M. H. C. SHANN.

MECHANICAL CONTROL OF SAILS.

APPLICATION FILED AUG. 24, 1920.

1,376,170.

Patented Apr. 26, 1921.

4 SHEETS—SHEET 1.

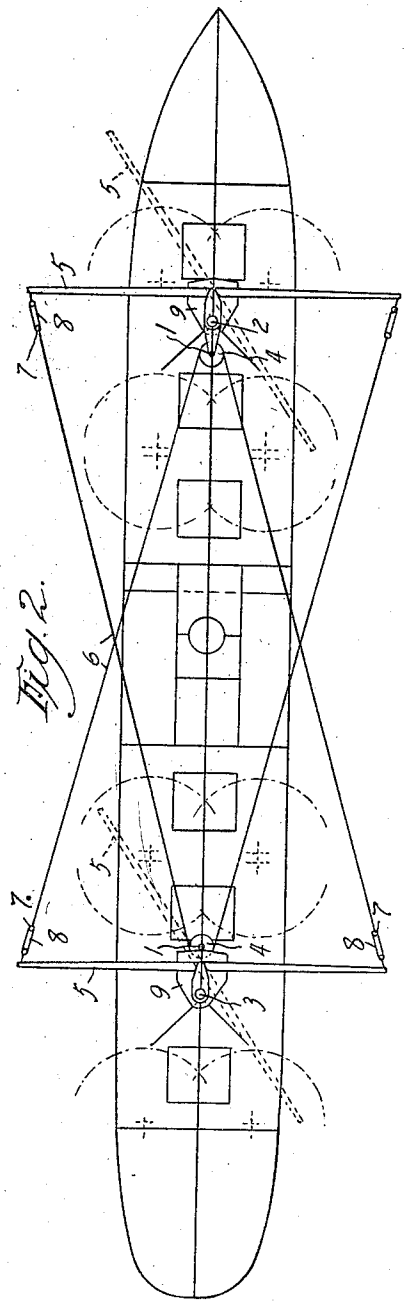


Fig. 2.

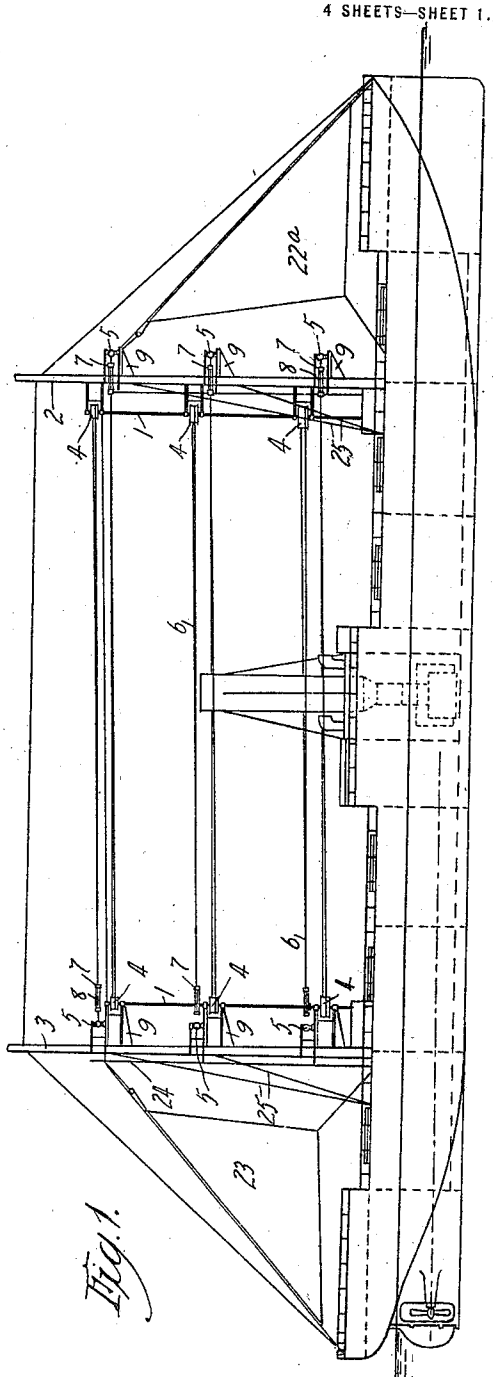


Fig. 1.

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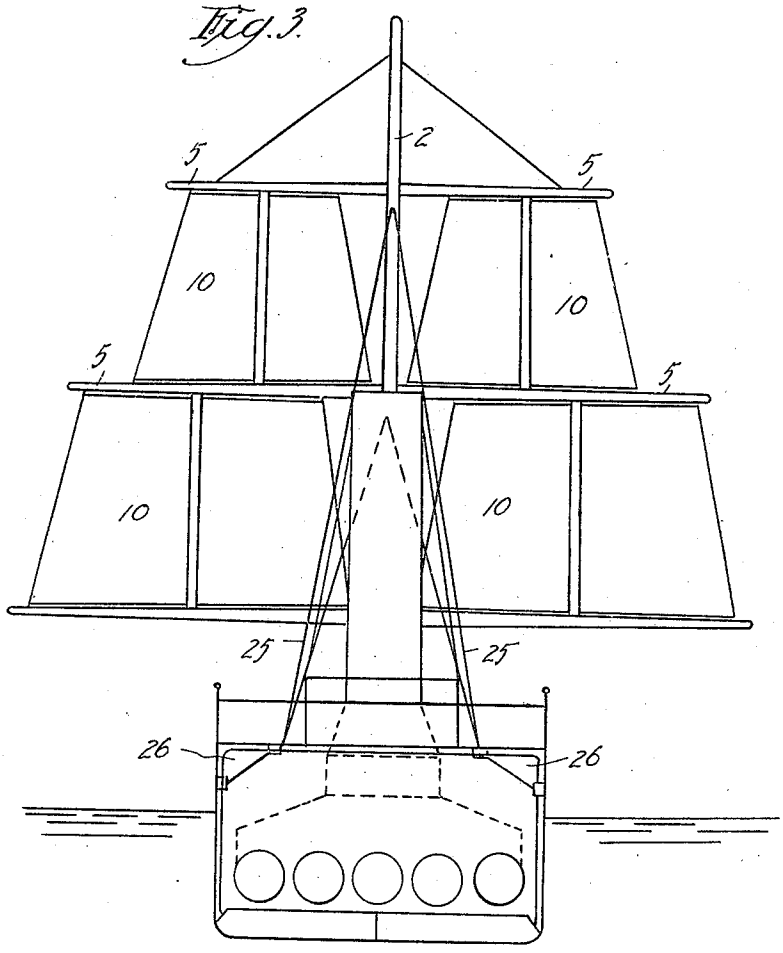
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4 SHEETS—SHEET 2.

Fig. 3.



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3 SHEETS—SHEET 3.

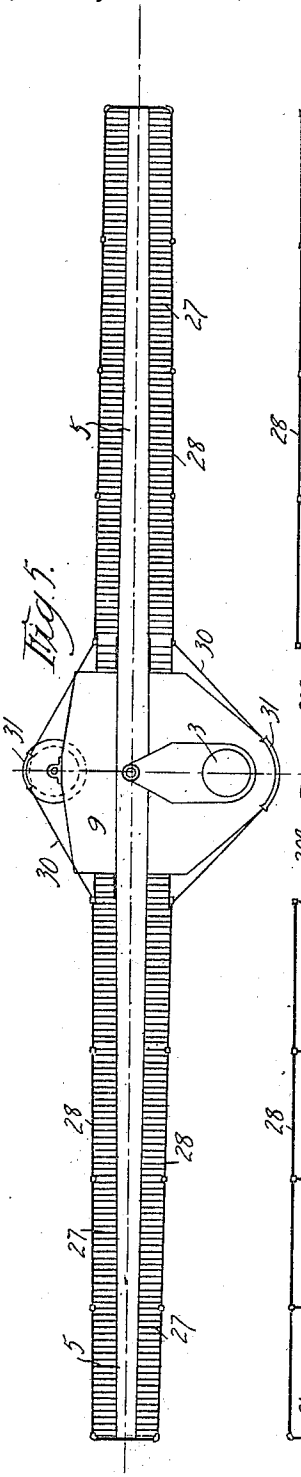


Fig. 5.

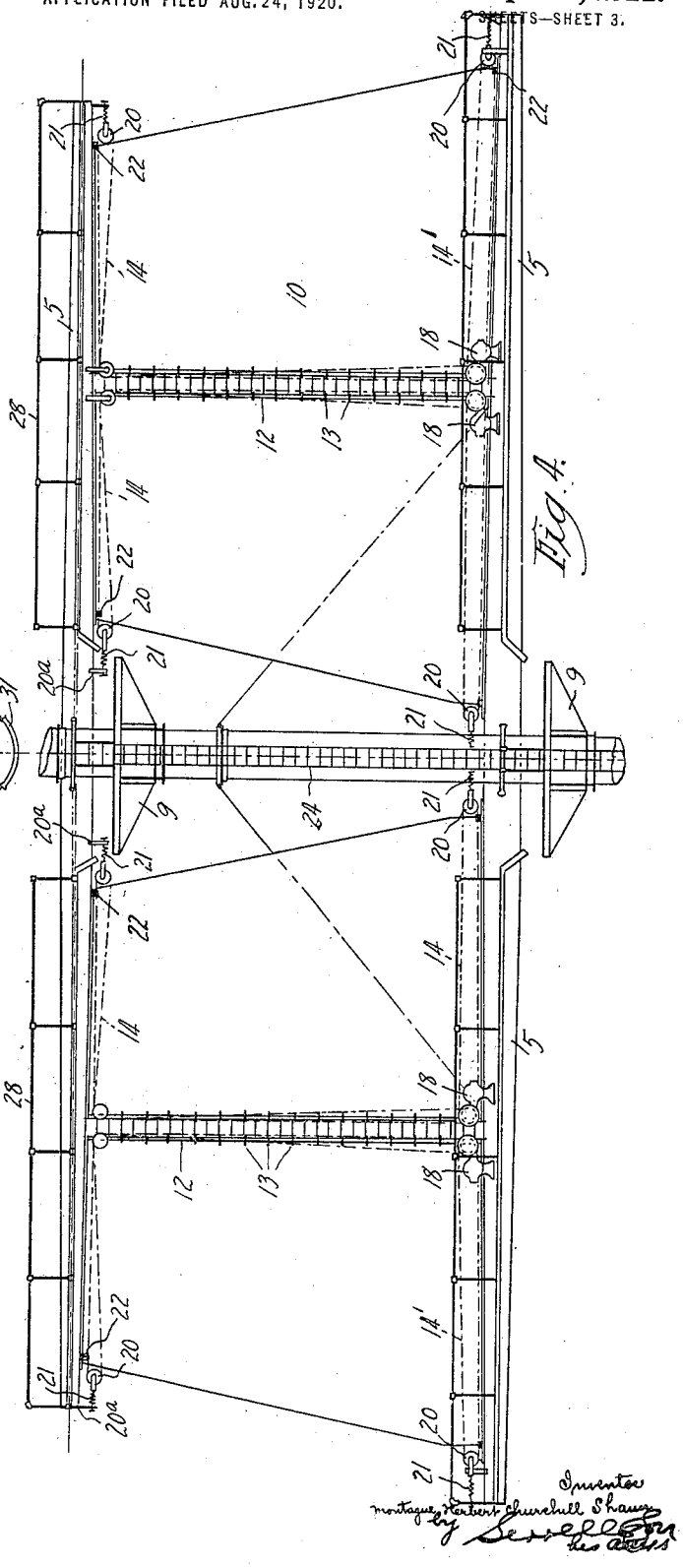


Fig. 4.

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4 SHEETS—SHEET 4.

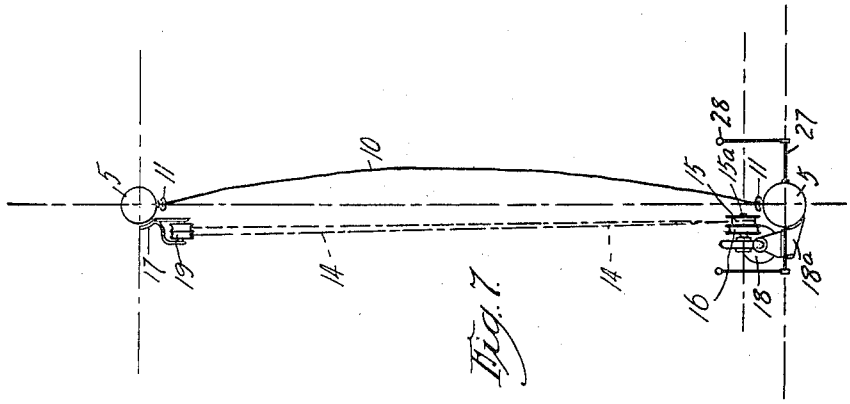


Fig. 7.

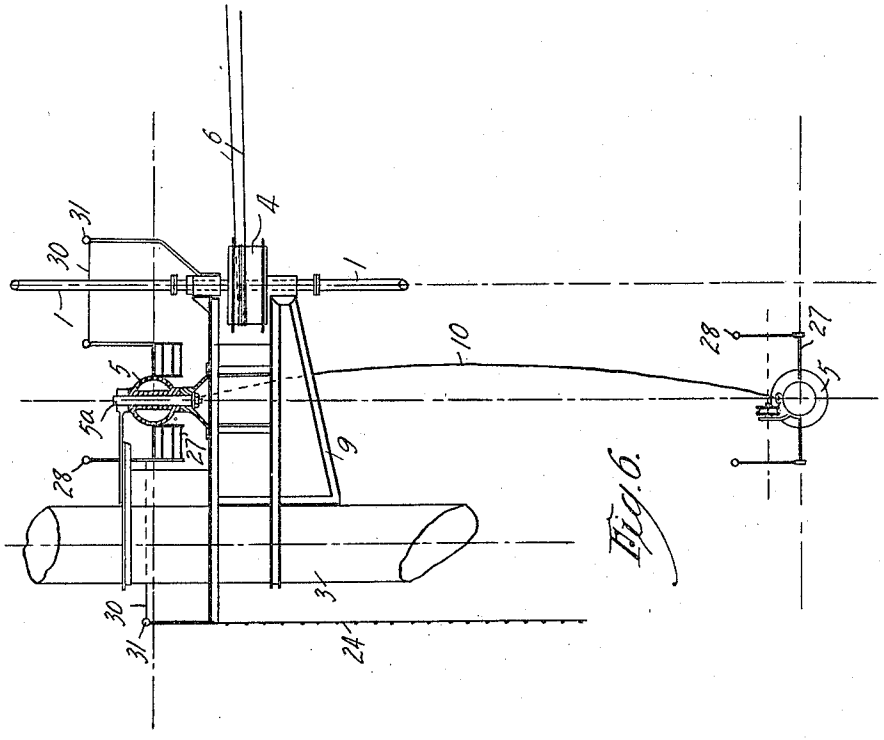


Fig. 6.

Inventor
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by
his Attorneys

UNITED STATES PATENT OFFICE.

MONTAGUE HERBERT CHURCHILL SHANN, OF WODONGA, VICTORIA, AUSTRALIA.

MECHANICAL CONTROL OF SAILS.

1,376,170. Specification of Letters Patent. Patented Apr. 26, 1921.

Application filed August 24, 1920. Serial No. 405,707.

To all whom it may concern:

Be it known that I, MONTAGUE HERBERT CHURCHILL SHANN, a subject of the King of Great Britain, residing at Wodonga, in the State of Victoria, Australia, have invented certain new and useful Improvements in Mechanical Control of Sails; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention has been devised to provide means for the mechanical control of the sails of square rigged vessels without the use of manual power so that either much larger sailing vessels may be used or the invention can be used in cases where power is used as an auxiliary to sail or in cases where the sail is an auxiliary to power.

In this latter case a large reduction in the power needed is obtained. For instance, the spread of sail would enable on trade wind routes an average speed of 13 knots to be got on the same power as required for 11, that is on the usual favorable conditions to be met with on such routes. This means practically a 30% reduction in the power required. But it must be understood that the ratio of the beam to the draft of the ship should approximately be as shown in the drawings, otherwise the meta center is too low to allow of the use of a full spread of canvas on a beam wind. A further advantage in the use of my invention is that the ratio of the beam to the draft does not require selective loading; this ratio is not the best for screw propulsion only; but since the narrower beam necessitates selective loading and where this cannot be obtained the broader beam must be adopted for safety purposes. This is essential in regard to homogeneous cargoes such as bulk grain and it is one of the reasons why so many ship-owners are not in favor of bulk grain as a cargo, it either affects the efficiency of their steamers or renders them unsafe.

With my invention however the advantage of sail power makes the broad beam type of vessel more efficient than the narrow one, and also secures the advantage of non-selective loading such as bulk grain or coal; furthermore the arrangement and construction of my invention enables the vessel to be navigated in the event of a total breakdown of the engines or the loss of the propeller without the expense of carrying any additional crew. Hence the expense of installing twin screws and the necessary duplication in engines now so often employed may be obviated. As the expense of installing the sails and gear would about equal the additional expense of the twin screws I get the economy of fuel consumption and the economy of time in being able to handle non-selective cargoes without any additional capital expenditure; further the sails may be so expeditiously handled that quick turning by reefing either the fore or main-mast sails of the ship is greatly facilitated. By doing so the head of the ship can be brought quickly to the eye of the wind or made to fall off very quickly. This is of great advantage in the event of a broken rudder.

I will now more particularly describe and ascertain how my invention is to be carried out with particular reference to the accompanying drawings which show a cargo vessel employing my invention where sails are employed as an auxiliary to speed.

Figure 1 is a side elevation of the vessel.

Fig. 2 is a plan view of same.

Fig. 3 is an enlarged midship cross section.

Fig. 4 is a view of the main and middle yard.

Fig. 5 is a plan view of the middle yard.

Fig. 6 is a side view of the cross trees.

Fig. 7 is a cross section of a sail hereinafter described.

In the accompanying drawings 1 is a vertical shaft disposed on the aft side of the foremast 2 and on the foreside of the main-mast 3.

This arrangement is preferable in a vessel employing a brig-rig, but when employed on a barque-rig the sails of the main-mast will be worked by the said vertical shaft on the mizzen and the vertical shaft on the fore-mast would be dispensed with.

With a brig-rig running before the wind the sails on the main-mast are not unfurled to the same extent as the sails on the fore-mast so that the disadvantage of trimming the yards from the foreside on the main-mast is not so disadvantageous as it would be on a barque.

Secured on the shaft 1 are drums 4 disposed at the same plane as each of the yards 5, the latter being supported in brackets 9 conveniently secured to the mast by pivots 5^a.

Each of the yards 5 is stayed by wire ropes

6 the ends of which are secured to a double pulley block 7 through which the rope 6 is reefed. This enables the correct tension of the respective stay rope 6 to be obtained. The stay rope 6 is taken several times around its respective drum 4 which may be provided with a worm groove to more effectively guide the rope as the drum rotates.

The diameter of each of the said drums 4 is made proportional to the radius of the yards 5 where the multiple pulley 8 is secured hence the mechanical rotation of the shaft by any convenient means will trim simultaneously all the yards on one mast to required angles. As the rotation of a shaft by mechanical means is so very well known I do not illustrate or confine my invention to any one particular method although I prefer an electric motor as hereinafter referred to, or the desired power may be obtained by the aid of a suitable drum on a rope drive onto any ordinary deck winch.

10 are the sails secured by clips 11 in the same manner as the main sails are secured to the booms of fore and aft rigged vessels. By sliding the clips 11 along the yards 5 the sails 10 can be reefed or unfurled.

The sails 10 are preferably cut to taper so the clips 11 may insure flatness of the sails.

12 are vertical wire ropes in the form of a ladder secured between yards 5, and to which the sails 10 are furled. I prefer the particular formation of wire ropes 12 as illustrated as it permits the sails to be secured by clips 13. These clips are of usual construction where the edge of a sail is lashed either to a mast or to a wire rope stay.

14 is an endless rope working in the drum 15 mounted on the shaft 15^a disposed on the lower sides of each of the sails 10. The function of this rope is hereinafter referred to.

16 is a larger diameter drum on the same shaft as 15 provided with a worm gearing on the shaft of a suitable electric motor 18 which is mounted on a suitable bracket 18^a fixed to the yards 5. I may use a suitable hand wheel for operating the shaft of the motor should it be disarranged.

19 is a double pulley around which the rope 14 is led, such pulley being supported in a bracket 17 attached to the yard 5.

20 is the outer pulley for one sail and the central pulley on the other sail.

Each rope 14 after passing over the drum 15 is carried upwardly and passed over the double pulley 19 and also over the corresponding outer pulley 20 whereby the upper edge of the corresponding sail is adjusted to position to determine the extent to which the sail is reefed or unfurled. A rope 14′ passes over the drum 16 and also over the corresponding lower pulley 20 so as to be simultaneously operated by the motor and the shaft 15^a to correspondingly shift the position of the lower edge of the sail to determine the extent to which the sail is reefed or unfurled.

21 represents screw adjustable springs to maintain the respective ropes 14 and 14′ at the correct tension. I prefer that these pulleys 20 should be hung on a radius rod 20^a so as to be vertically supported and to give freedom to the spring tension.

22 represents clips secured to the ropes 14 and 14′ and to the clips 11 on the sail 10. This is the usual construction on the boom of a fore and aft rig.

The ratio of the diameter of the drums 15 and 16 is the ratio of the taper of the sail 10, so that on a rotation of a motor the clips 22 are either close to 12 in which case the sails 10 are reefed or close to the outer pulley 20 in which the sails are unfurled.

A very great advantage of my improved method of rigging the sails is that when reefed the folds lie in a vertical direction hence no pockets are formed for the collection of water or soot when the sails are reefed. This will very greatly prolong the life of the sails when used in conjunction with steam as with a steamer sails must be reefed when she is steaming into a head wind.

I prefer that the wire ropes 12 should be arranged double as shown so as to form a ladder like construction. Hence the sails 10 can be quickly lashed so as not to present a large surface when steaming into a head sea.

22^a is the fore tri-sail which may be operated in any suitable manner.

23 is an aft tri-sail provided for use in heaving-to. As arranged it would not be of use in propulsion but it would prevent the vessel broaching broadside to the waves in the event of a temporary stoppage of the propeller screw or a breakdown of the steering gear.

The said aft tri-sail 23 will be found to be extremely useful when steaming into a cross swell as slewing would be checked and she would keep a straighter course.

Access to the cross trees which are identical with bracket 9 is accomplished by means of the wire rope ladder 24.

25 is the side standing rigging secured to deck beam knees 26. This arrangement allows the yards 5 being trimmed closer than usual when the vessel is being close hauled.

27 is a gallery each side of the yards 5 with a hand rail 28 to permit easy access to all the gear without having to cling on in the usual way.

30 are life-lines secured to the rails 28 and worked through curved pipes 31 as the yards 5 are trimmed. These pipes 31 are secured to the bracket 9 or the cross trees. Sometimes I prefer to place the taper on the lower sails so that the smaller dimensions may be on the lower side, the object

being to allow a big spread of canvas with short yards at the lower levels so that said yards will not foul the cranes when in dock, but for sea efficiency the taper as shown in the drawings is preferable.

The apparatus herein described and illustrated refers to the use of sails as an auxiliary to speed or other methods of power generation; with modifications the sails may be the main propelling agency or in some cases the sole means. The stays 6 may be omitted and other mechanical means used to transform the rotation of shaft 1 into the trimming of the yards 5. The advantage of the method shown is that on the fore sides in a heavy gale the pull of the sails will be partly transmitted to the stay ropes 6 and hence would relieve strain on the pivot 5^a.

I claim:—

1. Apparatus for controlling the position of sails comprising in combination with a mast and spaced yards and a sail of a ship, a double drum, means coacting with the drum and associated with the sails to shift the same laterally, and means for operating the said drum.

2. Apparatus for controlling the position of sails comprising in combination with a mast and spaced yards and a sail of a ship, a drum having different diameters, means for driving the said drum, and devices actuated by the different diameters of the said drum and connected to the upper and lower edges respectively of a sail for shifting the position of the same laterally.

3. Apparatus for controlling the position of sails comprising in combination with a mast and spaced yards and a sail of a ship, a drum having different diameters, means for operating the drum, an endless rope passing over one diameter of the drum and associated with the upper edge of the sail, and another endless rope passing over the other diameter of the drum and associated with the lower edge of the sail whereby upon the actuation of the drum the position of the sail is shifted laterally.

4. Apparatus for controlling the position of sails comprising in combination with a mast and spaced yards and a sail of a ship, a drum having different diameters, means for actuating the drum, an endless rope passing over one diameter of the drum and associated with the upper edge of a sail, a pulley over which the said endless rope also passes, means for maintaining the said endless rope under tension, a second endless rope passing over the other diameter of the drum and associated with the lower edge of the sail, a pulley over which the said second endless rope passes, and means for maintaining the said second endless rope under tension whereby through the actuation of the drum the endless ropes are moved to adjust the position of a sail.

5. Apparatus for controlling the position of sails comprising in combination with a mast and spaced yards and a sail of a ship, a ladder vertically disposed between the said yards and to which the sail may be lashed.

6. Apparatus for the control of sails and in combination with a mast, yards and the sail of a vessel, comprising a vertical shaft, drums mounted on the same, means for turning the vertical shaft, and devices actuated by the drums and connected to sets of vertically disposed yards on spaced masts for simultaneously trimming the said yards.

7. Apparatus for the control of sails and in combination with spaced masts, yards and the sails of a vessel, comprising a vertically disposed shaft adjacent each mast, a plurality of drums mounted on each shaft, means for turning the said shafts, devices coöperating with the drums on one shaft for simultaneously moving a pair of yards on one mast for trimming the same, and similar devices coacting with the drums on another shaft and connected to another set of yards on another mast for simultaneously and correspondingly trimming the latter set of yards.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MONTAGUE HERBERT CHURCHILL SHANN.

Witnesses:

AUGUSTINE THOMAS MADDEN,
DULCIE WINDRIDGE.