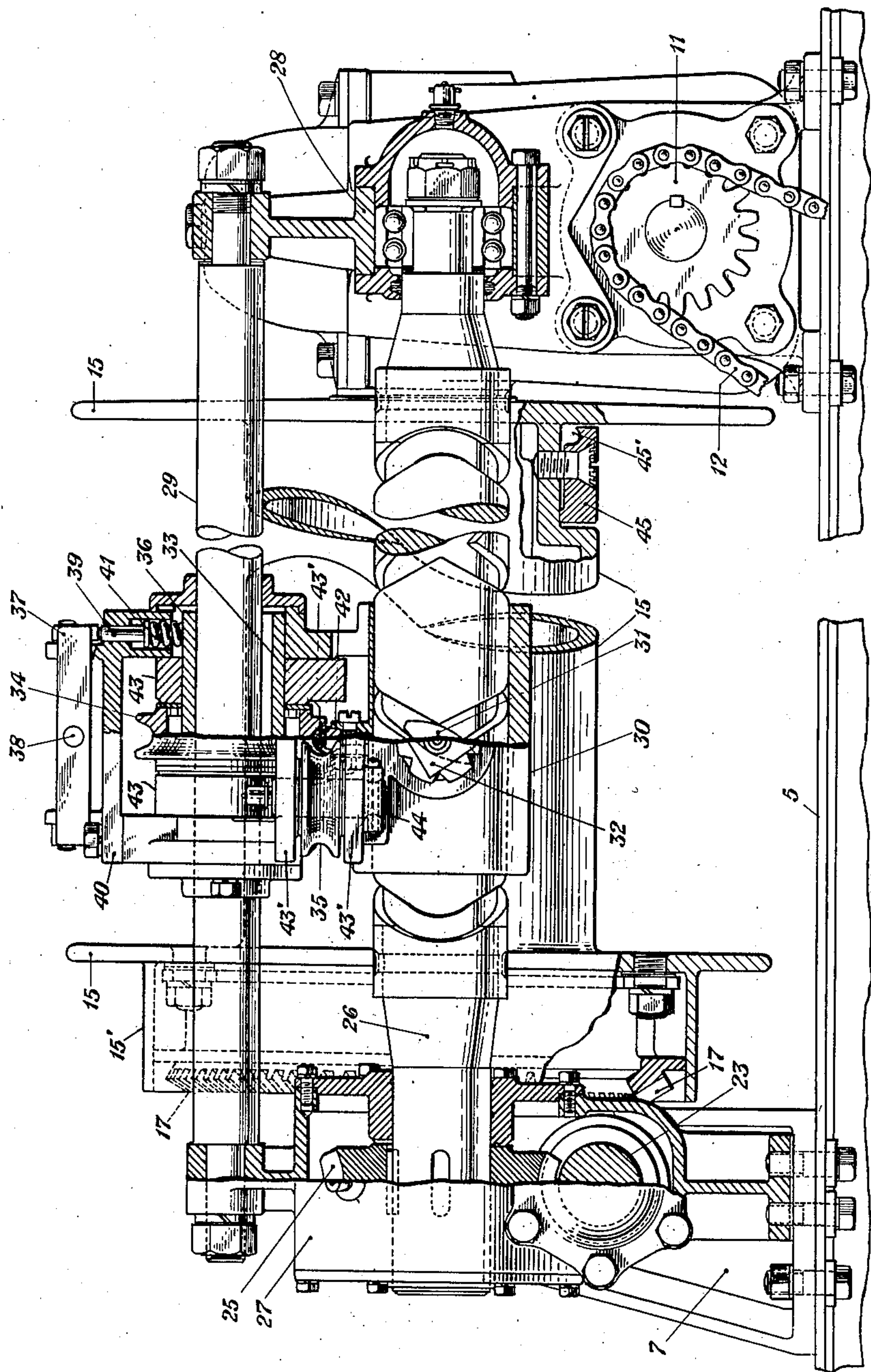


Fig. 1

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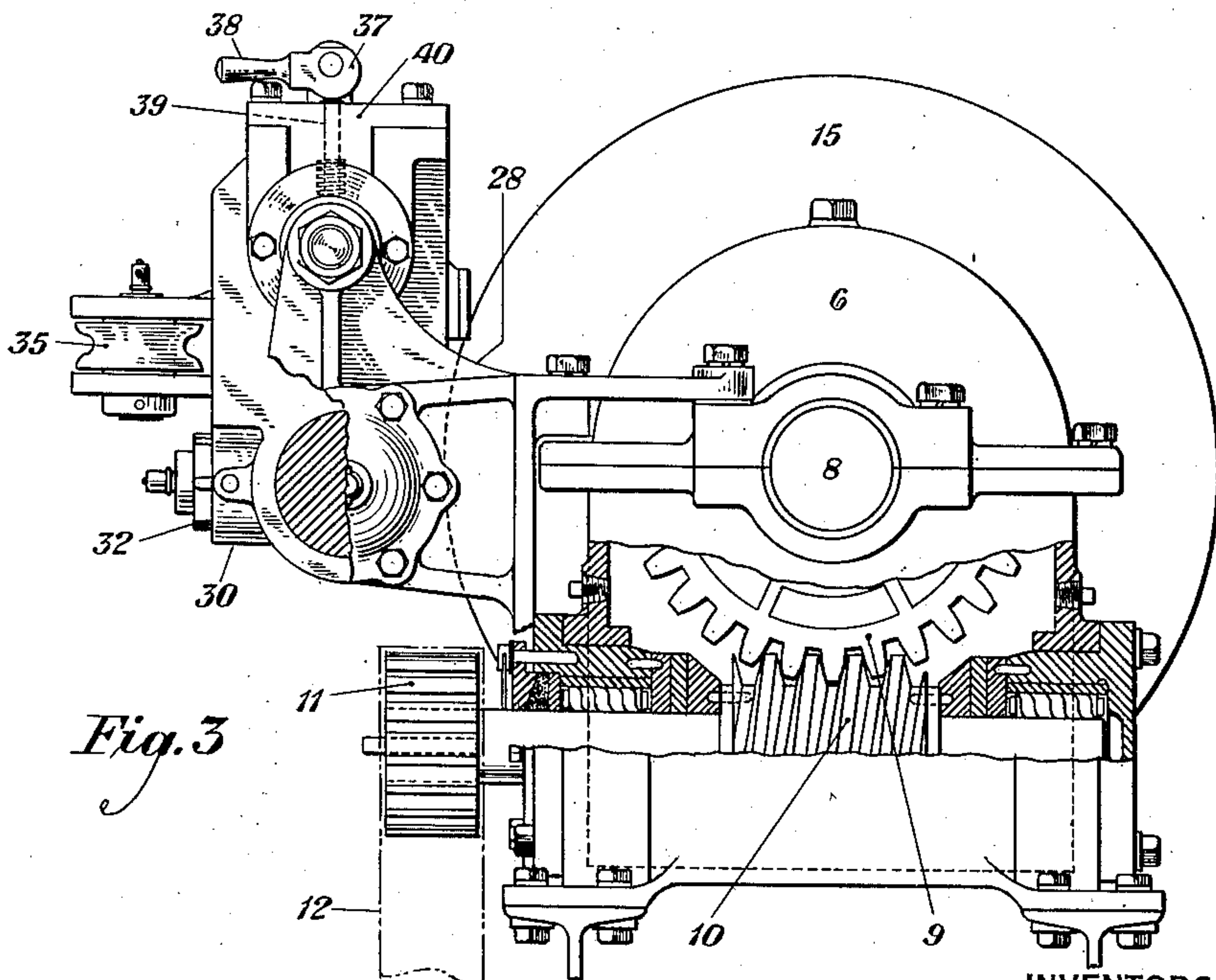
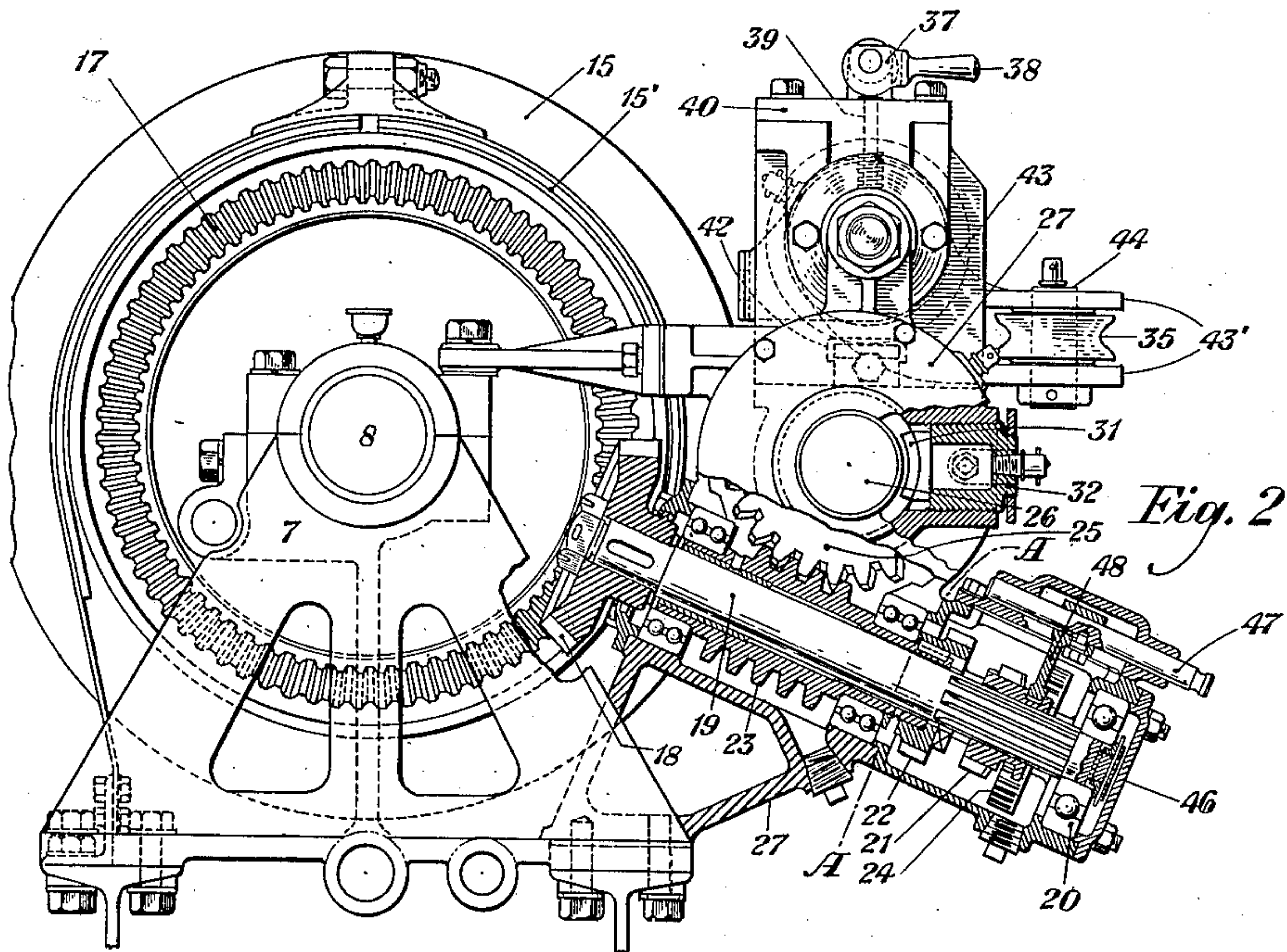
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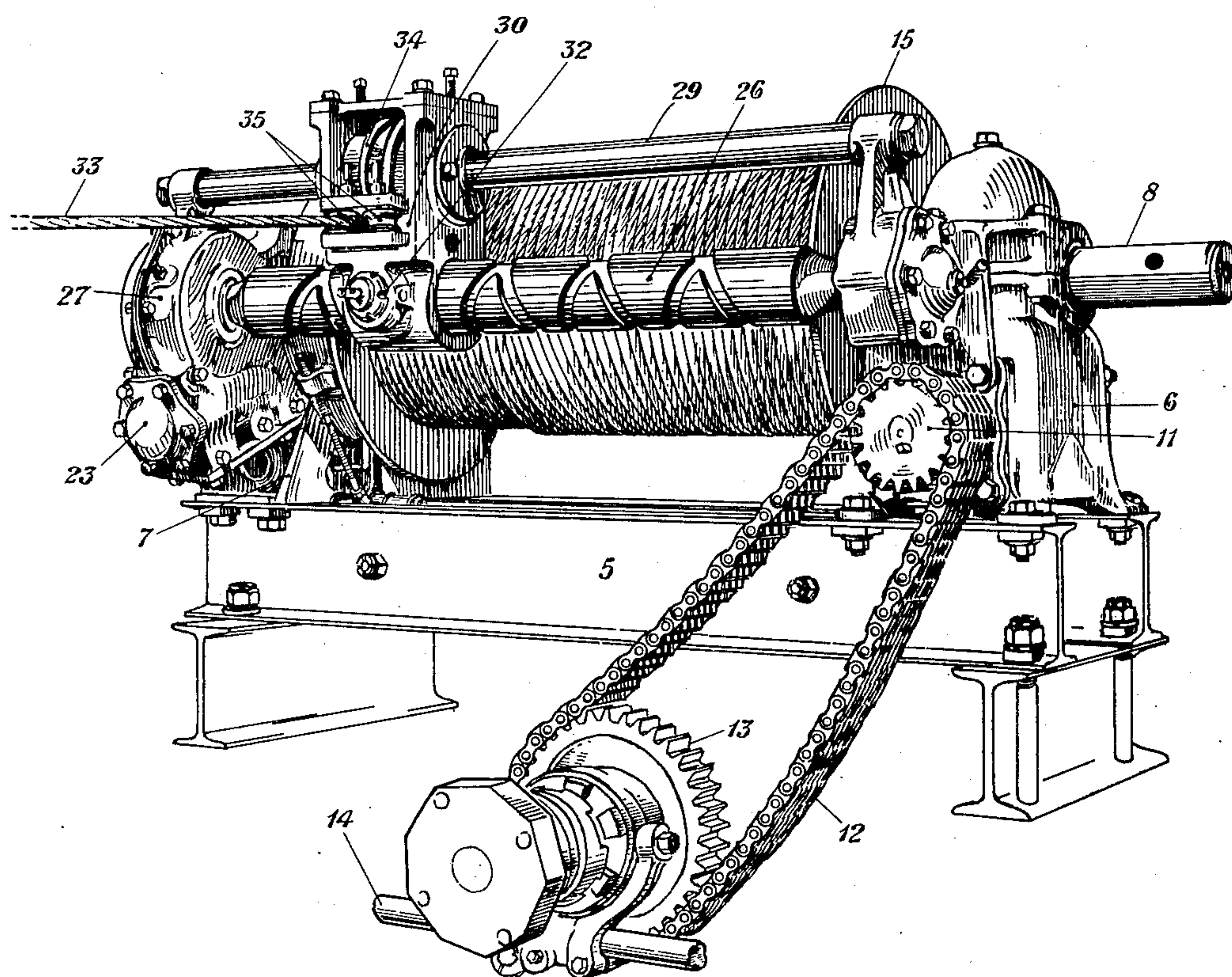


Fig. 4

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WINCH ROPE WINDER

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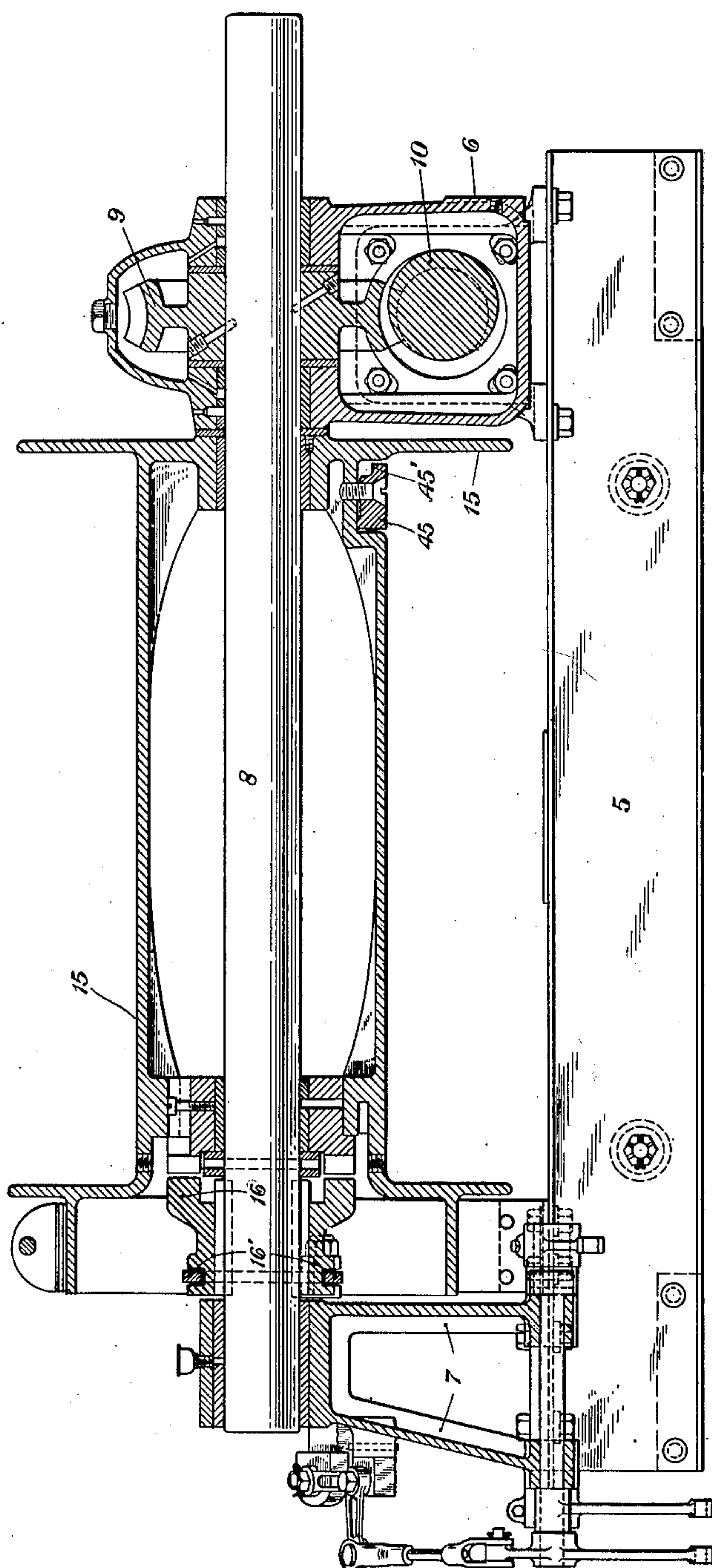


Fig. 5

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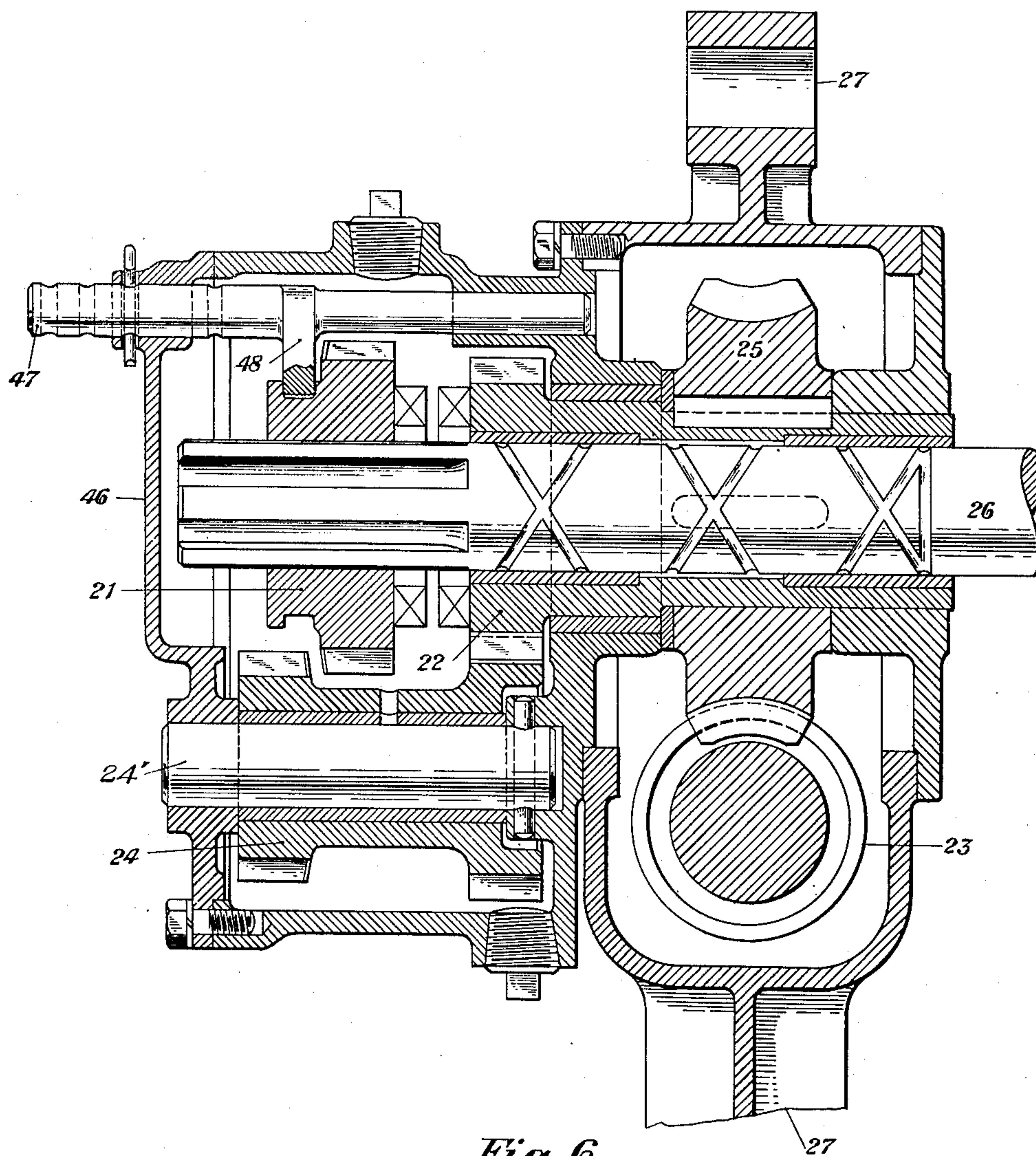
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WINCH ROPE WINDER

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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

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WINCH ROPE WINDER

Application filed October 27, 1928. Serial No. 315,550.

This invention relates to winches, and more particularly to mechanism for controlling and guiding the winding and unwinding of rope on and from winch drums.

One of the objects of the invention consists in the provision of means for feeding rope upon winch drums in orderly layers.

Another object is to provide such means for performing this function which are simple and comparatively inexpensive.

These and further objects will be apparent from the following description, when considered in connection with the accompanying drawings, in which one embodiment of the invention is illustrated.

Referring to the drawings, Figure 1 is a front elevation partly in section of the improved arrangement; Fig. 2 is a left end view of Fig. 1 showing the driving mechanism for the cam and shaft by which the rope is guided on the winch drum; Fig. 3 is a right end view of Fig. 1, showing driving mechanism for the winch; Fig. 4 is a perspective view of the improved arrangement; Fig. 5 is a longitudinal section of the winch, and Fig. 6 is an alternative arrangement for driving the cam shaft to that disclosed in Fig. 2.

In the drawings, the numeral 5 designates a support upon one end of which a housing 6 for a winch worm and wheel is mounted. The support 5 at its opposite end provides a mounting for a winch bearing support 7. A shaft 8 which is positioned longitudinally of the improved device, is journaled at one end in the housing 6 and at the other end in the bearing support 7. This shaft 8 may be driven by a worm wheel 9 and worm 10, or by spur gear as desired. The worm wheel 9 and worm 10 may be of ordinary construction and associated with each other and with the shaft 8 in a well understood manner. These elements may be enclosed in the housing 6, as more clearly shown in Fig. 3. The worm 10 is driven by power transmitted through sprocket 11, chain 12, from a main shaft drive sprocket 13 (Fig. 4). This drive sprocket 13 may be operated by means of a clutch mechanism operated by forks movable by a shaft 14 in a well understood manner.

A winch drum 15 comprising the usual core

with circular flanged ends is mounted to rotate idly on the shaft 8. Clutch mechanism 16 is mounted on the left end of shaft 8 (Fig. 5), and couples said shaft with the drum whereby power is transmitted to said drum to cause its rotation. The clutch mechanism 16 comprises a pair of clutch jaws, one of which is fastened to the drum. The other clutch jaw is keyed to shaft 8, and is adapted to slide thereon and into mesh with the companion clutch jaw on the drum. The sliding clutch jaw is moved along the shaft 8 by a fork 16' and when it meshes with the companion clutch jaw forms a coupling by means of which the drum 15 is rotated. The fork 16', by which the sliding clutch jaw is moved, is controlled by lever arms in a well understood manner.

The left end of the drum 15 is provided with a brake drum 15' which extends outwardly therefrom and is provided with a brake band. A beveled ring gear 17 is bolted or otherwise secured to the left side of the drum 15, and this gear meshes with pinion 18 which is keyed on shaft 19 (Fig. 2). The pinion 18 drives shaft 19 which is suitably journaled in a housing which carries bearing 20. The shaft 19 drives sliding clutch gear 21, which is adapted to assume two positions. When gear 21 is engaged with gear 22 a direct drive is given to worm 23. When the gear 21 is meshed with gear 24 through a counter shaft 24' (Fig. 6), a different speed is transmitted to worm 23. The worm 23 meshes with worm wheel 25, and transmits therethrough power to cam shaft 26. The cam shaft 26 is journaled at one end in worm housing 27, and, at the other end, in journal support 28.

The cam shaft 26 is provided practically throughout its length with an endless thread, which is properly pitched to operate a cam follower, to be presently described.

The cam shaft 26 is positioned in a horizontal plane and lies parallel to a guide shaft 29, which is also supported by the worm housing 27 and journal support 28. The cam shaft 26 and guide shaft 29 provide sliding supports for a carriage 30. This carriage is adapted to reciprocate upon the parallel

horizontal shafts 26 and 29 from an extreme position in either direction. A cam follower 31 is adjustably mounted in a journal 32 which permits the cam follower 31 to oscillate on the cam shaft 26. The oscillation of the cam follower 31 on the cam shaft 26 is caused by the proper mounting of said cam follower in the journal 32. This journal is screwed into the carriage 30 so that the cam follower lies in such position that its oscillation is forced along the endless thread on the cam shaft 26 by its rotation. The carriage 30 is thus caused to reciprocate on the cam shaft 26 and the guide shaft 29, in either direction. The cam follower 31 travels in the endless thread from one end of the cam shaft 26 to opposite end, and is then automatically returned toward its starting point. This movement is continued and the carriage is reciprocated until the rotation of the cam shaft ceases when the power is shut off by the disengagement of the clutch mechanism associated with the sprocket 13. The disengagement of the clutch mechanism 16 associated with shaft 8 of the winch drum 15 may also be used to disconnect the power.

The drum 15 is adapted to have a winch line 33, wound thereon, and the passage of the winch line to and from said drum, is guided by a pair of rollers 35 and a sheave 34. The sheave 34 is journaled on a sheave shaft 36, and lies in an approximate central position in the carriage 30. The sheave shaft 36 oscillates in a perpendicular direction in carriage 30 upon the guide shaft 29. A cam 37 positioned on the top of the carriage 30 is controlled by a handle 38. Upon movement of the handle 38, the cam 37 is caused to actuate plungers 39 and reciprocate them in cylindrical openings in an eccentric cap support 40. The plungers provide compression for springs 41 which engage the surface of the sheave shaft 36 and provide a brake for the winch line 33. This braking action for the winch line is brought about by the pressure exerted on the sheave shaft 36 by the compression springs 41, and causes the space between the sheave 34 and the brake block 42 to be reduced, thus providing tension to lock the winch line 33 between these elements.

The sheave shaft 36 forms a support for a bracket comprising two parallel arm members 43, 43, and extended fork flanges 43', 43'. The members 43 are positioned on the sheave shaft 36 at each side of the sheave 34, and are provided with alined openings through which the sheave shaft 36 passes. The forked flanges 43' are provided with alined openings in which shafts 44 are placed to journal the rollers 35, 35. The rollers 35, 35 lie in a plane of 90° with respect to the sheave 34. The mounting of the arm members 43 in the manner described permit the rollers 35 to assume adjustable positions and move in an arc about the axis of the sheave

shaft 36, as determined by the angle from which the line is being pulled. The winch line passes between the rollers 35 which act as guides therefor. The winch line is thus guided over the brake block 42 and beneath the sheave 34, and thence passes to the drum 15. The winch line is therefore guided on said drum regardless of the angle from which the winch line is being pulled.

A clamp 45 is provided at one end of the drum 15 to hold the end of a winch line securely to the drum. This clamp is positioned in a cut-away portion at an intersection formed by the core and flange of the drum and the outer portion of such clamp forms a hook like member 45' which embraces the winch line. A screw passes through an aperture provided in the clamp member into the core of the drum, and thus holds the clamp with its embraced winch line securely in position against the surface of the drum.

In Fig. 6 there is illustrated an alternative manner to that illustrated and described in connection with Fig. 2 by which the speed of the cam shaft 26 may be operated to accommodate winch lines of different diameters. When the arrangement shown in Fig. 6 is used with this improved device, the apparatus appearing at the left of the dotted line A—A in Fig. 2 is dispensed with, and a cap is placed at the end of the gear case at this point. The worm 23 may be integral with the shaft 19 or keyed thereto to cause the simultaneous rotation of the shaft 19 and worm 23.

In order to obtain the proper speed for winch lines of different diameters, a gear casing 46 (Figs. 2 and 6) may be applied to the end of the cam shaft 26 attached to worm housing 27. This gear casing contains the same elements as depicted in Fig. 2. The operation of the gear elements in this case is the same as described in connection with Fig. 2. In the case of Fig. 6, however, power is taken from the worm wheel to cause the cam shaft 26 to rotate at different speeds.

A gear shift rod 47 is journaled in the casing 46, and is provided with a finger engaging member 48 which is positioned in a groove provided in the gear 21. The member 48 serves to slide the gear 21 along the cam shaft 26 into mesh with the gear 22 to produce low speed rotation of the cam shaft 26, or into mesh with the gear 24 to produce a different speed of rotation of the cam shaft 26. The operation of the mechanism shown in Fig. 6 otherwise operates the same as that outlined in connection with the operation of the mechanism shown in Fig. 2.

In the operation of the improved device, the winch line is passed through the parallel rollers thence between the brake block and sheave and the end of said line is clamped to the drum. The shift rod associated with the gear case is set at a position to give the de-

sired speed according to the size of winch line used. The main drive control lever associated with the clutches controlling the drive sprocket rotation is now operated furnishing power for the driven sprocket. The driven sprocket causes the rotation of the worm and worm wheel, which in turn cause the rotation of the winch drum shaft. Through the operation of levers controlling the winch drum clutches, power is transmitted to cause the rotation of the winch drum.

The rotation of the winch drum transmits power through its ring gear to the pinion and worm and worm wheel and causes the rotation of the cam shaft. The rotation of the cam shaft causes the movement of the carriage along the endless thread by means of the cam follower.

The carriage reciprocating on the cam shaft at the end of each layer of winch line on the drum automatically returns or reverses its direction and continues the laying of the winch line. The distribution of the winch line is thus proceeded with, and said winch line is wound in orderly layers on the drum.

The brake is automatically released from the line when it is being wound on the drum under tension, thus preventing wear on the line.

When it is desired to have a slack line of considerable length with a freely rotating drum, the handle controlling the cam is released and this relieves any tension on the line.

It will be obvious that when the drum-clutch is disengaged to permit the free rotation of the drum for the purpose of freely unwinding the winch line from the drum, the carriage will reciprocate on the cam shaft during such unwinding operation. The carriage will thus travel back and forth in accordance with the unwinding of the winch line, and is always at the proper position to start rewinding said line on the winch drum in orderly layers.

What is claimed is:

1. A winch rope winder comprising a rotatable drum, a pair of shafts positioned parallel to the drum, a carriage mounted to reciprocate on said shafts and moving in synchronism with the drum, means adjustably mounted in said carriage and automatically movable thereon in a plane perpendicular to the axis of the drum for guiding rope in orderly layers on and from said drum, and automatic braking mechanism associated with said means for locking the rope on said drum.

2. A winch rope winder comprising a rotatable drum, a cam-shaft and a guide shaft positioned parallel to the drum, said cam-shaft being provided with an endless thread, a carriage mounted on said shafts, means positioned on said carriage and engaging the endless thread whereby the carriage is caused to reciprocate on said shafts upon the ro-

tation of the drum, means adjustably mounted on said carriage and automatically movable thereon in a plane perpendicular to the axis of the drum for guiding rope in orderly layers on and from said drum, and automatic braking mechanism associated with the last mentioned means for locking the rope on said drum.

3. A winch rope winder comprising a rotatable drum, a pair of shafts positioned parallel to the drum, one of said shafts having a gear connection with the drum, a carriage mounted to reciprocate on said shafts upon the rotation of one of the shafts, means adjustably mounted in said carriage and automatically movable in a plane perpendicular to the axis of the drum for guiding rope in orderly layers on and from said drum, and automatic braking mechanism associated with said means for locking the rope on said drum.

4. Winch rope winder comprising a rotatable drum provided at one end with gear mechanism, a cam-shaft and a guide shaft positioned parallel to the drum, said cam-shaft being provided with gear mechanism and an endless thread, an intermediate gear mechanism for connecting the gear mechanism of the drum with that of the cam-shaft to cause its rotation, a carriage mounted on said shafts, means positioned on said carriage and engaging the endless thread whereby the carriage is caused to reciprocate on said shafts upon the rotation of the cam-shaft, means adjustably mounted on said carriage and automatically movable thereon in a plane perpendicular to the axis of the drum for guiding rope in orderly layers on and from said drum, and automatic braking mechanism associated with the last mentioned means for locking the rope on said drum.

5. A winch rope winder comprising a rotatable drum, a pair of shafts positioned parallel to the drum, a gear member connecting said drum with one of said shafts to drive it at different speeds, a carriage mounted to reciprocate on said shafts and moving in synchronism with the drum, a pair of rotatable members mounted in said carriage and automatically movable about one of said shafts in a plane perpendicular to the axis of the drum for guiding rope in orderly layers on and from said drum, and automatic braking mechanism associated with said rotatable members for locking the rope on said drum.

6. A winch rope winder comprising a rotatable drum, gear mechanism on said drum, a cam-shaft and a guide shaft positioned parallel to the drum, said cam-shaft being provided with gear mechanism and an endless thread, a gear member connecting the gear mechanism of the drum with the gear mechanism of the cam-shaft to drive it at different speeds, a carriage mounted on said

shafts, a cam-follower positioned on said carriage and engaging the endless thread whereby the carriage is caused to reciprocate on said shafts upon the rotation of the cam-shaft, roller members adjustably mounted on said carriage and automatically movable in a plane perpendicular to the axis of the drum for guiding rope in orderly layers on and from said drum, and automatic braking mechanism associated with one of said roller members for locking the rope on said drum.

7. A winch rope winder comprising a rotatable drum, a pair of shafts positioned parallel to the drum, a carriage mounted to reciprocate on said shafts and moving in synchronism with the drum, means comprising parallel roller members and a sheave adjustably mounted in said carriage and movable in a plane perpendicular to the axis of the drum for guiding rope in orderly layers on and from said drum, a brake block on said carriage, and means associated with said carriage for automatically moving said sheave to cooperate with said brake block to lock the rope.

8. A winch rope winder comprising a rotatable drum, a stationary shaft and a rotatable shaft positioned parallel to the drum, a carriage mounted to reciprocate on said shafts and moving in synchronism with the drum, a plurality of rotatable members adjustably mounted in said carriage and movable in a plane perpendicular to the axis of the drum for guiding rope in orderly layers on and from said drum, and automatic braking mechanism including one of the rotatable members for locking the rope on said drum.

9. A winch rope winder comprising a rotatable drum, a cam-shaft and a guide shaft positioned parallel to the drum, said cam-shaft being provided with an endless thread, a carriage mounted on said shafts, means positioned on said carriage and engaging the endless thread whereby the carriage is caused to reciprocate on said shafts upon the rotation of the drum, means comprising a pair of parallel roller members and a sheave mounted on said carriage for guiding rope in orderly layers on and from said drum, and automatic braking mechanism including said sheave for locking the rope on said drum.

In testimony whereof, we have signed our names to this specification this 26th day of October 1928.

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