

No. 762,790.

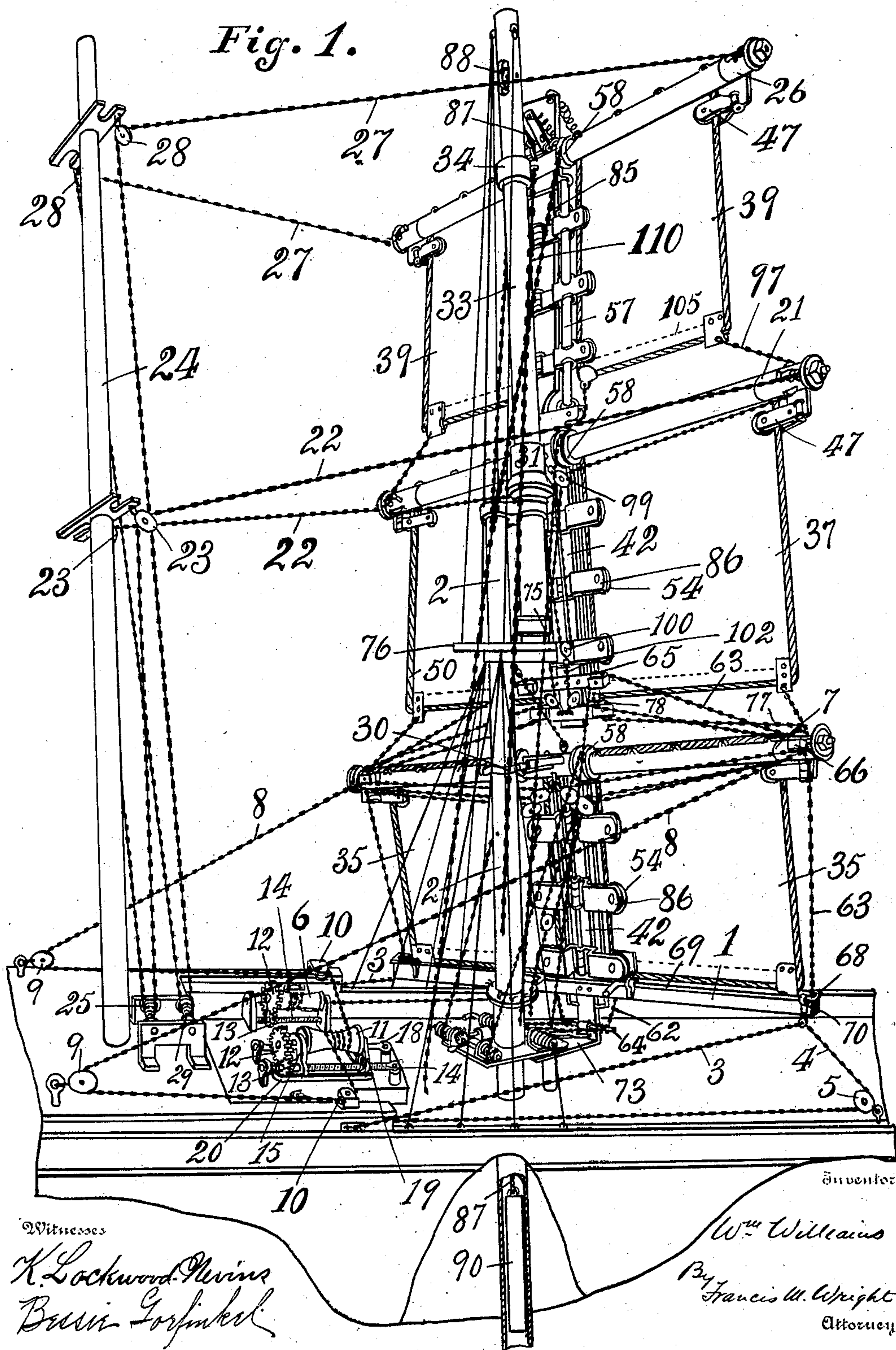
PATENTED JUNE 14, 1904.

W. WILLIAMS.
MEANS FOR WORKING SHIPS.

APPLICATION FILED JAN. 18, 1904.

NO MODEL.

3 SHEETS—SHEET 1.



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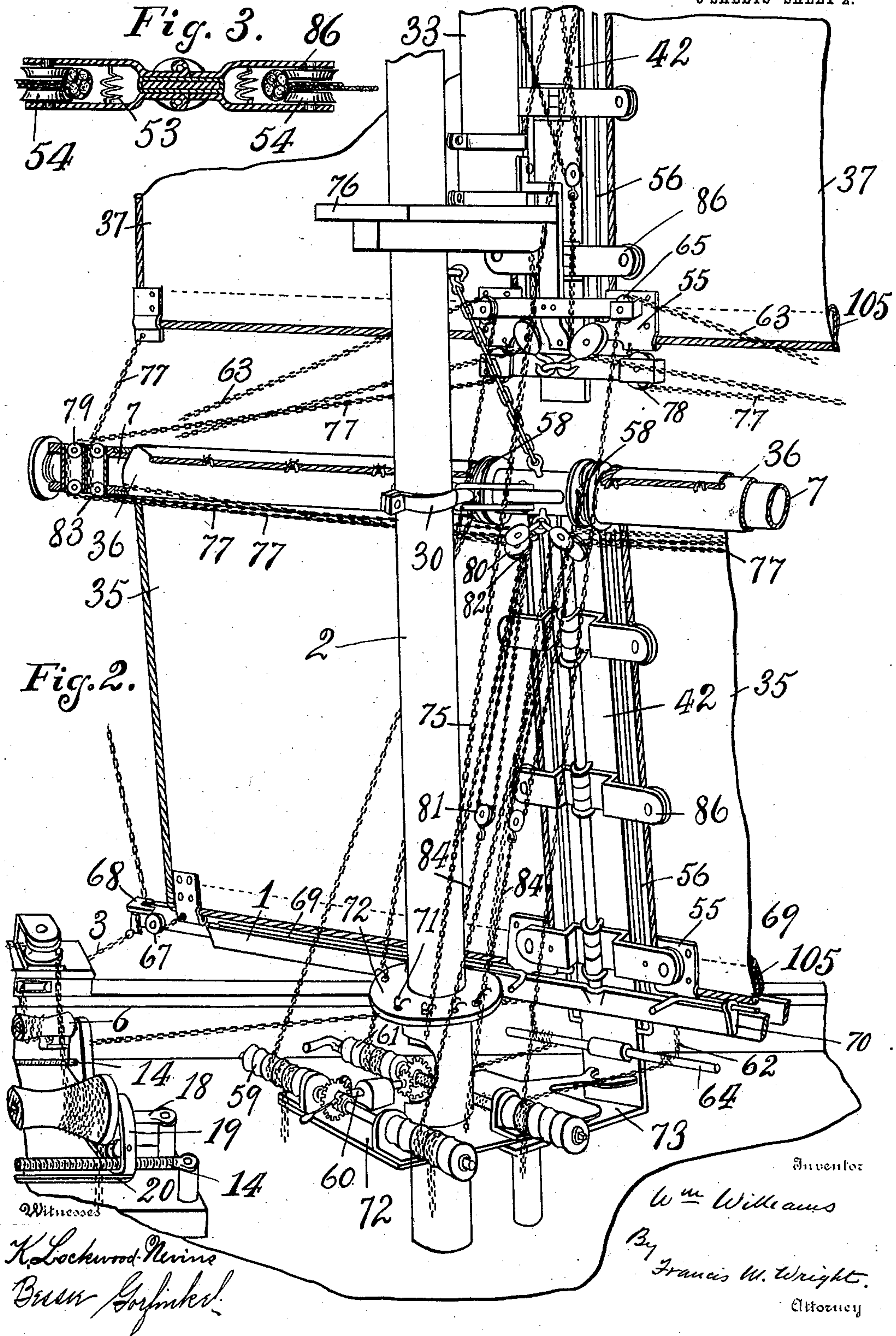
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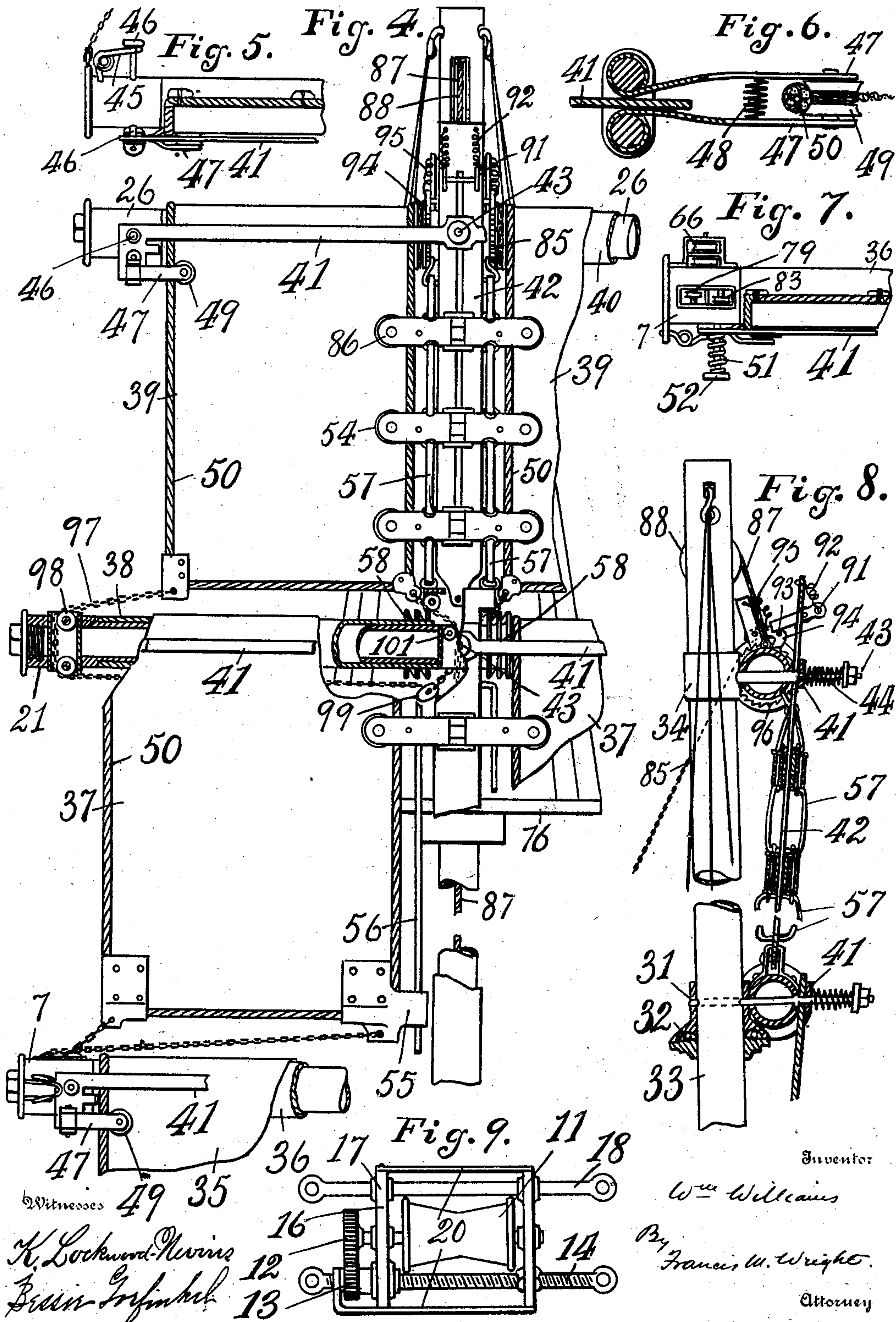


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3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

WILLIAM WILLIAMS, OF OAKLAND, CALIFORNIA.

MEANS FOR WORKING SHIPS.

SPECIFICATION forming part of Letters Patent No. 762,790, dated June 14, 1904.

Application filed January 18, 1904. Serial No. 189,401. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WILLIAMS, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Means for Working Ships, of which the following is a specification.

My invention relates to improvements in means for working ships, the object of my invention being to provide an apparatus of this character which shall render it easier to set and trim ships' sails and enable it to be done more quickly, requiring a smaller crew and dispensing with the necessity of ascending the rigging, but enabling the whole of the operation to be performed from the deck of the ship.

My invention also has for its object to provide an apparatus of this character which will hold the sails in a better position to catch the wind, thereby rendering them as efficient as possible, one, moreover, which shall be more economical, effecting a saving in the cost of cordage.

My invention therefore resides in the novel construction, combination, and arrangement of parts for the above ends hereinafter fully specified, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of a rear portion of a ship, a portion thereof being broken away. Fig. 2 is a similar view, on a larger scale, showing the lower portion of the mainmast and of the topmast. Fig. 3 is a horizontal section through the roller-carriers for the inner edges of the sails. Fig. 4 is a broken front view of the upper portion of the masts and the sails carried thereby. Fig. 5 is a broken plan view of the end of one of the sails. Fig. 6 is a horizontal section of one of the outside roller-carriers. Fig. 7 is a plan view of the end of the mainyard. Fig. 8 is a broken side view of the topmast, the yards being shown in section. Fig. 9 is a plan view of one of the double conical windlasses.

In the drawings I have illustrated my apparatus in connection with a single mast; but it will be understood that the same applies to each of the principal masts of a ship.

I will first describe the novel means which I use for squaring and trimming the sails. For this purpose to the ends of the boom 1 of the mainmast 2 are attached the main-sheets 3 and the main-tacks 4, the latter passing around forward sheaves 5, and the sheet and tack from each end of the boom passing in opposite directions around a gipsy or windlass 6 on the ship's deck near the side. Upon turning either windlass 6 in one direction the sheet on that side will be wound in and the tack let out, while at the same time the windlass on the other side is being wound in the opposite direction to let out the sheet and wind up the tack on that side. This swings the boom around the mast.

To the ends of the mainyard 7 are attached braces 8, which pass around sheaves 9 on the deck close to the stern, thence around sheaves 10, and thence pass to a gipsy or windlass 11 in the center of the deck, upon which they are wound in opposite directions.

Each of the gipsies 6 and 11 is of a double conical form, narrow in the center, and each of them at one end carries a gear-wheel 12, which engages a pinion 13, which is screw-threaded on the inside and acts as a worm-wheel turning on a worm 14, so that as the windlass is revolved the revolution of the pinion causes it to travel longitudinally upon the worm. The pinion is contained within the fork 15 of a leg 16 of a bearing for the windlass, the other leg, 17, of said bearing traveling upon a rail 18. Said fork is likewise connected with the leg of the forward bearing 19 by means of a longitudinal bar 20. Thus the longitudinal movement of the pinion imparts a corresponding movement to the bearings of the windlass and causes the whole windlass to travel longitudinally upon the worm. The object of this construction is to keep the braces and sheets and tacks taut, as the sail is trimmed from a position square to the ship to one close-hauled. The sums of the distance of the ends of the yard and boom from the windlasses differ in these two positions, so that it is necessary to take up the slack in making the change.

To the lower topsail-yard 21 are attached braces 22, which pass over sheaves 23, supported upon the jigger-mast 24, thence to a

windlass 25 upon the deck, around which they are wound in opposite directions. In the same manner the upper topsail-yard 26 has braces 27, passing around sheaves 28 on the jigger-mast and thence to the windlass 29. By turning these windlasses the upper and lower topsails can be set square or hauled close, as desired. The upper and lower topgallant-sails, which are here omitted, are operated upon the same principle. It will thus be seen that all the sails can be squared or trimmed from the deck without the necessity of ascending the rigging for any of the ordinary operations for this purpose.

I will now describe the means for furling or unfurling the sails. In all cases the sails are furled by being rolled up and are unfurled by being unrolled. The mainyard 7 is suspended at the center from the mainmast and is also secured to a collar 30 around said mainmast. The lower topsail-yard 21 is secured to a collar 31, which revolves on ball-bearings 32 around the topmast. Both the mainmast and the topmast 33 are of steel and hollow. The upper topsail-yard 26 is supported in like manner by a collar 34 upon the topmast. This collar 34 is, however, slidable upon the topmast for the purpose of furling or unfurling the upper topsail. All of the sails are made in two halves, one half on each side of the mast, each half being independently rolled upon a sleeve substantially the width of the sail upon the corresponding yard. The two halves of the mainsail 35 are rolled upon sleeves 36 upon the mainyard, the two halves of the lower topsail 37 upon sleeves 38 upon the lower topsail-yard, and the two halves of the upper topsail 39 being wound upon sleeves 40 upon the upper topsail-yard. In order to roll up the sails successfully, it is essential that they be maintained flat and taut while being rolled up, so that the edges do not wrinkle and overlap. For this purpose there is provided for each sail over against the sleeve on which it is being wound a straight strip 41, the inner or middle portion of which is movably secured to the central guide 42 for the sail by a bolt or pin 43, being pressed thereto by a spring 44, while the outer portion is movable horizontally from the end of the yard, a spring 45 pressing against the head of a sliding-bolt 46, the other end of which bolt engages the end of the strip 41, normally pressing said strip against the rope which forms the edge of the sail, while allowing the strip to move outward from the yard as the sail is being rolled up and increasing in thickness. On the lower portion of the enlarged end of said strip are secured the roller-carrying arms 47, connected by a spring 48 and carrying rollers 49, which bear against the inner edge of the rope 50, forming the edge of the sail, and hold said rope in its proper position. Such is the construction of these devices for the upper and lower topsail-

yards. The construction for the mainyard is the same, except that instead of the spring 45 on the rear side of the yard there is a spring 51 around a bolt 52 upon the forward side of the yard. The inner edges of the sails are maintained straight and taut by moving between carrier-arms 86, hinged upon the central guide 42 and drawn together by springs 53, said arms carrying rollers 54, which engage the rope forming the inner edge of the sail. For the mainsail and lower topsail the lower inner corners have eyes 55, sliding upon steel bars 56, and the roller-carrying arms 52 are stationary; but for the upper topsail said arms are movable, being connected by flexible bands 57.

The sails are furled and unfurled in the following manner: To the inner ends of the revoluble sleeves on the yards are rigidly secured the roll-up channels 58 for the chains. 59 represents a winding-up windlass for winding up the chains for furling the sails, which chains pass around the roll-up channels 58. This windlass 59 is connected by beveled gear and a transverse shaft 60 with another windlass, 61, which is used for unfurling the sails. For this purpose there are provided for each half of the mainsail two chains 62 63, one of which passes around a roller 64 and thence to the inner corner of the foot of the sail, and the other passes around a sheave 65, secured to the lower end of the guide 42 for the lower topsail, thence around a sheave 66 on the mainyard, thence around a sheave 67 on the end of the boom, and thence to the outer lower corner of the sail. By winding up this latter windlass both lower corners of the mainsail are drawn down to the boom. This boom consists of two pieces of metal spaced from each other to allow the foot of the sail to pass in between. In order to hold the foot of the sail firmly down against the strength of the wind, there is provided a key or clutch 68, which can be moved inward to engage the chain and hold it down, said clutch having a stem 69, which passes through eyes 70, secured upon the main-boom, and is bent outward at right angles at its inner end in order to more conveniently operate the same from the middle of the main-boom. After the sails are rolled up by means of a windlass the chains are detached from said windlass and are attached to claw-hooks 71. These windlasses and claw-hooks are secured upon a platform or frame 72, revoluble about the mainmast, as is also the extension 73, which supports the lower end of the central guide for the mainsails, as well as the roller 64. The frame 72 supports the windlasses 59 and 61, so that these windlasses revolve about the mainmast with the sails. The lower topsails are wound upon sleeves upon the lower topsail-yard by means of the roll-up channels 58, around which are wound chains 75, which pass through the maintop 76 and can then be at-

tached to the windlass 59 for winding up the same. After being wound up they are attached to claw-hooks in the same manner as those for the mainsail. The lower inner corners of the lower topsail are attached to chains 77, which pass around pulleys 78, secured upon the central guide, and thence around pulleys 79, carried in the end of the mainyard, thence around sheaves 80, suspended from the center of the mainyard, and thence down to a pulley 81, thence back to a second sheave 82 in the same block as the sheave 80, thence around a second pulley 83, carried in the end of the mainyard, and thence to the outer lower corner of the sail. To the pulley 81 is secured a chain 84, which may be attached to the windlass 61, so that by winding said windlass a pull is produced upon both the lower corners of the sail, and the sail is extended. The upper topsails are wound upon sleeves on the upper topsail-yard, and for the purpose of furling these sails the upper topsail-yard is drawn down, causing the sleeves to roll at the same time. For this purpose the chains 85, which pass around the roll-up channels 58, extend down to the deck, and upon pulling said chains said channels and sleeves are rotated, rolling up the sails. When the chains 85 are released, the upper topsail-yard is again raised by means of a chain or rope 87, passing over a pulley 88, secured in the top of the topmast 33, the other end of said rope or chain 87 extending down in the hollow mainmast and being attached to a heavy counterbalance-weight 90 in said mast as low as possible below the deck. The weight of this counterbalance is sufficient to raise the sail when the chains 85 are released. In order to arrest the upward movement of the upper topsail-yard due to the weight of said counterbalance, there are provided two levers 91, pivoted in the top of the central guide, the forward ends of said levers being drawn up by means of springs 92, so that their rear ends, extending toward the mast, normally press downward. When the upper topsail-yard comes to the proper height, these levers bear down upon a cross-bar 93, attached to two pawls 94, which are normally drawn upward by springs 95 and force said pawls 94 down into contact with ratchet-teeth 96, carried upon the ends of the sleeves, so that said sleeves can no longer rotate. By this means the upper topsails are prevented from drawing out or unwinding from the force of the wind. The springs 92 break the shock of the arrest of the upper topsail-yard in its upward movement. The upper topsail-yard cannot be drawn completely down on account of the roller-carriers coming together and resisting said downward movement. When the upper topsail-yard has been drawn down as far as possible by means of the chains 85, the yard is then secured against upward movement due to the counterbalance by means of a chain

106, attached to the center of the upper topsail-yard. This chain is at that time secured to one of the door-hooks. The chains 85 may then be still hauled down, at the same time letting out the sheets therefor, thus rolling up and completely furling the upper topsails. To unfurl the same, the sheets are drawn down, and the chain 106 is released. It will be understood that for the sake of clearness of illustration these carriers and rollers are shown as very much larger than actual size in proportion to the size of the sails.

To stretch the outer lower corner of each upper topsail, there is provided a chain 97, attached thereto, which passes around a pulley 98 in the lower topsail-yard, thence around a pulley 99, carried by the center of the lower topsail-yard, thence around a pulley 100, near the lower end of the central guide, thence around a pulley 101, carried by the center of the main lower topsail-yard, and thence to the lower inner corner of the upper topsail. To the pulley 100 is attached a chain 102, which leads around suitable direction-pulleys to the deck. Of the three central guides for the sails the lower one (for the mainsails) has its upper end attached to the center of the mainyard and its lower end attached to the extension 73 of the frame at a considerable forward obliquity downward. The object of this upward and downward slope is to enable the sails to be swung around when close-hauled to clear the shrouds. The two upper central guides for the sails are both secured to the lower topsail-yard.

It will be seen that with this construction all the operations of working the ship can be performed from the deck without the necessity of ascending the rigging. Therefore a much smaller crew is required, and the ship can be worked with much greater safety in storms. Also the sails can be furled much more quickly than as at present. This is of especial importance in case of a storm coming on very quickly. It will also be observed that all the sails are set and held flat and square to the wind, the lower edge of each sail is stiffened by a stiffener-piece 105, and the whole sail when set can be drawn as tight as if it were a sheet of metal. This provides a sail much more effective in driving the ship. A further advantage is that there is the saving in the cost of cordage, which at present is a great item of expense in a ship.

It will be understood that while the drawings illustrate only a single mast of a ship the same principles are applicable to all the masts and also to the upper and lower topgallant-sails. The sails of each of the forward masts will be braced from the mast immediately to the rear in the same way as those of the masts here shown are braced from the jigger-mast. To the jigger-mast will be secured fore and aft sails in the usual manner; but these are omitted as forming no part of the present invention.

I claim—

1. In means for squaring and trimming the sails of a ship, the combination with the main-mast and the mainsail, of a boom secured to the lower edge of the mainsail, main-sheets and main-tacks attached to the ends of said boom, sheaves forward of the boom around which the tacks pass, and a windlass around which the sheet and tack from each end of the boom pass in opposite directions, substantially as described.

2. In means for squaring and trimming the sails of a ship, the combination with the main-mast and the mainsail, of a boom secured to the lower edge of the mainsail, main-sheets and main-tacks attached to the ends of said boom, sheaves forward of the boom around which the tacks pass, and a windlass at each side of the ship around which the sheet and tack from the corresponding end of the boom pass in opposite directions, substantially as described.

3. In combination with braces for a ship's yard, a windlass of double conical form, narrow in the center, around which said braces are wound in opposite directions, a gear-wheel secured to said windlass, a pinion meshing with said gear-wheel and screw-threaded on the inside, a worm upon which said pinion travels, and means whereby the movement of the worm imparts a corresponding longitudinal movement to the windlass, substantially as described.

4. The combination, with the masts of a vessel, of yards suspended therefrom, sleeves revoluble upon said yards, sails attached at their upper edges to said sleeves, and means for rolling and unrolling the sails upon the sleeves, substantially as described.

5. The combination, with the masts of a vessel, of yards suspended therefrom, sleeves revoluble upon said yards, on each side of the center, sails attached at their upper edges to said sleeves, and means for rolling and unrolling the sails upon the sleeves, substantially as described.

6. The combination, with the masts of a vessel, of centrally-suspended yards, sleeves revoluble upon said yards upon each side of the center, two-part sails attached at their upper edges to said sleeves, roll-up channels upon the inner ends of the sleeves, and chains or halyards passing around said channels and leading therefrom to the ship's deck whereby the sleeves may be revolved upon the yards to furl and unfurl the sails, substantially as described.

7. The combination with the masts of a ship, of centrally-suspended yards, sleeves revoluble thereon on each side of the mast, sails attached at their upper edges to said sleeves, roll-up channels upon the inner ends of the sleeves, chains or halyards passing around said channels and extending to the ship's deck for turning said channels to furl and unfurl the sails, sheets connected with the lower corners

of the sails, direction-pulleys mounted in the stationary portions of the yards, around which pulleys said sheets pass to the deck of the ship, substantially as described.

8. The combination, with the masts of a ship, of centrally-suspended yards, sleeves revoluble thereon, sails attached at their upper edges to said sleeves, sheets connected with the lower edges of the sails by which they may be unfurled, roller-carriers attached to the ends of the yards and rollers mounted therein, said rollers being adapted to engage the belt-ropes upon the vertical edges of the sails to control the same when being rolled up, substantially as described.

9. The combination with masts of a ship, of yards suspended therefrom, revoluble sleeves upon said yards mounted between the center and the ends of the yards, sails attached at their upper edges to said sleeves, means for rolling and unrolling the sails upon the revoluble sleeves, arms carried by the yards beyond the revoluble sleeves, rollers journaled on the arms, and adapted to engage the vertical belt-ropes of the sails, and devices by which the roller-carrying arms may be moved to adjust the rollers to or from the yards to conform to the thickness of the roll of the sail as it is rolled up, substantially as described.

10. The combination, with the masts of a ship, of yards suspended therefrom, sleeves revoluble upon the yards between the center and ends thereof, sails attached at their upper edges to the sleeves, means for revolving the sleeves to furl the sails, means for extending the lower edges of the sails and connecting them with the yard below when set, carriers and rollers carried thereby, said rollers engaging the inner edges of the sails, and vertical guides upon which said carriers are slidable in unison with the furling and unfurling of the sails, substantially as described.

11. The combination with the masts of a ship, of yards supported thereby, sleeves revoluble upon said yards, sails attached at their upper edges to said sleeves, means whereby the sleeves are revoluble to furl or unfurl the sails, rollers engaging the outer vertical edges of the sails, arms carrying said rollers and supported by the ends of the yards, rollers engaging the inner edges of the sails, arms carrying said rollers, central guides for said arms, and springs for drawing the arms together to retain the rollers in engagement with the edges of the sails, substantially as described.

12. The combination with the masts of a ship, of yards supported thereby, sleeves revoluble upon said yards, sails attached at their upper edges to said sleeves, means whereby the sleeves are revoluble to furl or unfurl the sails, rollers engaging the outer vertical edges of the sails, arms carrying said rollers and supported by the ends of the yards, rollers engaging the inner edges of the sails, arms carrying said rollers, central guides for said arms, and

springs for drawing the arms together to retain the rollers in engagement with the edges of the sails, eyes attached to the inner lower corners of the sails, and slide-bars upon which
5 said eyes slide when the sails are furled or unfurled, substantially as described.

10 13. The combination with the masts of a ship, of yards suspended therefrom, sleeves revoluble upon the yards between the center and the outer ends, sails attached at their upper edges to said sleeves, means for revolving the sleeves to furl or unfurl the sails, a rope or chain connected with the center of the yard, a pulley journaled in the mast over which said
15 rope passes, a vertically-movable counterbal-

ance connected with the opposite end of the rope, roll-up channels connected with the inner ends of the sleeves, ropes or chains passing around said channels and leading to the deck of the ship, and means for securing the
20 ends of said ropes or chains, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

W. WILLIAMS.

Witnesses:

FRANCIS M. WRIGHT,
BESSIE GORFINKEL.