

May 18, 1926.

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T. C. SMITH ET AL

WINCH

Filed June 14, 1924

6 Sheets-Sheet 1

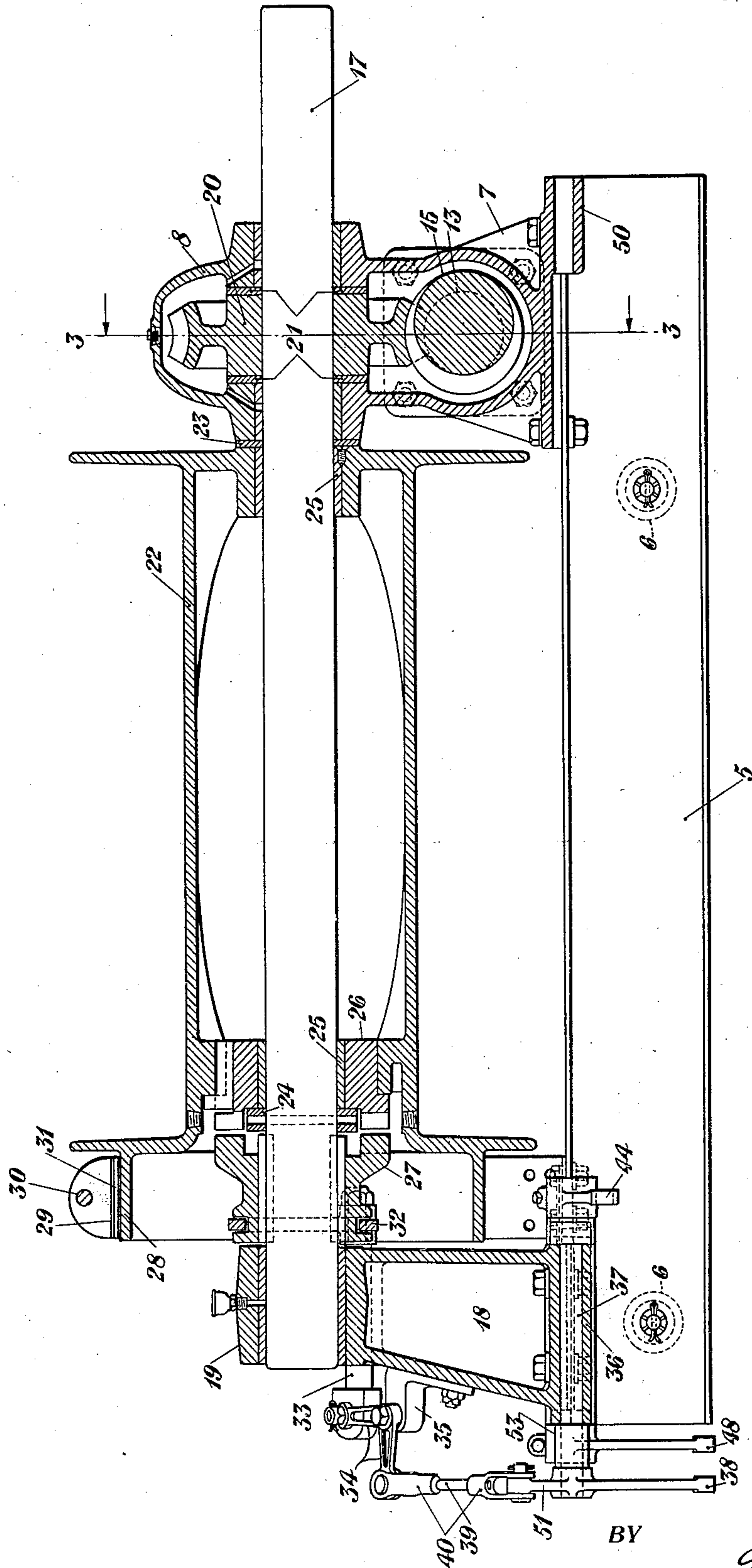


Fig. 1

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6 Sheets-Sheet 2

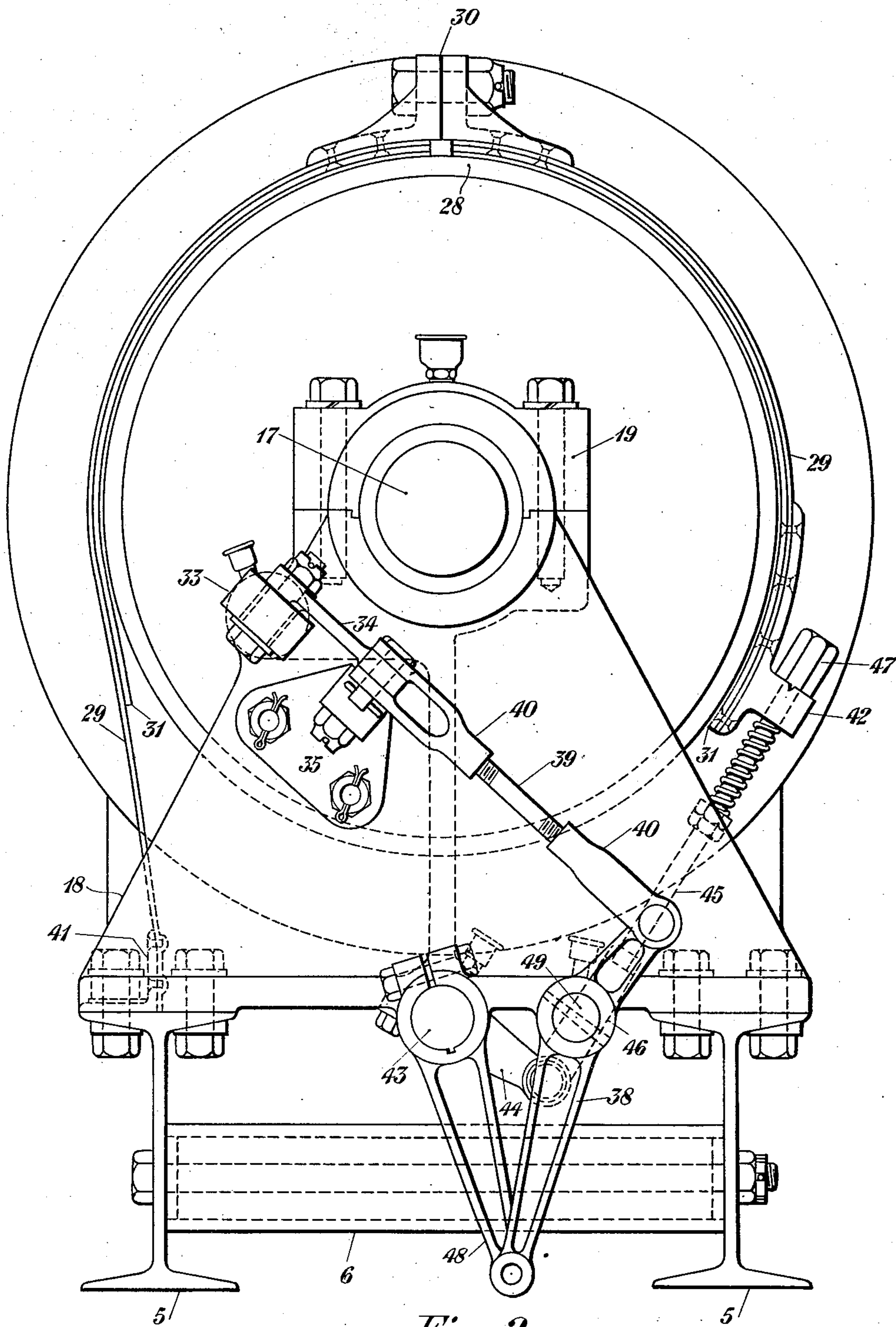


Fig. 2

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6 Sheets-Sheet 3

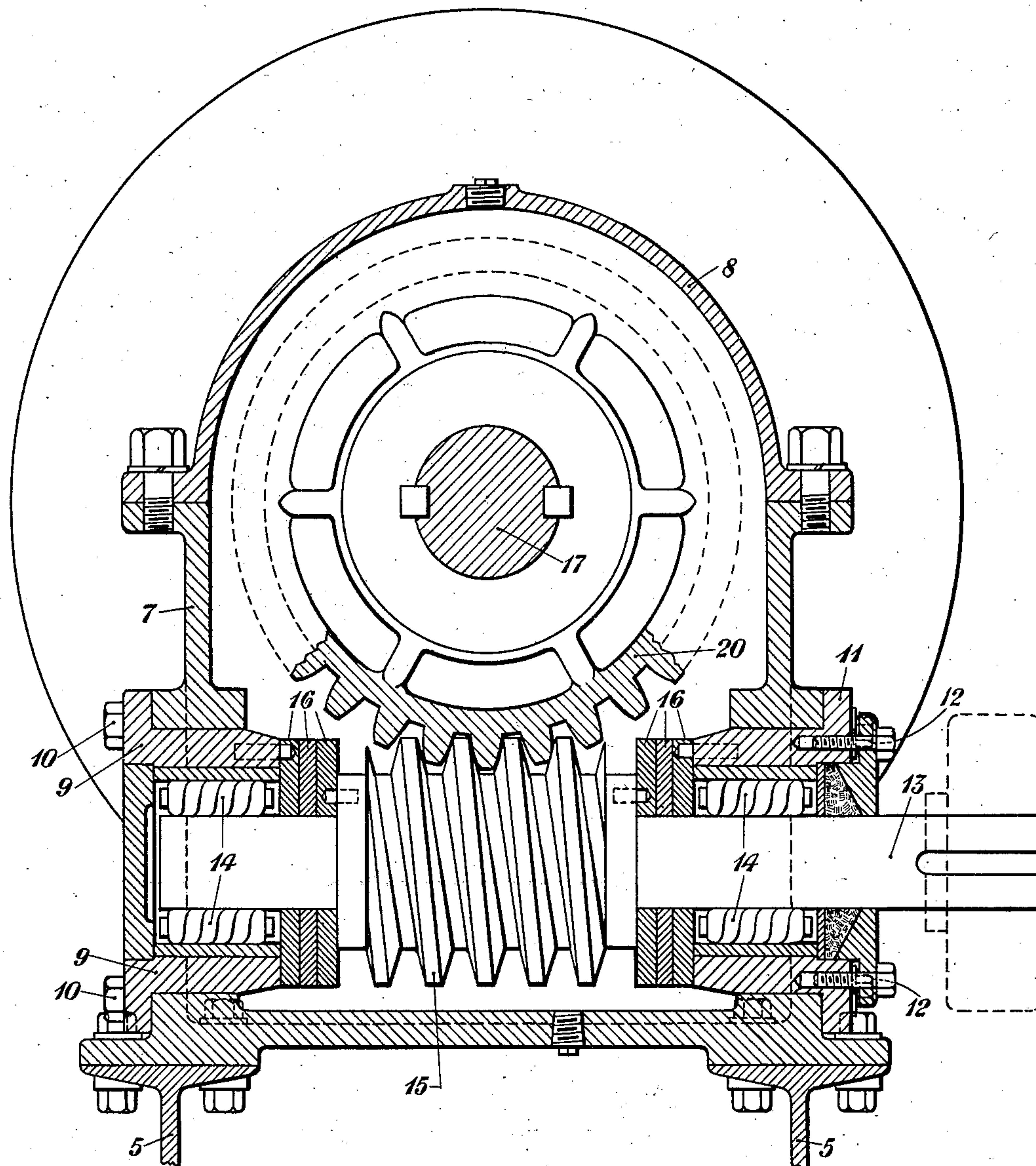


Fig. 3

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6 Sheets-Sheet 4

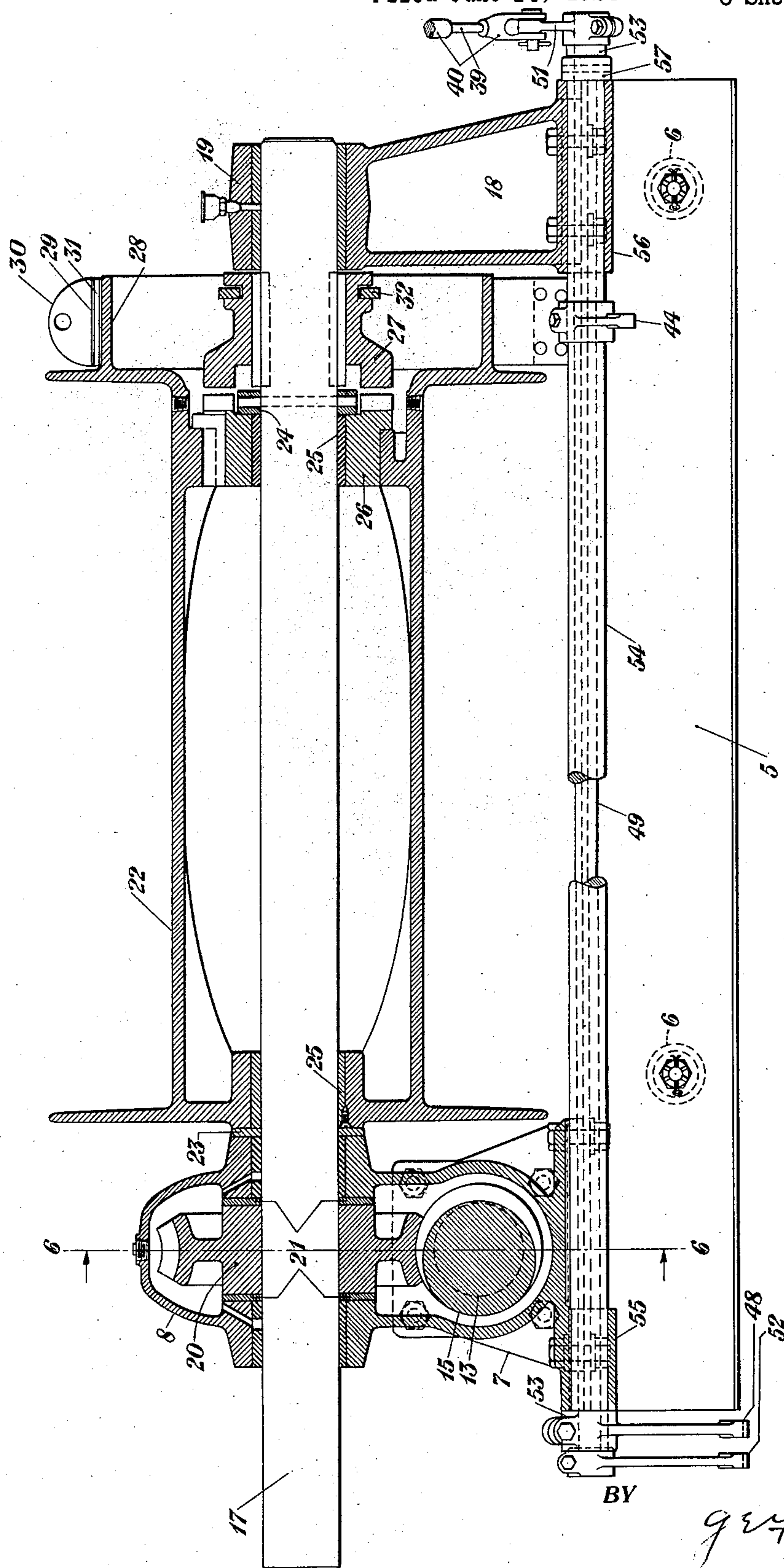


Fig. 4

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6 Sheets-Sheet 5

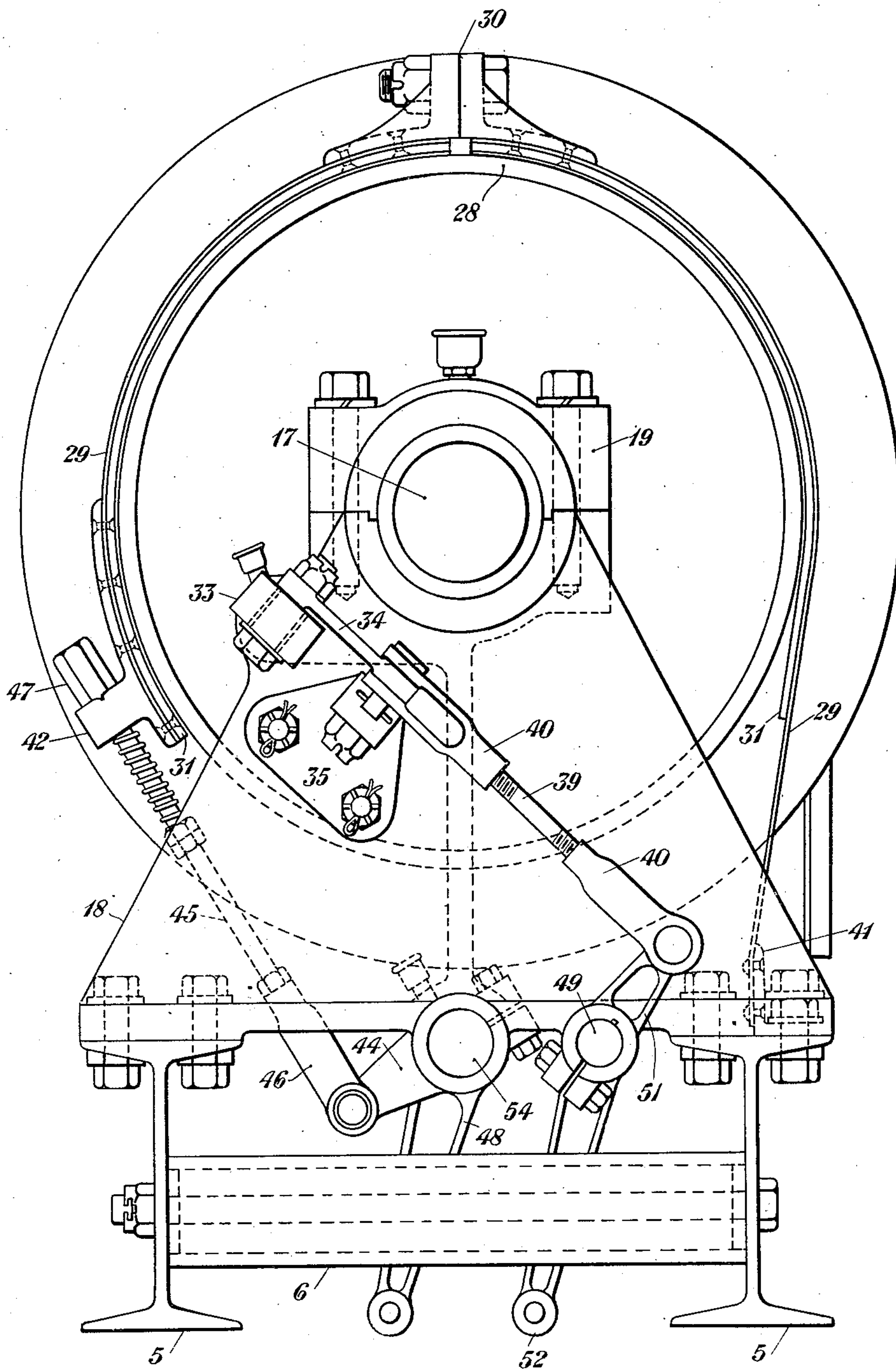


Fig. 5

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6 Sheets-Sheet 6

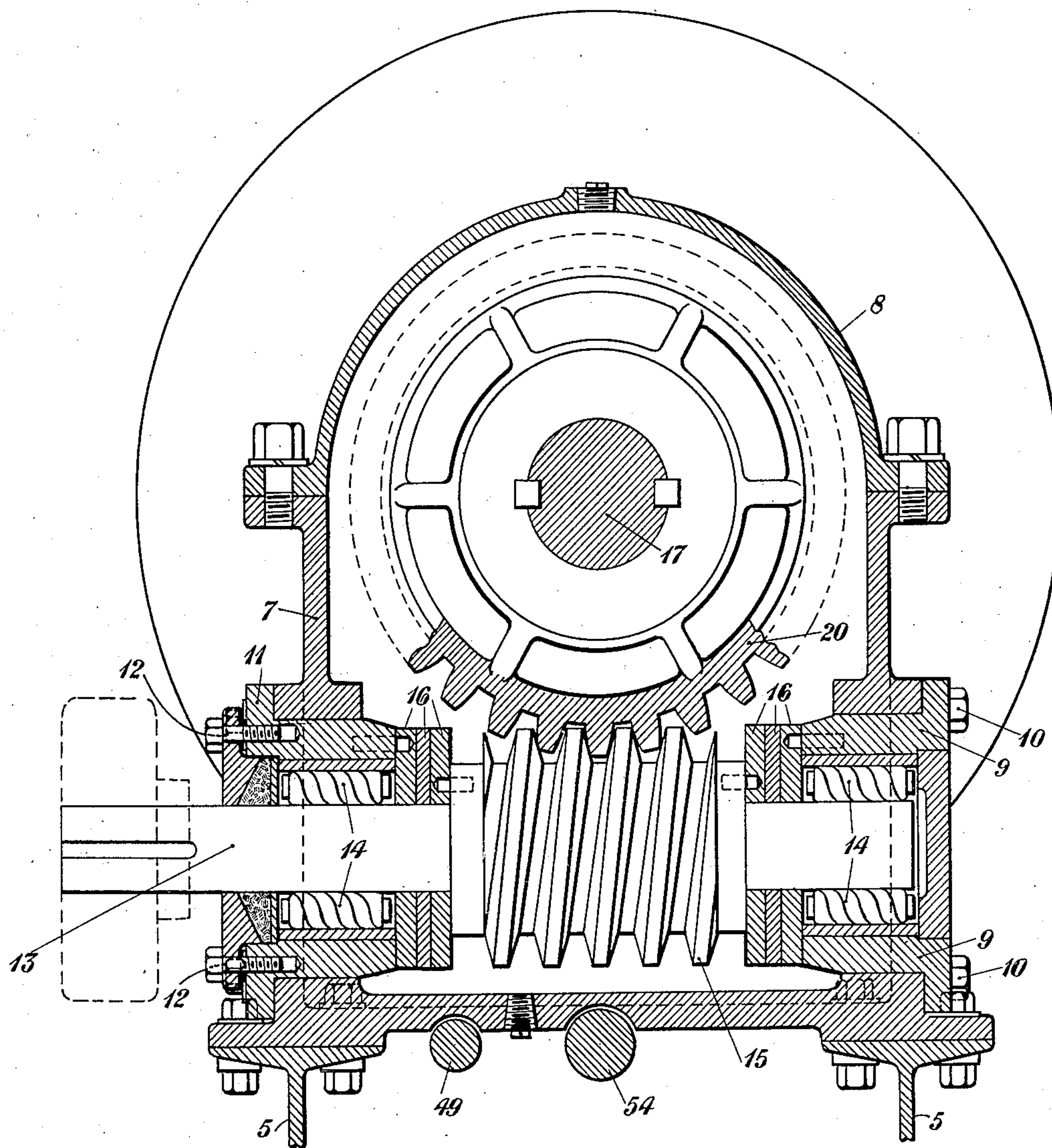


Fig. 6

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WINCH.

Application filed June 14, 1924. Serial No. 720,071.

This invention relates to hoisting or pulling apparatus, and more particularly to winches adapted to be operated by power transmitted from motor-driven apparatus.

One of the objects of the invention is to provide a winch of such design that it may be mounted and operated on various makes of motor-driven vehicles.

Another object consists in providing the improved device for comparatively few and simple parts which may be readily assembled, and which may be removed and replaced without disturbing certain of the associated parts.

A further object consists in providing the winch with such interchangeable parts as to permit it to be driven from either the right or left side with respect to its supporting frame with the power drive positioned at any of the four corners of the winch.

These objects 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, in which like numerals represent like parts throughout, Figure 1 is a longitudinal section of the improved winch; Fig. 2 is an elevation showing the control end thereof; Fig. 3 is a sectional view taken on line 3—3 of Fig. 1, looking in the direction of the arrows and showing the other or drive end of the winch; Fig. 4 is a similar view to Fig. 1 showing the winch in a reversed position; Fig. 5 is an elevation showing the control end thereof in the reversed position, and Fig. 6 is a similar view to Fig. 3 on the line 6—6 of Fig. 4, showing the worm shaft assembly in the reversed position.

A supporting frame is provided for the winch, and in this instance is indicated in the drawings as comprising two parallel I-beams 5, which are transversely mounted and suitably secured to a frame or chassis, and these beams may be braced or reinforced by the members 6, which are bolted thereto. At either end of the beams 5 is positioned a housing 7, which is bolted at its base to the flanges of said beams and at its upper portion to a cover 8. The housing and its cover is provided with a bearing surface, to be presently described, in which a shaft

is journaled. A bearing cage 9, having a closed end, is affixed to the lower portion of the housing at one end thereof, by means of bolts 10 and at the other side of the housing is a bearing cage 11 having an open end and which is secured to said housing by bolts 12. A shaft 13 is journaled in roller bearings 14 provided within the cages 9 and 11, and has an integral worm 15 associated therewith. One end of the shaft 13 extends beyond the open cage 11 and has a sprocket wheel splined or otherwise affixed thereto. This wheel engages a chain, or the like, which is connected to a power take-off or other mechanism from which power is transmitted to drive the shaft and worm. On either side of the worm 15 is positioned a series of thrust washers 16, 16, each series consisting of three washers. In order to provide a maximum wearing efficiency between these washers, the center washer of each series is composed of bronze, while the associated outer washers are composed of hardened steel, the bearing area of which is ground and polished. The inner steel washer of each series is pinned to the worm and the outer steel washer of each series is pinned to the bearing cages. Thus, the surfaces presented by the steel washers of each series to their intermediate bronze washer will have approximately the same coefficient of friction and other physical characteristics, and will be identical so that the latter washers will turn at approximately one-half the speed of the worm, and consequently will be subjected to a minimum of wear. The roller bearing 14, previously mentioned, will take up the radial load of the worm shaft 13, while the washers 12 take up the thrust load thereof.

A shaft 17 extends longitudinally of the winch, and is journaled on one end in bushings carried by the housing 7 and its cover 8, and on the opposite end in bushings carried by the hanger 18 and its bolted cap 19. The hanger 18 is bolted to the flanges of the beams 5 similarly to the housing 7 at the opposite end of said beams. A worm wheel 20 is keyed to the shaft 17, and meshes with the worm 15, by which it is driven, and thrust washers 21 may be provided on either side of the wheel 20 as indicated.

In the position shown in Fig. 3, the worm

15 is indicated as having its shaft 13 extending forwardly of the winch so that it may be driven by power transmitted from the right forward side of the supporting frame.

5 5. It will be apparent that by removing the bolts 10 from the closed bearing cage 9 and the bolts 12 from the open bearing cage 11, these elements including the customary gland and other parts of the assembly
10 may be readily interchanged so that the extended end of the shaft with its sprocket wheel may be positioned at the rear right side of the winch to be driven by power transmitted from that location.

15 A drum 22 is rotatably mounted on the shaft 17 between the housing 7 and the hanger 18. The drum 22 at one end has thrust washers 23 interposed between its vertical flange and the housing 7 and its
20 cap 8, which takes up the drum thrust in one direction. The thrust in the other direction is taken up by a collar 24, which is pinned to the shaft 17 on the outside of the drum. The positioning of these thrust members in this manner permits easier assembling and obviates the difficulty otherwise encountered if said members were positioned within the drum. The radial load of the drum 22, while it is rotating freely on the
30 shaft, is taken up by the oilless bronze bushings 25, 25.

A drum clutch member 26, preferably composed of hardened steel, is pressed in and keyed to the control end of the drum 22.
35 A clutch member 27 is slidably positioned on the shaft 17 and is adapted to engage the member 26 by jaws cut on each clutch member when it is desired to drive the drum. The jaw clutch is so designed to allow the
40 collar 24 to be pinned to the outside of the drum as previously pointed out. The movable clutch member 27 is provided with a groove in which a forked member 32 is positioned to reciprocate the clutch 27 along the
45 shaft 17 to engage and disengage the drum clutch 26. The fork 32 is connected to a shifter rod 33 in the customary manner, and this rod is connected to a bell crank 34 by means of a shouldered bolt operating in a slot in the shifter rod 33. The bell crank
50 34 is pivotally mounted on a bracket 35 bolted to the hanger 18, and at the bottom of the hanger 18 a bearing 36 is provided in which a clutch shaft 37 is journaled. The shaft 37 is provided with suitable thrust collars which prevent side play of said shaft. A bell crank 38 is pinned to the outside end of the clutch shaft 37, and the upper arm of
55 said bell crank is connected to another bell crank 34 by means of an adjustable connecting link which consists of a rod 39, the threaded ends of which engage clevises 40, 40. The lower arm of the bell crank 38 is
60 connected to a rod which extends to an operating lever, which may be positioned

at some convenient point, and this lever serves to reciprocate the clutch 27 along shaft 17 as previously described, to engage and disengage the jaw clutch 26 in an obvious manner. When the clutch members 26 and
70 27 are in engagement, movement will be imparted from the shaft 17 to the drum 22 which causes it to rotate with the shaft.

A brake shaft 43 is journaled in a bearing at the bottom of the hanger 18 similar
75 to and lying parallel with the bearing 36, in which the clutch shaft 37 is journaled. The brake shaft 43 has connected to its inner end a lever arm 44, which in turn is connected to the pull bracket 42 by means of
80 a threaded rod 45 and a clevis 46. The rod 45 extends through a clearance hole in the pull bracket 42, and has a nut 47 provided on its end for adjusting purposes. The outside end of the brake shaft 43 is connected to lever arm 48, which in turn is
85 connected to a rod which extends to an operating lever, which is positioned at a point adjacent to the operating lever for the clutch previously referred to.

The vertical flange at the control end of the drum has a horizontal annular extension 28, which forms a surface to which the brake band 29 may be applied. This brake band
90 consists of two parts which are riveted to a brake union 30, and the usual brake lining 31 is provided therefor. One end of the brake band is anchored to the angle strip 41, which is bolted to the beam 5, the other end of said brake band is riveted to a pull bracket
95 42. Thus when the brake operating lever is manipulated, movement will be translated through the elements above described to the brake band and its lining which applies friction to the surface 28 to stop the rotation of the drum.

In the interchanged position of the winch as indicated in Figs. 4, 5 and 6, the hanger 18 is located at the right end of the supporting frame 5, while the housing 7 and its cap 8 are located at the left end of said frame.
100 The shaft 17 is journaled in these members in the same manner as formerly outlined, and the shaft 13 and worm 15 are also similarly journaled in the housing 7 as indicated previously. In this instance, as shown in Fig. 6 the worm and its shaft are positioned to be driven by power transmitted from the left forward corner of the winch, but said
105 worm and shaft are also adapted to be interchangeably positioned to be driven by power transmitted from the left rear corner of the winch. This flexibility of mounting of shaft 17 and the worm 15 and shaft 13 permits the winch to be operated on various makes of trucks which supply their source of power from different positions.

In the interchanged position of the winch clutch shaft 49 extends longitudinally of
110 the winch and is journaled in the bearing

36 at the control end of the winch and the bearing 50 at the drive end thereof. The lever arm 51 at the control end is connected to bell crank 34 by the threaded rod 39 and clevises 40, 40, as previously outlined, in connection with the positioning of the drum in the opposite manner. The drive end of the shaft 49 is pivotally connected to a lever arm 52, which in turn is connected to the operating lever extending to the point of control. Spacing collars 53, 53 are provided on the clutch shaft 49 between the journal bearings and lever arms at each end of the winch to prevent side play of the shaft 49.

A brake shaft 54 also extends longitudinally of the winch in a plane parallel to the clutch shaft 49, and is journaled in the bearings 55 and 56. A collar 57 is pinned to this shaft at the outside of the control end to prevent side play thereof in one direction. A lever arm 44 is affixed to the brake shaft 54 at the inside of the control end, and is connected to the brake pull bracket 42, as more clearly indicated in Fig. 5. A lever arm 48 is affixed to the outside of the drive end of the brake shaft 54, and is connected to a control brake lever similarly to the manner previously described in connection with the mounting of the drum in the first position.

The operation of the improved winch by power transmitted from any of its corners and in each of its interchanged positions will be the same, and in each case the longitudinal shaft will be symmetrically mounted with respect to the axis of the supporting frame. Thus when power is transmitted from a power take-off to the sprocket wheel or other driving device attached to the worm shaft, the worm integral therewith is rotated and causes the rotation of the worm wheel with which it is in mesh. As the worm wheel is keyed to the longitudinal shaft, this is likewise rotated. The drum on this shaft will not rotate until the slidable clutch is moved by means of the control lever into engagement with the jaw clutch affixed to the drum. When this occurs, the drum is caused to rotate with the shaft and winds the rope or cable about the periphery of the drum so as to hoist or pull the object to which one end of the rope or cable is attached in a well understood manner. When the object is in the position desired, the clutch at the power unit is thrown out of engagement, and the design of the worm and worm wheel together with the friction developed in the worm thrust washers will instantly stop the rotation of the drum. This feature makes it necessary for the operator to apply power in the reverse direction in order to lower the object and give more positive and safer control of the lowering operation than would obtain if the jaw clutch were disen-

gaged and the object lowered by means of the brake.

The brake is provided as an emergency control in case of failure of the drum shaft driving keys and in order to relieve the pressure between the worm and worm wheel teeth if the vehicle is being moved with the object suspended.

The jaw clutch is provided in order to free the drum from the driving mechanism when it is desired to pull the winch line off the drum easily and quickly.

It is preferred to have the control for operating the clutch member as well as the control for the brake positioned at points adjacent each other on the left side and forwardly of the supporting frame.

While there is shown and described herein one preferred form of the invention by way of illustration, it is understood that it is not limited or confined to the precise details of construction herein described and delineated, as modification and variation may be made within the scope of the claims without departing from the spirit of the invention.

What is claimed is:

1. In a winch comprising a supporting frame, a drum, a shaft therefor, supporting means on said frame in which said shaft is journaled positioned at both ends of said drum, driving means journaled in one of the supporting means for rotating said shaft, said supporting means and said driving means being adapted to be reversibly positioned on said frame without disturbance of other elements of the winch, and a clutch member associated with the shaft at one end of the drum for connecting and disconnecting said drum and shaft.

2. In a winch comprising a drum, a shaft therefor, supporting means positioned at both ends thereof in which said shaft is symmetrically journaled with respect to the axis of said supporting means, driving means journaled in one of the supporting means for rotating said shaft, said driving means being adapted to be interchangeably positioned so as to be driven by power supplied forwardly and rearwardly of the supporting means, and a clutch member associated with the shaft for connecting and disconnecting said drum and shaft.

3. In a winch comprising a drum, a shaft therefor, supporting means positioned at both ends thereof in which said shaft is symmetrically journaled with respect to the axis of said supporting means, a pair of bearing cages in one of the supporting members symmetrically positioned with respect to the axis of said shaft, driving means journaled in said bearing cages for rotating said shaft, said bearing cages being adapted to be interchangeably positioned transversely of the supporting means, and

a clutch member associated with the shaft for connecting and disconnecting said drum and shaft.

4. In a winch comprising a drum, a shaft therefor, a worm wheel affixed to said shaft, supporting means positioned at both ends of the shaft in which it is symmetrically journaled with respect to the axis of said supporting means, a driving shaft journaled in one of the supporting means, a worm associated with said driving shaft for engaging the worm wheel to rotate said first mentioned shaft, said shaft being adapted to be interchangeably positioned transversely of the supporting means so as to be driven by power supplied forwardly and rearwardly thereof, and a clutch member associated with the shaft for connecting and disconnecting said drum and shaft.

5. In a winch, a supporting frame therefor, a shaft extending longitudinally of said winch, a drum associated therewith, bearing members mounted on said supporting frame for journaling both ends of said shaft, said bearing members and shaft being adapted to be interchangeably positioned on said supporting frame, means operated from either side of said frame for controlling said drum in each of its interchangeable positions on said supporting frame, and driving means associated with one of said bearing members and adapted to be interchangeably positioned transversely therein so as to be driven by power supplied forwardly and rearwardly thereof to rotate said shaft.

6. In a winch, supporting frame therefor, a shaft extending longitudinally of said winch, a drum mounted thereon, bearing members mounted on said supporting frame for journaling said shaft at both of its ends, said bearing members and shaft being adapted to be interchangeably positioned on said supporting frame, driving means adapted to be interchangeably associated with one of said bearing members to rotate said shaft, control means for said drum associated with the opposite bearing member and operated from one side of the supporting frame, said control means including a clutch member for connecting and disconnecting said shaft and drum and a brake member for applying friction to said drum, and means extending longitudinally of said winch whereby the control means for said drum in one position is operated from the opposite side thereof.

7. In a winch, a supporting frame therefor, a shaft extending longitudinally of said winch, a drum mounted thereon, bearing members mounted on said supporting frame for symmetrically journaling said shaft

with respect to the axis of said members, said bearing members and shaft being adapted to be interchangeably positioned on said supporting frame, driving means associated with one of said bearing members and adapted to be interchangeably positioned transversely therein so as to be driven by power applied forwardly and rearwardly thereof to rotate said shaft, control means for said drum associated with the opposite bearing member and operated from one side of the supporting frame, said control means including a clutch member for connecting and disconnecting said shaft and drum and a brake member for said drum, and means associated with said bearing members and extending longitudinally of the winch for transferring the control means to one side of the supporting frame in the reversed position of the drum and shaft whereby said control means are operated from the opposite side of the supporting frame.

8. In a winch, a supporting frame therefor, a shaft extending longitudinally of said winch, a drum normally non-rotatably mounted thereon, bearing members mounted on said supporting frame for symmetrically journaling said shaft with respect to the axis of said bearing members, said bearing members and shaft being adapted to be interchangeably positioned on said supporting frame, and driving means associated with one of said bearing members and adapted to be interchangeably positioned forwardly and rearwardly thereof to rotate said shaft.

9. In a winch, a supporting frame therefor, a shaft extending longitudinally of said winch, a drum mounted thereon, bearing members mounted on said supporting frame for symmetrically journaling said shaft with respect to the axis of said bearing members, said bearing members and shaft being adapted to be interchangeably positioned on said supporting frame, driving means associated with one of said bearing members and adapted to be interchangeably positioned forwardly and rearwardly thereof to rotate said shaft, and means associated with said bearing members and extending longitudinally of the winch for transferring the control means to one side of the supporting frame in the reversed position of the drum and shaft whereby said control means are operated from the opposite side of the supporting frame.

In testimony whereof, we have signed our names to this specification this 11th day of June, 1924.

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