

No. 836,119.

PATENTED NOV. 20, 1906.

G. W. KING.
WINCH.

APPLICATION FILED MAY 26, 1905.

2 SHEETS—SHEET 1.

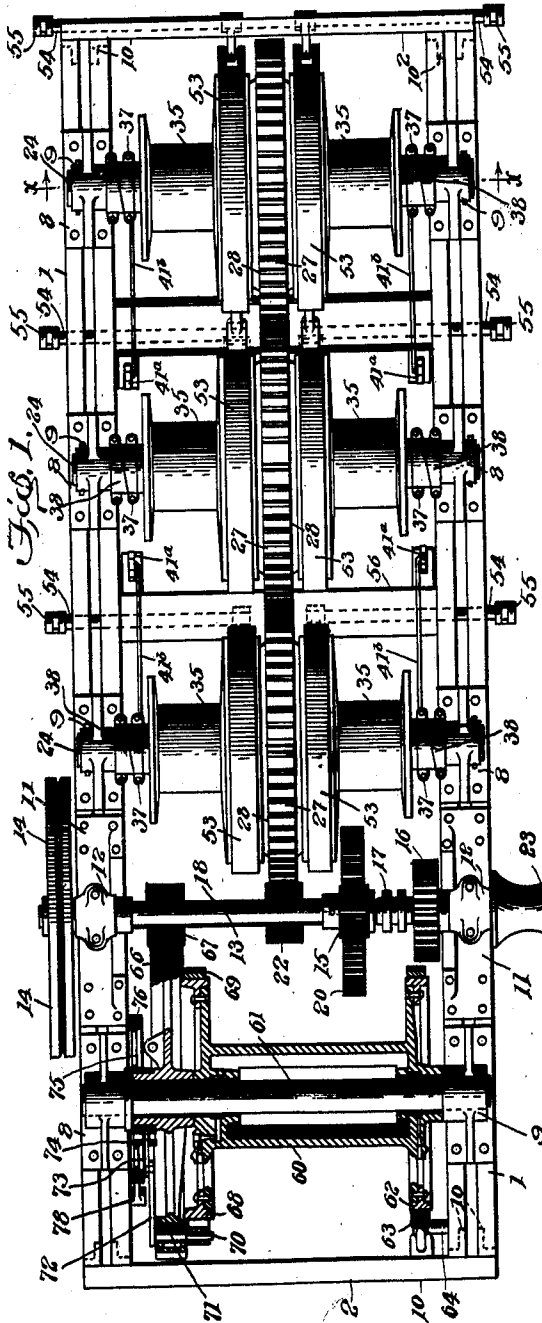
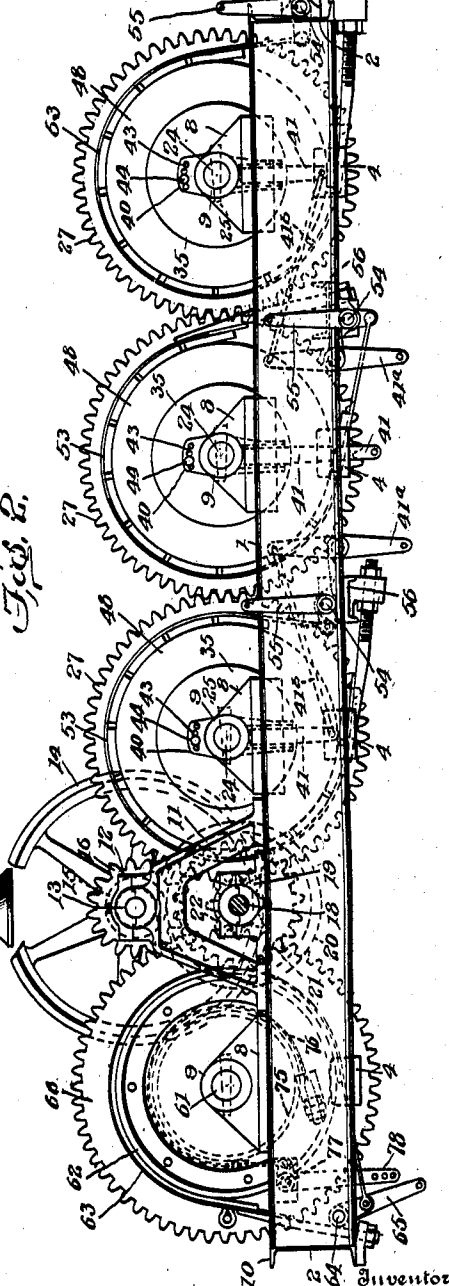


Fig. 2.



Inventor
George W. King,

Witnesses

L. Howard Walmsley,
Irvine Miller.

334 *H. A. Tulliver,*
Attorney

No. 836,119.

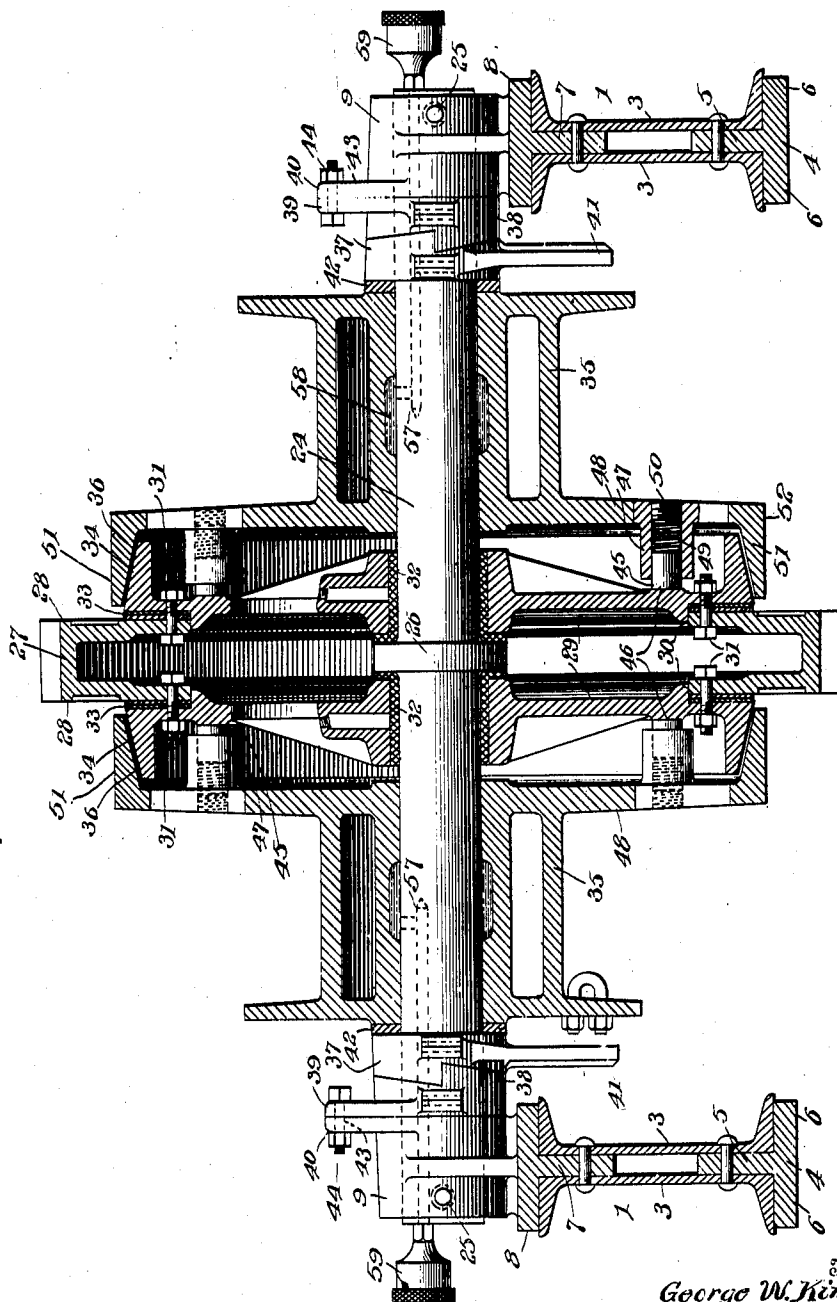
PATENTED NOV. 20, 1906.

G. W. KING.
WINCH.

APPLICATION FILED MAY 26, 1905.

2 SHEETS—SHEET 2.

Fig. 3.



George W. King, Inventor

Witnesses

G. Howard Adamsley,
Irvine Miller.

J. A. Toulmin,

Attorney

UNITED STATES PATENT OFFICE.

GEORGE W. KING, OF MARION, OHIO, ASSIGNOR TO THE MARION STEAM SHOVEL COMPANY, OF MARION, OHIO, A CORPORATION OF OHIO.

WINCH.

No. 836,119.

Specification of Letters Patent.

Patented Nov. 20, 1906.

Application filed May 26, 1905. Serial No. 262,379.

To all whom it may concern:

Be it known that I, GEORGE W. KING, a citizen of the United States, residing at Marion, in the county of Marion and State of Ohio, have invented certain new and useful Improvements in Winches, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to winches, and more particularly to that class of winch machinery or winch mechanism employed for the purpose of independently controlling the winding in and paying out of a number of ropes by means of a corresponding plurality of drums driven from a single shaft, either wholly or in part, by a common train of gearing, the entire mechanism being mounted in a single frame, so as to constitute a complete organized machine adapted to be driven from a single motor and controlled by a single operator.

The structure is primarily devised for use in connection with gold-mining dredges for the purpose of controlling the head line the four fleeting lines and the two spud-controlling lines, by means of which the position of the dredge is shifted and maintained, although the structure is obviously capable of other applications.

The object of my invention is to provide a simple, compact, and self-contained structure designed with a special view to the reducing of the amount of power required to actuate the same.

To these and other ends my invention consists in certain novel features which I will now proceed to describe and will then particularly point out in the claims.

In the accompanying drawings, Figure 1 is a plan view, partly in section, of a winch mechanism embodying my invention in one form. Fig. 2 is a side elevation of the same, partly in section; and Fig. 3 is an enlarged transverse sectional view taken on the line $x x$ of Fig. 1 and looking in the direction of the arrows.

In the said drawings I have shown the main frame of the structure as substantially rectangular in form, being composed of longitudinal side members 1 and transverse end members 2. The former are preferably composed of channel-bars 3, placed back to back or with their channels arranged outward, the beams being spaced apart at the

bottom by spacing-blocks 4, T-shaped in cross-section, which also serve to support the frame, one of the members of said T-shaped blocks (indicated by the reference-numeral 5) extending up between the channels to space them apart, while the two other members (indicated by the reference-numeral 6) extend under and support the channels from below. At their upper edges these channel-bars are spaced apart by downwardly-extending ribs 7, formed on the bases 8 of the several shaft-supporting brackets 9, which are mounted on the top of the channels constituting the side members of the frame. The end members 2 are preferably in the form of channel-bars, having their channels directed outwardly and secured to the side members by means of angle-bars 10. Upon this frame, near one end thereof, there are mounted on opposite sides thereof two upwardly-extending brackets 11, carrying bearing-boxes 12, in which is mounted the main driving-shaft 13 of the winch. Said shaft is provided with a wheel or pulley 14, by means of which the shaft 13 is driven from any suitable motor. Said shaft 13 has loosely mounted thereon a small pinion 15 and large pinion 16, either one of which may be caused to rotate along with the shaft by the engagement therewith of a clutch 17, splined on the shaft 13, so as to rotate therewith and capable of sliding longitudinally on said shaft, so as to be brought into engagement with either of said pinions.

18 indicates a counter-shaft located below and parallel with the driving-shaft 13, being mounted in bearing-boxes 19 on the side members of the main frame. This counter-shaft is provided with a large gear 20, secured thereon and meshing with the small pinion 15, and a small gear 21, also secured on said counter-shaft and meshing with the large pinion 16. By reason of this construction the counter-shaft speed and power may be varied relatively to the speed and power of the driving-shaft, so as to give greater speed when light loads are handled and greater power when heavy loads are handled without varying the speed of the motor. The counter-shaft 18 has centrally secured thereon a pinion 22, from which a plurality of winding-drums are driven through a single train of gearing, which I will now proceed to describe, first noting that the end of the counter-shaft on that side of the machine opposite the side

on which the driving wheel or pulley 14 is located is extended to receive a spool or drum 23, which may be used as an ordinary winch or windlass by taking around it a turn or two of any rope which it is desired to manipulate.

In the present instance I have shown six drums as driven from the pinion 22, although this number may be varied. These drums are arranged in pairs, two drums upon a common shaft so that, in the present instance there are three of these shafts, (indicated by the reference-numeral 24.) The structural features of each shaft and its two drums being similar to those of the others, I will confine my description to one set. Each shaft 24 is a fixed or non-rotating shaft mounted in supporting brackets or housings 9, hereinbefore referred to, located on top of the side frame members 2. The shaft is secured in these supports in any suitable way—as, for instance, by means of a pin 25 through each end of the shaft and through the corresponding housing. Each shaft is provided with a central collar 26, which serves to maintain in position a gear-wheel 27, which is loosely mounted on said shaft, so as to rotate freely thereon, being prevented from moving longitudinally of the shaft by the collar 26. To this end each gear-wheel 27 is composed of an annular peripheral portion 28, detachably secured between two centers 29 on the shaft 24 or on opposite sides of the collar 26. The centers 29 are provided on their opposing inner faces with seats 30 to receive the annular gear 28, which is secured in said seats by bolts 31, so as to be capable of being detached from the centers. These latter are provided with bushings 32, of suitable antifriction material, which bear not only against the body of the shaft 24, but also against the sides of the collar 26, to take up the lateral thrust arising from the engagement of the friction-cones hereinafter described. As these bushings and the collar are subject to wear, provision is made for bringing the centers closer together after such wear occurs by the insertion between the lateral faces of the members 28 and 29 of spacing pieces or liners 33. By the removal of these spacing pieces or liners the centers may be brought closer together and any wear which has occurred may be readily taken up.

Each gear-wheel 27 is provided on its opposite sides with conical friction surfaces or rings 34, these being preferably formed on the peripheral portions of the centers 29, as shown. On each shaft 24 there is mounted on each side of the central gear 27 thereof a winding-drum 35, said drums being loosely mounted on said shaft. Each drum is provided with a conical friction surface or ring 36, adapted to cooperate with the corresponding frictional surface 34 of the gear 27. Each drum is moved into engagement with the central gear, so as to be rotated thereby

by means of a cam-shifting collar 37, mounted loosely on the shaft 24 between the outer end of the drum and a similar fixed cam-collar 38, which latter is secured in position on the shaft by having an arm or lug 39 thereof extended upward and secured to a corresponding lug 40 on the support or housing 9, against which the fixed collar 38 abuts. Each movable collar 37 is provided with an operating-arm 41, by means of which it may be so rotated on the shaft 24 that its inclined cam-surface, bearing against the similar but reverse cam-surface of the cooperating cam-surface of the fixed collar 38, will move the drum longitudinally on the shaft 24 and cause its friction-cone 36 to engage with the corresponding friction-cone 34 of the gear 27 with any desired pressure. A washer or wearing-ring 42 is interposed between the shifting cam 37 and the end of the drum 35. The limits of movements of the drum for any given movement of the shifting collar may be regulated by the adjustment around the shaft 24 of the fixed collar 38, and to this end the lug 40 is provided with a plurality of apertures 43, arranged in the arc of a circle having the center of the shaft 24 for its center. A bolt 44, which connects the lug 39 to the lug 40, may be passed through any one of these apertures, according to the angular adjustment around the shaft 24 of the fixed collar 38.

Provision is made for disengaging the friction-cones and holding each drum against its shifting collar, the means for the accomplishing of this consisting of spring-actuated plungers 45, bearing against the face of the gear 27, each center of which is provided with an annular bearing-surface 46, cooperating with the plungers 45. Each plunger 45 is mounted to slide in a housing 47, carried by the head 48 of the drum 35, and is backed by a spring 49, located in said housing and bearing against the inner end of the plunger and against an adjusting-screw 50, threaded into the outer end of the housing and serving as an abutment for the spring and as a means for adjusting its pressure. The inner head 48 of each drum is provided with a peripheral flange 51, the inner surface of which forms the conical frictional surface 36, while its outer surface 52 is cylindrical and receives a brake-band 53, which encircles the same and which is controlled by a shaft 54, having an operating-arm 55. The main frame is provided with cross braces or members 56, preferably in the form of channel-bars, on which the bearings of the brake-shafts 54 of two of the pairs of drums are mounted, the third brake-shaft being mounted on the end member 2 adjacent to its pair of drums.

Provision is also made for lubricating the bearings of the drums 35 on the shaft 24 by means of an oil-channel 57, extending in-

ward from each end of the shaft and thence outward to the periphery thereof, where it terminates in communication with an oil-space 58, formed in the inner central portion of the body of the drum. An oil-cup or lubricator 59 is located at each end of the shaft to supply each channel 57 with lubricant.

When the apparatus is in use, the driving-shaft 13 is in constant rotation, and the counter-shaft driven at either of its two speeds similarly rotates the pinion 22, which meshes with the first of the series of gears 27, the successive gears 27 being in mesh with each other, so that all of said gears are in continuous rotation. Any one or more of the drums may be rotated to wind the cable thereon by bringing it into frictional connection with its cooperating gear 27 through the mechanism provided for that purpose. Similarly any one or more of the drums may be disconnected from its driving-gear and either held stationary by its band-brake or be permitted to turn under the load to unwind the rope or cable.

In mechanisms of this kind as heretofore constructed, so far as I am aware, it has been customary to secure the driving member corresponding to the gear 27 to the supporting-shaft corresponding to the shaft 24, thus making the shaft a rotating shaft and creating friction between said shaft and the winding-drums when these latter are held stationary. When such a drum is held stationary under the strain of a heavy load or strong pull on its rope, the amount of friction between said drum and the shaft rotating therein is necessarily large, increasing the load on the motor, and where a number or all of the drums are thus held stationary under load it will be seen that the load on the motor even when doing no useful work is very greatly multiplied. All of this useless frictional resistance is obviated by the construction which I have devised, in which the supporting-shafts are stationary or non-rotating, both driving-gear and drums being free to rotate on said shaft independently of each other, so that when the drums are disconnected from the driving-gear and held stationary under load said load has no effect whatever in increasing the frictional resistance which the motor has to meet. I am therefore enabled to obtain a maximum of efficiency from a motor of given capacity or to obtain a greater efficiency from a motor of relatively smaller capacity.

Winches of this character as usually constructed also include in their structure a winding-drum used for the head-line in the case of a dredge and driven independently of the winding-drums heretofore considered. Such a head-line drum is shown in the present instance, being indicated by the reference-numeral 60. It is mounted to rotate on a

fixed or non-rotating shaft 61, secured in the supports 9, already referred to, said supports being located at the forward end of the main frame. Said drum has a band wheel 62, surrounded by a brake-band 63 and controlled from a shaft 64, provided with a controlling-arm 65. By this means the drum may be held stationary under load or permitted to unwind its rope or cable. The drum is positively driven from a gear-wheel 66, also mounted loosely on the shaft 61 and meshing with a pinion 67 on the counter-shaft 18. Said gear-wheel may be connected to and disconnected from the drum in any suitable manner, preferably by means of a friction-drive. The specific form of drive shown is one in which a band-wheel or annulus 68 on the drum is surrounded by a brake-band 69, one end of which is fixedly connected to the gear 66. The other end is connected to an eccentric-pin 70 on a shaft 71, mounted in the gear-wheel 66 and connected by an arm 72 and link 73 with a collar 74, mounted loosely on the hub of the gear-wheel 66. This collar has secured to it a band-wheel 75, around which passes a brake-band 76, controlled by a shaft 77 and operating-arm 78. Stoppage or retarding of the wheel 75 by its brake-band will cause the collar 74 to actuate the shaft 71, so as to tighten the brake-band 69 on the band-wheel 68 of the drum 60, and thereby cause this latter to rotate. This construction of the head-line drum possesses the advantage already pointed out in connection with the other winding-drums, that it releases the continuously-rotating parts of the friction of the load on the drum, since the shaft on which the drum is mounted is stationary.

It will be observed that the structure is simple, compact, self-contained, and well balanced, the drums being readily accessible and suitable provision being made for wear and adjustment.

I do not wish, however, to be understood as limiting my invention as to its broader features to the precise details of construction hereinbefore described, and shown in the accompanying drawings, as it is obvious that they may be varied without departing from the principle of my invention.

In order to better group the mechanism controlling the shifting collars 37, some of them may be connected to actuating-levers 41^a, connected to the arms 41 by rods 41^b. In practice all of the controlling arms and levers, such as 41, 55, 41^a, 65, and 78, are connected by rods or other suitable connecting devices to a corresponding group of hand-levers arranged within convenient reach of the operator.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a winch mechanism, the combina-

tion, with a non-rotating shaft having a central collar, of a driving member loosely mounted on said shaft and engaging the opposite sides of said collar, said driving member being provided with friction-surfaces on its sides, and winding-drums rotatably mounted on said shaft, movable longitudinally thereof, and provided with friction-surfaces to engage those of the driving member, substantially as described.

2. In a winch mechanism, the combination, with a non-rotating shaft provided with a central collar, and drums loosely mounted on the shaft on each side of the center thereof and provided with friction-surfaces, of a driving member loosely mounted on the central portion of the shaft and comprising an annular outer portion to which the power is applied, and two centers connected to said annular portion at their outer margins and bearing on said shaft and collar on the opposite sides of the latter, substantially as described.

3. In a winch mechanism, the combination, with a non-rotating shaft having a central collar, of a driving member loosely mounted thereon and comprising an outer annular part, and two centers bearing on the shaft and against the opposite sides of the collar thereon, said centers being secured at their outer margins to the annular part, and spacing pieces or liners removably mounted be-

tween said centers and annular part, substantially as described.

4. In a winch mechanism of the character described, the combination, with a non-rotating shaft having a central collar, of a driving member loosely mounted thereon, comprising an outer annular part and two centers secured thereto at their margins, said centers being provided with bushings bearing on the shaft and on opposite sides of the collar thereon, and removable spacing pieces or liners located between the annular part and centers, substantially as described.

5. The combination, in a winch mechanism, with a frame and a drive-shaft mounted on said frame, of a series of driving-gears carried by said frame and driven from said shaft, winding-drums carried on the opposite sides of said driving-gear and adapted to be driven thereby, a single drum mounted on said frame on the opposite side of said drive-shaft, means for driving said drum from said shaft, and means for operating any of the individual drums independent of the remaining drums, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE W. KING.

Witnesses:

ROBERT G. LUCAS,
WILLIAM R. SHISLER.