July 5, 1927. 1,634,766

G. E. BARRETT

DRIVING MECHANISM FOR THE WINDLASSES AND CAPSTANS OF VESSELS

Filed Feb. 8, 1927 3 Sheets-Sheet 1

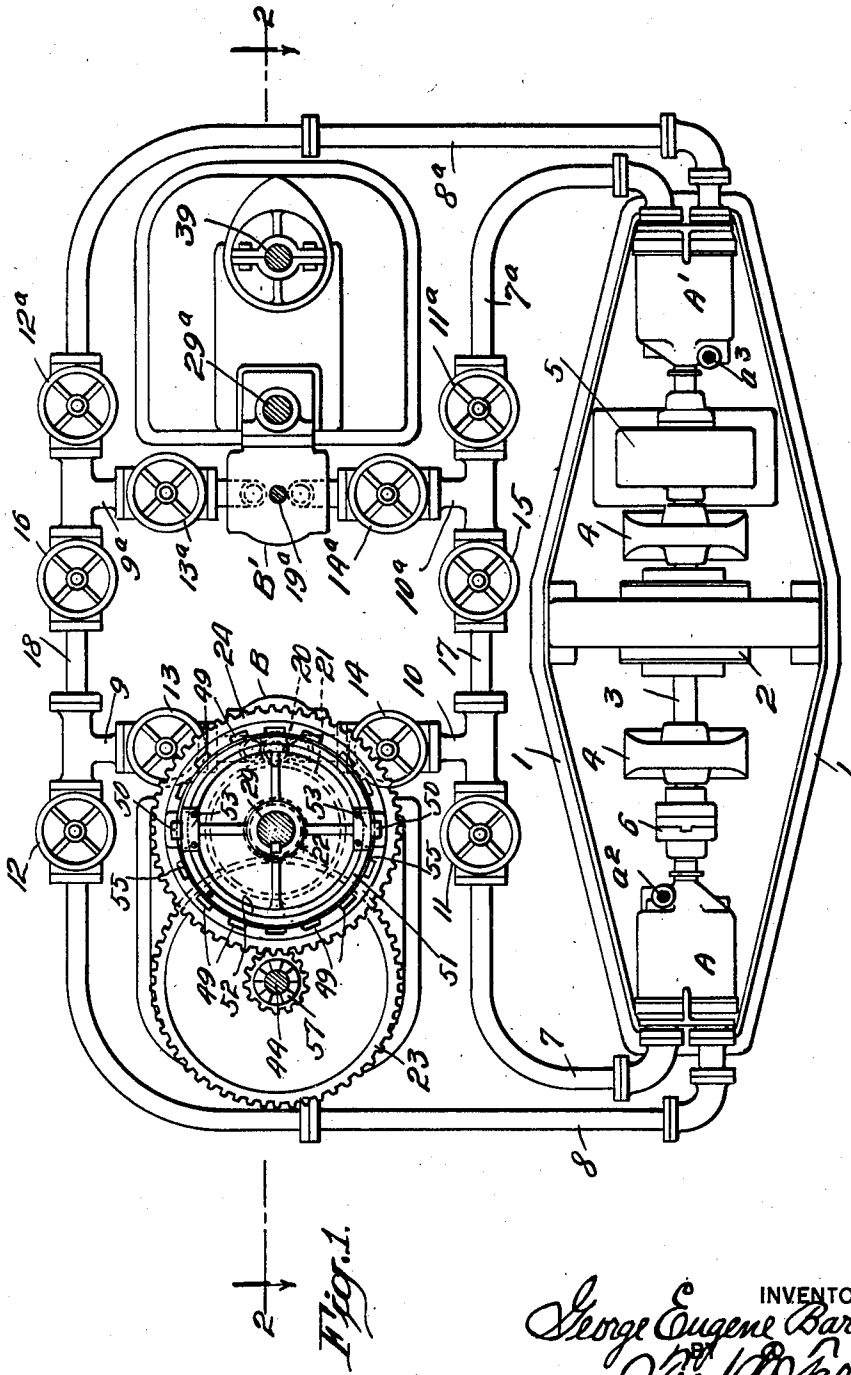


Fig. 1.

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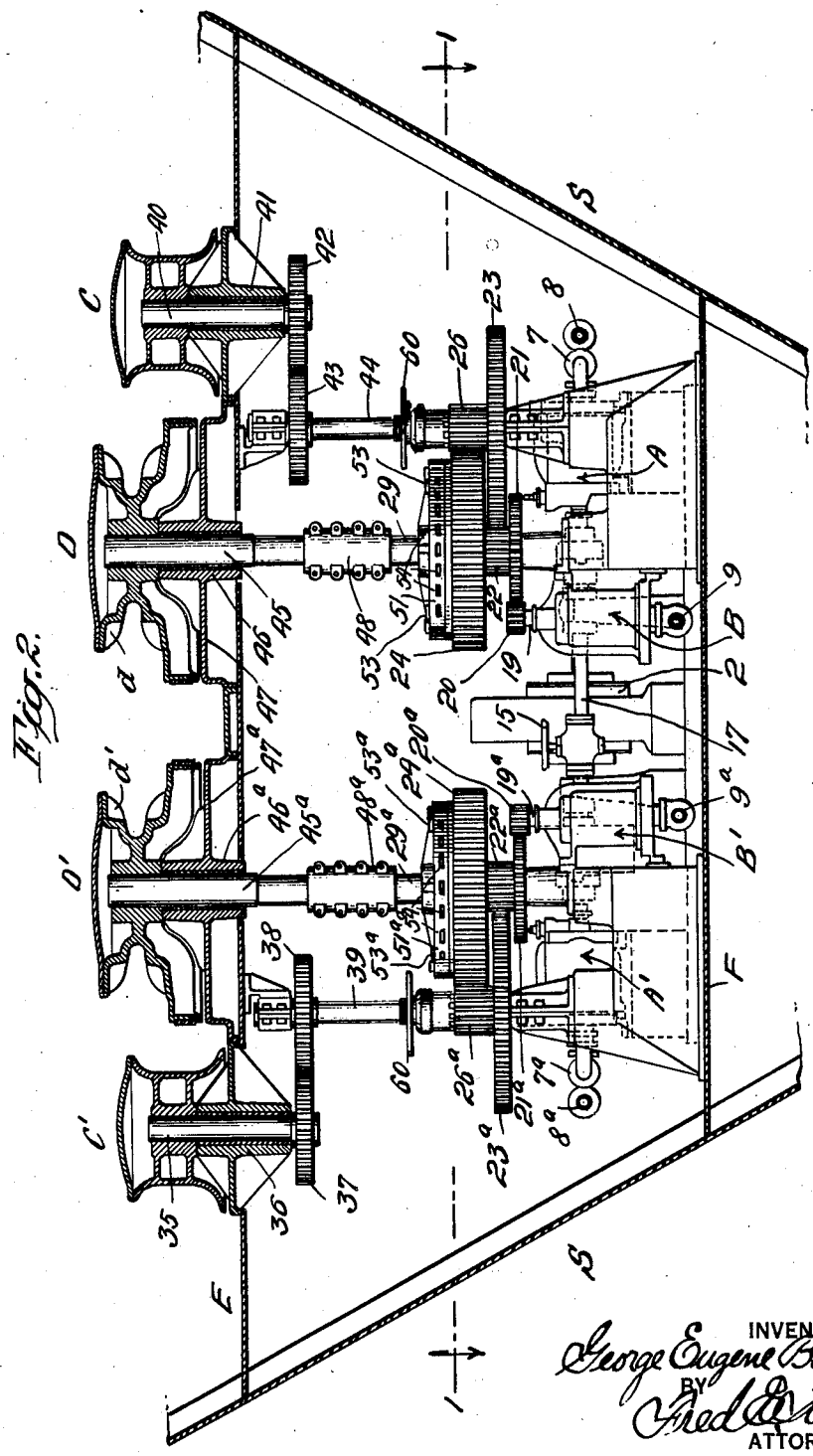


Fig. 2.

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Fig. 3.

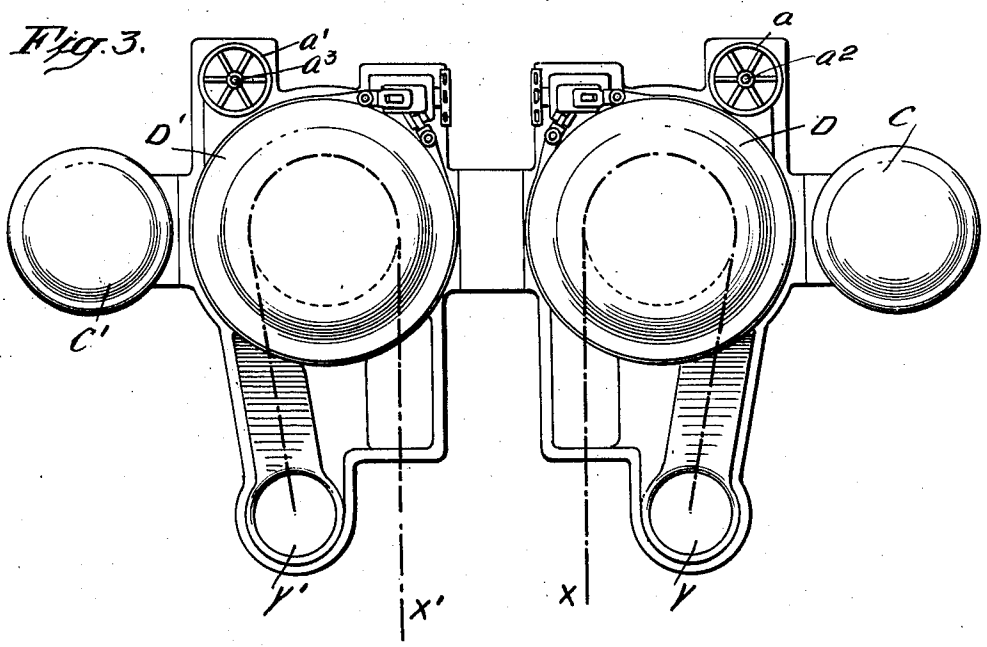


Fig. 4.

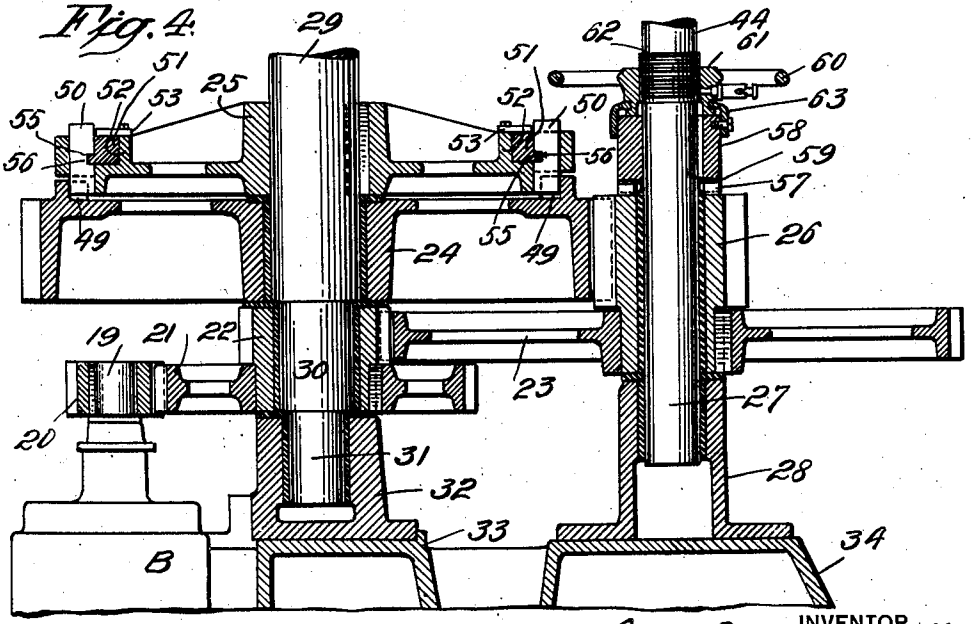


Fig. 5.



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UNITED STATES PATENT OFFICE.

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DRIVING MECHANISM FOR THE WINDLASSES AND CAPSTANS OF VESSELS.

Application filed February 8, 1927. Serial No. 166,623.

This invention relates to novel and ingenious power mechanism for driving windlasses, capstans, and the like on board of vessels, particularly warships; and more especially the invention applies to novel and simplified gearing and other transmission means between the prime movers or power appliances, consisting for example of variable speed driven pumps actuated by variable speed driving pumps, and the windlass, capstan, or other instrumentality to which the power is to be applied for the purpose intended, which in the case of the windlass is to lift or drop the anchor, and in the case of a capstan is usually to warp ship.

Heretofore the connections between the pumping mechanism and the windlass or capstan have consisted of a multiplicity of shafts and gears arranged in a complicated and expensive manner, requiring much space and utilizing many mechanical elements. The object of my invention is to simplify the mechanism by using as few shafts and gears and pinions as possible, thus economizing in space and in the cost of machine construction, besides concentrating in a small area and compacting thus particular transmission machinery, so as to secure greater strength, easier and quicker manipulation, surer and more accurate results, and numerous additional advantages over the complicated mechanisms now in use.

With these and numerous other objects in view the invention may be said to consist essentially in the construction, combination, and arrangement of parts, substantially as will be hereinafter more fully described, and then pointed out in the ensuing clauses of claims.

In the accompanying drawing illustrating my invention:

Figure 1 is an incomplete top plan view in partial irregular section on the line 1, 1, of Figure 2 of my improved mechanism for operating a ship's windlass and similar machines.

Figure 2 is a vertical sectional elevation of the same on the line 2, 2, of Figure 1.

Figure 3 is a top plan of a pair of windlasses and capstans, as they are arranged in Figure 2.

Figure 4 is an enlarged detail view of the simplified gear and shaft combination for transmitting power to the windlass and capstan or other elements.

Figure 5 is an edge view of the locking ring used in connection with certain of the gear wheels.

Like characters of reference denote like parts in all the different figures of the drawing.

As already stated the invention comprises a novel system of gearing for imparting motion to the windlass and capstan of a vessel, and I shall presently describe this system in detail.

First, however, I will describe the power appliances for actuating the gearing. For this purpose I have selected the appliances in use to-day on many battleships, cruisers and other vessels, not because my invention restricts me to a combination of my simplified gear transmission with such power machinery, but because it will commonly be used with such machinery, though it will be obvious that it may be used with other classes of driving machines. As I do not claim the power machines as my invention, and as they are already in extensive and efficient use, I do not consider it necessary to describe or to show the same in great detail, but only in general outlines, in order to indicate an operative combination.

It may be said that these power mechanisms include essentially variable speed driving pumps, as A and A′, and variable speed driven pumps, as B and B′, with connections whereby the driving pumps drive the driven pumps, the duplicate arrangement being set forth to correspond with the duplicate windlasses and duplicate capstans, which I have preferably illustrated in order to better explain the invention.

In the sectional plan view of Figure 1 I have shown, in outline only, a bedplate 1, in which are arranged the two driving pumps A and A′, which are operated by an electric motor 2, deriving its power from some suitable source of energy, and having a shaft 3 which runs from motor 2 to the two pumps A and A′, said shaft 3 being carried in bearings 4, 4, and being provided with a coupling or clutch 6, a brake 5, and any other customary accessories for assisting in the operation thereof and its control. The pump A is controlled by a hand-wheel a on a shaft or connection a^2 that leads to the

pump A, and the pump A′ is controlled by a hand-wheel a' on a shaft or connection a^3 that leads to the pump A′; said shafts a^2 and a^3 being associated with interior mechanism in the pumps which controls their action in starting, stopping, reversing, etc.

In order that the pumps A and A′ may respectively drive the driven pumps B and B′, certain piping leads from pump A to pump B, and other piping from pump A′ to pump B′. From pump A to pump B run two pipes 7 and 8, and from pipe 7 a connecting pipe 10 leads into one side of pump B, while from pipe 8 a connecting pipe 9 leads into the other side of pump B. Pipe 7 has hand valve 11, and pipe 8 has hand valve 12; while pipe 10 has hand valve 14 and pipe 9 has hand valve 13. Similarly from pump A′ to pump B′ run two pipes 7^a and 8^a, and from pipe 7^a a connecting pipe 10^a leads into one side of pump B′, while from pipe 8^a a connecting pipe 9^a leads into the other side of pump B′. Pipe 7^a has hand valve 11^a, and pipe 8^a has hand valve 12^a; while pipe 10^a has hand valve 14^a and pipe 9^a has hand valve 13^a. Thus here are two pipe systems for conveying fluid, as oil, to drive the two pumps, one for each of the two windlasses. To enable the prime mover pumps A and A′ to operate the pumps B′ and B respectively, in case of breakdowns, instead of pumps B and B′, as normally, the pipe 7 is connected with the pipe 7^a by a pipe 17 provided with a hand valve 15, and the pipe 8 is connected with the pipe 8^a by a pipe 18 provided with a hand wheel 16.

Normally the pump A is to drive the pump B, and in so doing the valves 11, 14, 13, and 12 will be open, while the valves 15 and 16 will be closed. And normally the pump A′ will drive the pump B′, and in so doing the valves 11^a, 14^a, 13^a, and 12^a will be open, while the valves 15 and 16 will be closed as before.

It will be evident however that the pump B may be driven from the pump A′, in case the pump A is out of order and for the time being inoperative. In order to do this open valves 11^a, 15, 14, 12^a, 16, and 13, and close valves 13^a, 14^a, 11, and 12. Or to drive pump B′ from pump A, close valves 13, 14, 11^a and 12^a and open the others.

Obviously the pumping through pipes 7 and 7^a will drive the pumps in one direction and pumping through pipes 8 and 8^a will drive them in the opposite direction.

I will next explain the general arrangement of the windlasses and capstans or other equivalent machines, and their location in relation to the mechanism which drives them. In Figure 2 I show a cross section of the hull of a ship, S being the so-called skin of the vessel, E being one deck on which the windlasses and capstans are supported, and F being a lower deck on which the machinery for driving the windlasses, etc., is supported. I show these decks simply to assist in the explanation. Usually each windlass and capstan will be located far forward in the bow. Of course there may be one or several of each of them. In the drawing I show two windlasses D and D′, and near them two capstans C and C′. The base of each is secured in or on the floor of the deck E. The windlass D has a revolvable member called the wildcat which is provided with teeth d that are adapted to be engaged by the anchor chain, said wildcat being secured to the vertical shaft 45, by means of which it is rotated. Shaft 45 has a bearing 46 provided with a suitable bushing, said bearing being integral with frame 47 which is fitted into or secured to deck E. Similarly the windlass D′ has teeth d' that are engageable by the anchor chain, and this wildcat part of the windlass is keyed to the vertical shaft 45^a, which is bushed in bearing 46^a made integral with frame 47^a that rests on or in deck E. In Figure 3 I show in dotted lines an anchor chain X running around windlass D and dropping down through the opening Y, and a chain X′ running around windlass D′ and dropping down through opening Y′, the same being only a conventional method of showing the disposal of the anchor chains. Likewise the capstan C adjacent to the windlass D has its drum keyed to the vertical shaft 40 which is bushed in a bearing 41 supported on deck E. Shaft 40 carries at its lower end a gear wheel 42, that meshes with another gear 43 secured on a vertical shaft 44 that is rotatable in suitable bearings. And in the same manner the capstan C′ is adjacent to the windlass D′ and has its drum keyed firmly on a vertical shaft 35 revolvable in a bushed bearing 36 that is carried on deck E. Said shaft 35 carries at its lower end a gear wheel 37 which meshes with another gear wheel 38 on a shaft 39 which is supported in suitable bearings so as to revolve easily as required.

I come now to the essential part of my invention which consists in simplified transmission gearing connecting the driving mechanism, or prime mover, consisting in the special example given, of pumps, and the driven means, consisting of windlasses, capstans and the like devices, the latter being operated together or independently, all as I shall set forth in detail. Heretofore this transmission mechanism has been complicated and multifarious, but I have reduced the same to a very simple and compact form.

The driven pumps B and B′, which in turn become driving means for the windlasses and capstans, have respectively shafts 19 and 19^a; and the windlass D has shaft 45, the windlass D′ has shaft 45^a, the capstan C shaft 40 and the capstan C′ shaft 35. The

problem therefore is for shaft 19 to drive shafts 45 and 40, and the shaft 19ª to drive shafts 45ª and 35. The gearing for doing this is shown in Figure 2 and in enlarged detail in Figure 4, in so far as it connects shaft 19 with shafts 45 and 40, and obviously the gearing connecting shaft 19ª with shafts 45ª and 35 will be a duplicate thereof.

Shaft 19, which is turned in one direction or the other by the pumping mechanism B, accordingly as the motive current of oil flows through one set of pipes or the other, as above fully explained, has keyed firmly thereon a pinion 20, see Figure 4, which meshes with a gear wheel 21 keyed on the hub on a pinion 22 loose on the section 30 of the vertical shaft 29 which is coupled by coupling 48 to the wildcat shaft 45 of windlass D. Shaft 29 has the aforesaid section 30 of reduced diameter and below it another section 31 of still further reduced diameter, the section 31 being carried in bearing 32 having a suitable bushing and resting on the base 33 mounted on deck F. The shoulder between shaft sections 30 and 31 rests on suitable packing on the top of bearing 32. Further the shaft section 30 is surrounded within the loose pinion 22 with suitable packing or bushing, a section of which packing also lies on top of the pinion 22 below the shoulder on shaft 29 between it and shaft section 30. Thus the pinion 20 drives the gear 21 and its connected pinion 22, and rotates same loosely around shaft section 30. The pinion 22 meshes with and drives a gear wheel 23 which forms part of the train for driving the capstan and windlass, and surrounds and is keyed to the hub of a wide toothed pinion 26 which is loose on shaft 27, parallel to shaft 29. Further the shaft 29 has loose thereon a large gear wheel 24, with which the pinion 26 engages and drives, proper bushings and packing pieces being within the bearing of gear wheel 24 and on top of same, in order to facilitate the operation. The lower end of shaft 27 revolves in bearing 28, that is mounted on base 34 on deck F, and a suitable bushing surrounds shaft 27 in bearing 28, and within pinion 26, and there is packing between the lower end of pinion 26 and top of bearing 28. Thus pinion 20 drives gear 21 and pinion 22, which drives gear 23 and pinion 26, which drives gear wheel 24. The shaft 27 is the lower end of the shaft 44 which transmits motion through gears 43 and 42 to the capstan shaft 40.

In quite a similar manner, see Figure 2, the shaft 19ª of pump B′ has a pinion 20ª thereon which meshes with and drives a gear wheel 21ª secured to pinion 22ª that is loose on a part of shaft 29ª, and pinion 22ª engages and drives gear wheel 23ª secured to wide pinion 26ª loose on shaft that forms lower end of shaft 39, and pinion 26ª meshes with and drives large gear wheel 24ª loose on shaft 29ª. The gears 24ª and 26ª may be locked to their shafts as in the case of gears 24 and 26. The shaft 39 drives gear 38 that engages gear 37 on shaft 35 of capstan C′. Shaft 29ª is coupled to shaft 45ª by coupling 48ª to drive the windlass D′.

I will now explain the devices for locking the windlass shaft 29 to the gearing so that pump B will drive same and the windlass; and the means for locking shaft 44 to the gearing so that the capstan shaft may be driven or may be disconnected and thrown out of action. Windlass and capstan may be driven together or separately.

Keyed to shaft 29 above the loose gear wheel 24 is a horizontal locking head or wheel 25. The upper surface of the outer periphery of gear 24 is provided with a series of rectangular notches 49, adapted to be entered by a pair of locking block keys 50. These keys are raised and lowered so as to be caused to engage with or be disengaged from two or more of the notches 49 by means of a ring 51, see Figure 5, which loosely surrounds a flange 52 on wheel 25 and is kept in place by small plates 53 that overlap and cover same, said ring 51 being moved and adjusted around the flange 52 by using a bar or handle that is inserted in one or more of the openings 54 in the side of ring 51. Ring 51 further has a couple of inclined ribs 55 that engage notches 56 in the locking blocks 50. Thus by rotating ring 51 more or less the blocks 50 may be lowered into or raised out of notches 49, and connection made or broken between members 24 and 25. It is also necessary to provide means for locking the shaft 44 and its extension 27 to the loose wide pinion 26. The top of the pinion is provided with teeth of any desired kind at 57. Vertically adjustable on shaft 44 above teeth 57 is a block 58 that is splined or feathered to the shaft, and has teeth 59 to clutch teeth 57 when block 58 is depressed. A hand wheel 60 has an internally-threaded hub 61 that screws on a screwthreaded section 62 of shaft 44. The hub 61 connects with block 58 by a ring 63 which enters a groove in the hub but is rigidly screwed or attached to block 58. Thus by turning hand wheel 60 the block 58 may be raised or lowered and put into or out of clutch, so as to connect pinion 26 to the shaft or disconnect it therefrom, and obviously when connection is made the gearing will drive the capstan.

Many modifications may be made without exceeding the scope of the claims, and I reserve the liberty of varying the details and making many changes in the precise combination without affecting the invention.

What I claim is:

1. In a mechanism of the character described, the combination with driving means

and driven means, of transmission mechanism connecting them, and consisting essentially of a pair of parallel shafts, a gear wheel loose on one shaft, means for locking it thereto, a pinion loose on the other shaft, means for locking it thereto, said pinion engaging said gear, and a train of gears on said shafts between the said pinion and the driving means, all arranged so that either or both shafts may be actuated.

2. In a mechanism of the character described, the combination with driving means and driven means, of transmission mechanism connecting them, and consisting essentially of two parallel shafts, a gear wheel loose on one shaft, means for locking it thereto, a pinion loose on the other shaft and engaging the gear wheel, means for locking the pinion to said shaft, a pinion actuated by the driving means, a combined large and small gear loose on the aforesaid first shaft which carries the aforesaid gear wheel, and a large gear wheel loose on the second shaft and engaged by the small gear member of the combined gear wheel and also secured to the pinion which is loose on the same shaft, all arranged so that either or both shafts may be driven.

3. In a transmission mechanism, for the operation of plural driven means jointly or independently, two parallel shafts that transmit power to different driven means, a united gear wheel and pinion loose on the first shaft, a pinion engaging and actuating same, a united gear wheel and pinion loose on the second shaft and driven by the other united gear wheel and pinion, a loose gear wheel on the first shaft actuated by the pinion on the second shaft, means for locking the first shaft to the last mentioned gear wheel, and means for locking the second shaft to the pinion and gear wheel thereon.

4. In a transmission mechanism, for the operation of plural driven means jointly or independently, two parallel shafts that transmit power to different driven means, a gear wheel and pinion fastened together and loose on the first shaft, means for rotating same, a gear wheel and pinion fastened together and loose on the second shaft, the same being driven by the pinion on the first shaft, another gear wheel loose on the first shaft and driven by the pinion on the second shaft, means for locking the first shaft to the last mentioned gear wheel thereon, the same including a locking head, locking blocks and a locking ring, and means for locking the second shaft to the loose pinion thereon.

5. In a transmission mechanism, for the operation of plural driven means jointly or independently, two parallel shafts that transmit power to different driven means, a pinion loose on the first shaft and a gear wheel fixed thereto, a power driven pinion engaging said gear wheel, a large pinion loose on the second shaft and carrying a gear wheel fixed thereto which is in mesh with the pinion on the first shaft, another gear wheel loose on the first shaft in mesh with the pinion on the second shaft, separate means on each shaft for causing the same to be engaged with the gearing thereon, so that the shafts may be driven both at the same time or only one at a time.

6. In a transmission mechanism, two parallel shafts that transmit power to different driven means, a combined gear wheel and pinion loose on each shaft, that on the first shaft being actuated by a power driven pinion and itself actuating the combined wheel on the other shaft, another gear wheel loose on the first shaft and actuated by the combined wheel on the second shaft, means for locking the latter wheel to the first shaft consisting of a wheel fast on said shaft, the same having a notched circular flange, blocks adapted to engage said notches, and an operating ring for said blocks having openings for the use of an operating tool and ribs to engage the blocks, and means for locking the second shaft to the gearing thereon.

7. In a transmission mechanism, the combination of two parallel shafts, a windlass and a capstan, means connecting one of the shafts with the windlass, means connecting the other shaft with the capstan, a combined gear wheel and pinion loose on each shaft, that on the first shaft being actuated by a power driven pinion and itself actuating the combined wheel on the other shaft, another gear wheel loose on the first shaft and actuated by the combined wheel on the second shaft, means for locking one shaft to the gearing thereon, and means for locking the second shaft to the gearing thereon, whereby the windlass and capstan may both or only one be driven.

8. In a transmission mechanism, the combination of two parallel shafts, a windlass and a capstan, means connecting the shafts independently therewith, gear mechanism loose on the first shaft, gear mechanism actuated thereby and loose on the second shaft, a pinion for driving the gear mechanism on the first shaft, another loose gear wheel on the first shaft, means for locking one shaft to the large gear thereon, and means for locking the other shaft to the gearing thereon, whereby both the windlass and capstan or either one of them may be driven.

9. The combination with a windlass, of a shaft, means connecting the shaft with the windlass to impart a rotary movement to the latter, a combined gear wheel and pinion loose on said shaft, a power driven pinion for actuating said combined gear wheel and pinion, a second combined gear wheel and pinion driven by the first one, a second shaft on which the second combined gear wheel

and pinion loosely revolves, another gear wheel loose on the first shaft and actuated by the second combined gear wheel and pinion, and means for locking the first shaft to the said loose gear wheel in order to transmit motion to the windlass.

10. The combination with a capstan, of a shaft, means connecting the shaft with the capstan to revolve the same, a parallel shaft, a combined gear wheel and pinion loose on said parallel shaft, a power driven pinion actuating said combined gear wheel and pinion, a second combined gear wheel and pinion loose on the first shaft which transmits power to the capstan, said second combined gear wheel and pinion being driven by the first one, and means for locking said second gear wheel and pinion to the shaft to transmit motion to the capstan.

11. In a transmission mechanism, the combination of two parallel shafts, a windlass and a capstan, means connecting the shafts independently therewith, gear mechanism loose on the first shaft, means for driving it, gear mechanism actuated by the first gear mechanism and loose on the second shaft, another loose gear wheel on the first shaft, driven by the second gear mechanism and means for locking the first shaft to the said large loose gear, consisting of a locking head on the shaft having a series of notches, blocks adapted to enter the notches, and a ribbed locking ring for moving the blocks into and out of the notches.

12. In a device of the class described, the combination of two parallel shafts, the second of which has a screwthreaded part, a combined gear wheel and pinion loose on the first shaft, a combined gear wheel and pinion loose on the second shaft and driven by the first combined wheel, and means for locking the second shaft to the combined wheel that is loose thereon, consisting of a vertically-movable toothed block adapted to engage teeth in the combined wheel, and a hand wheel traveling on the screwthreaded part of the second shaft and loosely coupled to the toothed block, and operated to cause the block to be moved into and out of engagement with the said combined wheel.

13. Windlass driving mechanism, consisting in the combination with the wildcat and its spindle, of a shaft and means connecting it with said spindle, a combined gear wheel and pinion loose on said shaft, another large gear wheel loose on the shaft above the combined wheel, intermediate gearing connecting the combined wheel and the large gear wheel, means on which said intermediate gearing loosely revolves, a power-driven pinion actuating the first-mentioned combined gear wheel and pinion, and means for locking the aforesaid shaft to the large gear wheel.

14. In a windlass and capstan driving mechanism, the combination with a windlass and a capstan, of two parallel shafts, one of which transmits power to the windlass and the other to the capstan, gearing connecting these shafts, driving mechanism for the shafts, and means for locking the windlass shaft to the gear train, consisting of a locking head on the windlass shaft, said head having blocks adapted to engage the gearing, and a ring encircling a flange on the locking head, said ring having ribs that engage the blocks and a series of openings for the insertion of a tool for moving the ring to cause the blocks to engage or release.

In testimony whereof I hereunto affix my signature.

GEORGE EUGENE BARRETT.