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CRANE EQUIPMENT FOR THE RECOVERY OF SEAPLANES AND BOATS

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Fig. 1

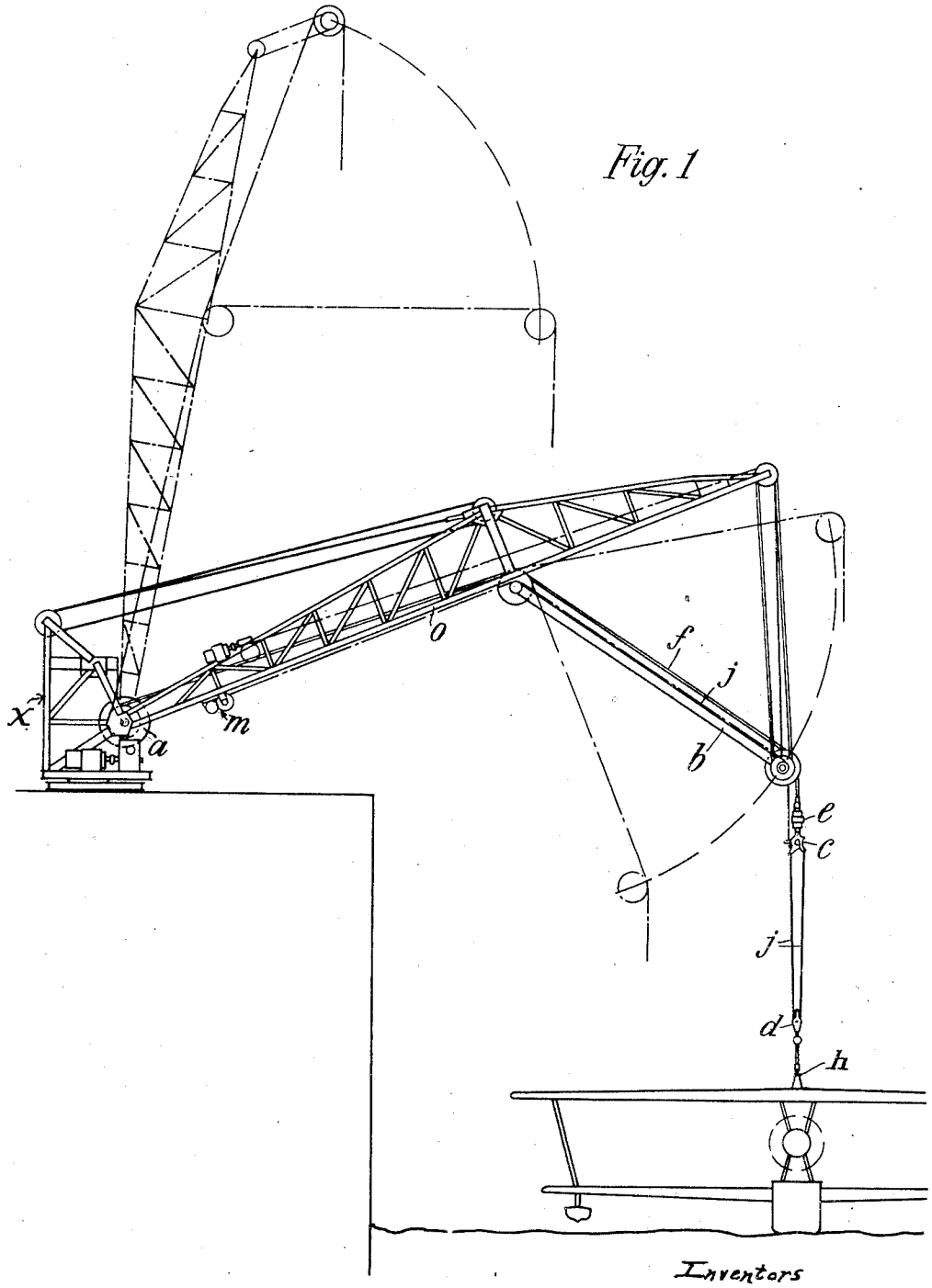

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Fig. 2

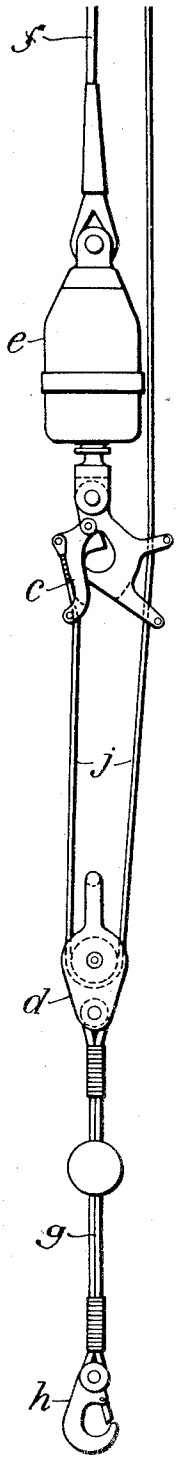

Fig. 3

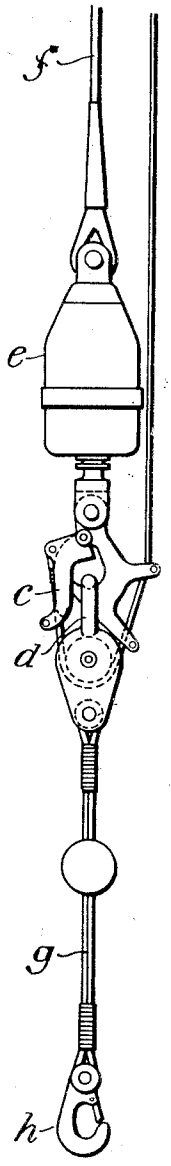

Fig. 4

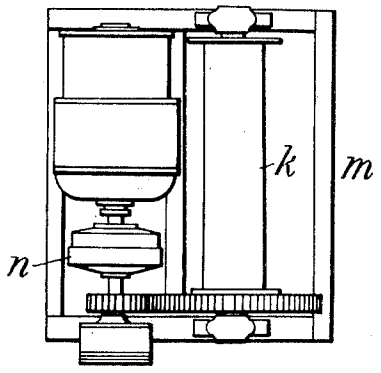

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Fig. 5

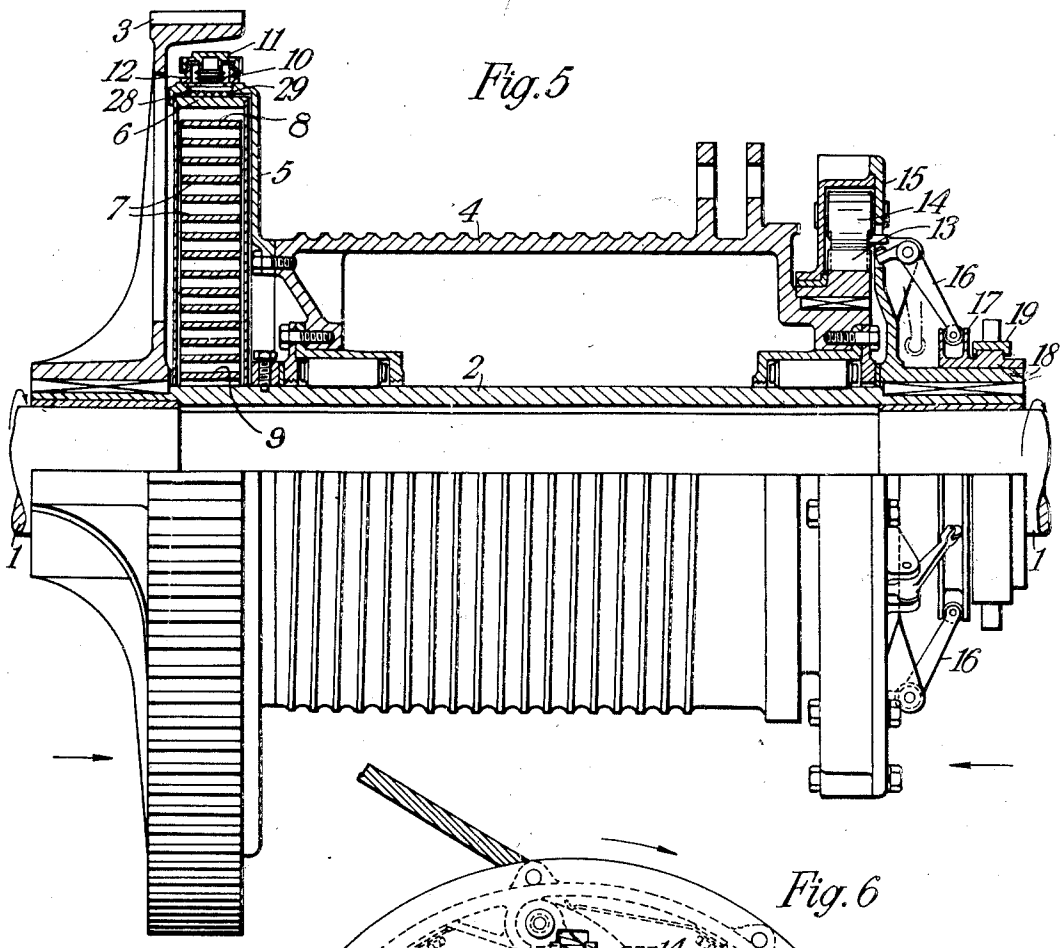
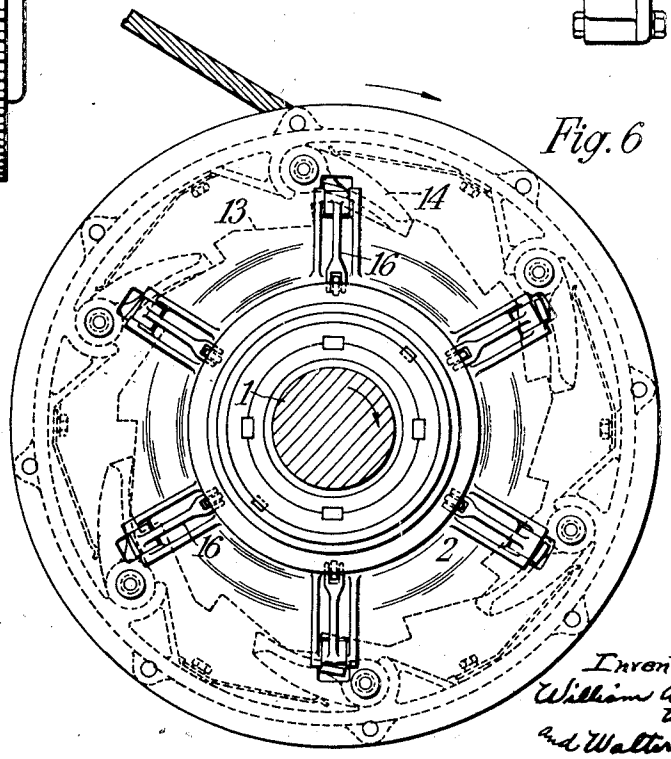


Fig. 6



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2,187,439

CRANE EQUIPMENT FOR THE RECOVERY OF SEAPLANES AND BOATS

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Application January 14, 1939, Serial No. 251,006

3 Claims. (Cl. 212—3)

This invention relates to means or more particularly to crane devices designed for recovering or hoisting seaplanes and boats onto vessel decks of the general type illustrated for example in our co-pending application Serial No. 242,798 filed November 28, 1938 entitled Means for the launching and recovery of waterborne craft from and to ships.

The particular problem of the recovery from water to ship of seaplanes and boats with the ship underway in rough water is one of considerable difficulty, the stresses that have to be countered by crane mechanism being of such varied character, large magnitude and sudden application.

The object of the present invention is to provide an improved equipment which will enable craft to be recovered in circumstances such as referred to with greater facility and safety than has heretofore been possible.

To this end the equipment, comprising a jib and hoisting winch, provides for the quick attachment of a craft to one portion of a mechanical coupler while it is disengaged from but supported by another portion of the coupler secured to the main hoist rope, the support referred to being afforded by a control rope which, like the main hoist rope, is led along a steadying arm of the crane to a separate control winch, the control winch including a fluid coupling and the main hoist winch a spring and pawl influenced compensator barrel which is arranged to slip under certain load conditions. The arrangement is such as to allow the man on a seaplane for instance to overhaul the coupler portion to which attachment is to be made while the control winch is running slowly, at which time the torque exerted by the fluid coupling is small, whereafter the speed of the control winch, and consequently the torque, can be increased to wind up the control rope and draw the two coupler portions together into engagement, which act sooner or later involves winding up of the spring of the compensator barrel or even slipping of the latter.

The improved equipment is illustrated more or less diagrammatically in the accompanying drawings with regard to which it will now be further described.

In the said drawings, Fig. 1 is a view of the general lay out of the equipment, showing a seaplane just about to be raised. Figs. 2 and 3 are views, upon larger scale, of the mechanical coupler section, the coupler in one case being free and in the other engaged. Fig. 4 is a plan view of the coupling hoist and Figs. 5 and 6 are views at right angles to one another of part of the main hoisting winch.

It may facilitate understanding to here first outline the arrangement shown in Figs. 5 and 6, which per se is not herein claimed.

Referring to said last views, 1 is a stationary shaft upon which a hollow shaft 2 is rotatable. This shaft 2 is adapted to be positively driven through a gear wheel 3, keyed thereon. Encircling said shaft, 4 is the winch barrel which at one end is attached to an annular member 5 that envelops a cylindrical spring case 6, the spring 7 therein being of clock type anchored at one end 8 to the case 6 and at the other end 9 to the shaft 2 by means not shown. Between the spring case 6 and the member 5 there is provided a slipping connection of any suitable kind, which in the example illustrated comprises a number of plate blocks 28 resiliently pressing a lining 29 of friction material against the case with a force derived from spring washers 10 which can be varied by manipulation of adjusting nuts 11, said nuts being screwed upon housings 12 for the washers, secured to the member 6 in any convenient way.

The other end of the barrel 4 is provided with ratchet teeth 13 with which are adapted to cooperate pawls 14 on a driver 15 keyed to the shaft 2. The driver 15 is furnished also with lever 16 which, by means of a thrust collar 17 feathered on the hub 18 of the driver 15, can be moved from the full line position shown in Fig. 5 where the teeth 13 are pawl-engaged, to the dot and dash position of the same figure in which the pawls are all held out of the path of the said teeth. The shifting of the thrust collar 17 is effected by the ring 19 shown only in Fig. 5.

The operation is as follows:

Assuming first that the pawls 14 are held clear of the ratchet teeth 13 and that the shaft 2 is stationary, then it will be obvious that the barrel 4 is free to rotate under a pull applied to the hoisting rope opposed only by the winding up of the spring 7.

A considerable length of the rope can thus be extended quickly and with comparative ease, enabling it to be expeditiously attached to a load. If the load should move so as to tend to lessen or increase the pull on the rope, the latter will in either case remain taut, the spring 7 in the one case unwinding and in the other being further wound up. Should the rope pull exceed a predetermined value then the spring case 6 will slip relatively to the drum. The same rope tensioning conditions occur should the driving shaft 2 be

rotating and the pawl and ratchet gear be inoperative, the winding up of the spring 7 being effected at least in part by the shaft 2.

When, however, it is desired to haul or lift the load, the pawls are engaged with the ratchet teeth after the spring has been wound up with the result that any decrease in load, such as that due for instance to rise of a waterborne craft being lifted, will allow the ratchet teeth 13 to overrun the pawls due to the unwinding effort of the spring and maintain the rope taut. In other words the parts reach new hauling positions in which they are ultimately locked automatically.

In the equipment according to this invention the hoisting winch, as described, is indicated at *a* in Fig. 1, in combination or association with a crane generally indicated by X which in other respects is substantially the same as that forming the subject of our copending application Serial No. 242,798, filed November 28, 1938, *o* being the main boom thereof and *b* being the auxiliary boom which constitutes the steadying arm intended to minimise risk of damage to or due to the craft while being raised or lowered. Depending from the auxiliary boom end (see Figs. 2 and 3) *c* and *d* are two parts of a mechanical coupler, *e* is a spring loaded overhauling weight through which the coupler part *c* is connected to the main hoist rope *f* and *g* is a flexible stop connecting a quick release hook *h* to the coupler part *d*. The coupler part *d* is supported by a coupling rope *j* which at one end is attached to the coupler part *c* and at the other end to the barrel *k* (see Fig. 4) of a coupling winch *m* that includes a fluid coupling *n* and is mounted on the main boom *o* of the crane.

The sequence of operations is as follows:

Before the seaplane is brought alongside the ship and proceeding at the same speed and in the same direction as the ship, the overhauling weight *e* which has the upper portion *c* of the coupler attached, and which is itself attached to the main hoist rope *f*, is lowered to a suitable safe position above the water with the steadying arm *b* as near as possible to it somewhat as indicated in full lines in Fig. 1.

The lower half *d* of the coupler which is suspended on the rope *j*, is next positioned, disengaged, just below the upper half *c* of said coupler (see Fig. 2).

When the seaplane is ready to be recovered the quick release hook *h* which is connected to the lower half *d* of the coupler is by means of the coupling winch *m*, lowered quickly to the man at the slings on the seaplane.

The controller for the coupling winch is then put into the balance position.

The fluid coupling *n* of the winch *m* allows the man on the seaplane to pull down the quick release hook and hook on to the seaplane slings.

The crane operator then pulls down by means of the coupling winch *m* the upper portion *c* of the coupler and engages it with the lower portion *d* (see Fig. 3).

This action winds up the spring 7 on the compensator barrel 4 of the hoisting winch *a*, which puts a riding tension in the main hoist rope *f*; there is also a tension on the coupling rope *j* through the fluid coupling *n* on the coupling winch *m*.

At this stage both ropes *f*, *j* are kept taut when seaplane is rising or falling on the waves.

The next operation is to raise the seaplane from the water.

The coupling winch motor is kept running at preferably a speed just sufficient to maintain tension in the coupling rope *j*.

The ratchet pawls 14 in the compensator barrel 4 are engaged with the ratchets 13.

The main hoist *a* is started in the hoisting direction.

The seaplane can not now descend but if a wave raises the seaplane the compensator barrel spring will wind in the slack rope.

When the upward speed or moment of the wave becomes zero, the ratchet pawls 14 automatically take up the engaged position without shock and the raising of the plane is continued by the main hoist *a* until the overhauling weight *e* is close up to the end of the steadying arm *b*. The latter prevents excessive swaying due to roll of ship thereby avoiding damage to the seaplane.

The steadying arm can now be used for further raising or lowering the seaplane without altering the relative distance between the seaplane and the arm.

The crane can now be revolved to bring the seaplane aboard.

What we claim is:

1. A seaplane or boat recovery equipment of the character described, comprising in combination with a crane jib and a hoisting winch associated therewith embodying a spring and pawl controlled compensating barrel arranged to slip under certain load conditions, a hoist rope extending from the hoisting winch barrel, a quick release load hook securable to the seaplane or boat, a mechanical coupler between the hoist rope and load hook, said coupler comprising upper and lower engageable portions the upper of which is attached to the hoist rope, a control rope connected at one end to said upper portion of the coupler and reeved around the lower portion of said coupler upon which said lower portion is suspendively supported in vertically movable relation to the upper portion, said control rope being bent back upon itself along the crane jib, and a control winch on the jib to which the opposite end of the control rope is attached, said winch embodying a fluid coupling and being adapted therethrough to control said mechanical coupler.

2. A seaplane or boat recovery equipment of the character described, comprising a crane jib, a hoisting winch associated therewith embodying a windable spring and pawl controlled compensator barrel arranged to slip under certain load conditions, a steadying boom pivoted to the crane jib, a hoisting rope extending from the hoisting winch along the crane jib and steadying boom to the end of the latter, a mechanical coupler comprising an upper portion attacheu to the end of the hoisting rope and a lower portion adapted to be automatically engaged with said upper portion, a control rope having one end connected to the upper coupler portion and adapted intermediately thereon to support the lower coupler portion in up and down movement relative to said upper coupling portion, and a control winch to which the opposite end of said control rope is attached, the control rope extending along the steadying boom and crane jib to the control winch and said control winch embodying a fluid coupling, the arrangement being such as to allow the lower coupler to be overhauled while the control winch is running slowly, at which time the torque exerted by the fluid coupling is small, after which the speed of the control winch, and consequently the torque thereof, can be increased to wind up the control

rope and draw the two coupler portions together into engagement, which act, sooner or later, involves winding up of the spring of the compensating barrel or even slipping of the latter.

3. A seaplane or boat recovery equipment of the character described, comprising in combination, a crane jib having a steadying boom pivoted intermediately thereto, a hoisting winch at the base of the jib embodying a spring and pawl controlled compensating barrel arranged to slip under certain load conditions, a hoist rope extending from said winch along the jib and steadying boom over the latter's end, means controlling the angular positioning of said boom to the jib, a quick release load hook securable to the seaplane or boat, a mechanical coupler interposed between the hoist rope end and said load hook, said coupler comprising upper and lower engageable portions the upper of which is attached directly to the hoist rope, a control rope having one end connected to said upper portion of the coupler and reeved with a backward bend therefrom around the lower portion of said coupler so as to suspendively support the latter in vertically movable relation to the former, the said control rope being thence passed over and along the steadying boom to the jib, and a control winch on the jib to which the opposite end of the control rope is attached, the said control winch embodying a fluid coupling through which the control rope may be maintained taut and being adapted to control said mechanical coupler.

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