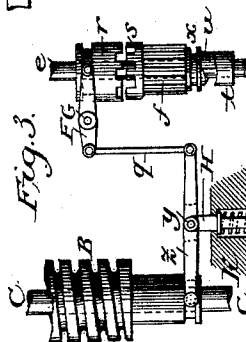
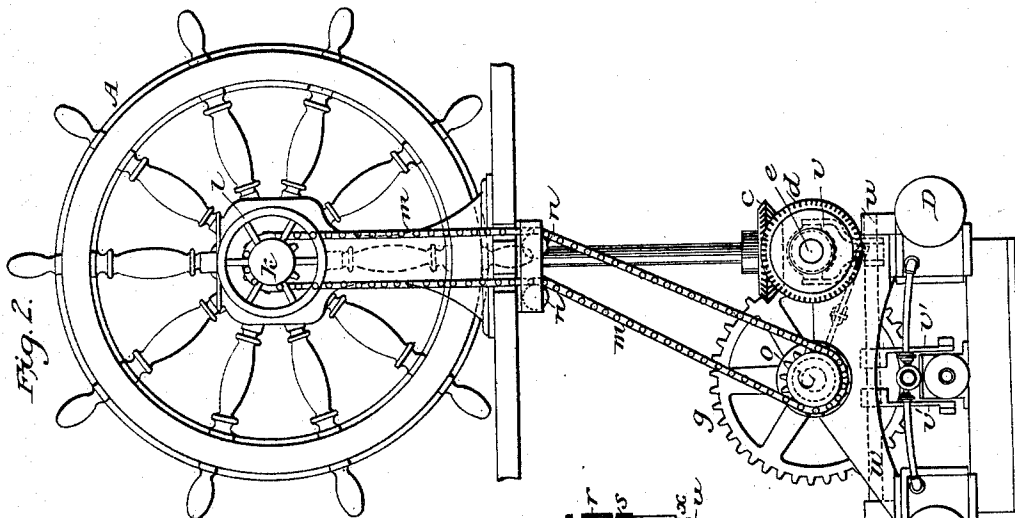
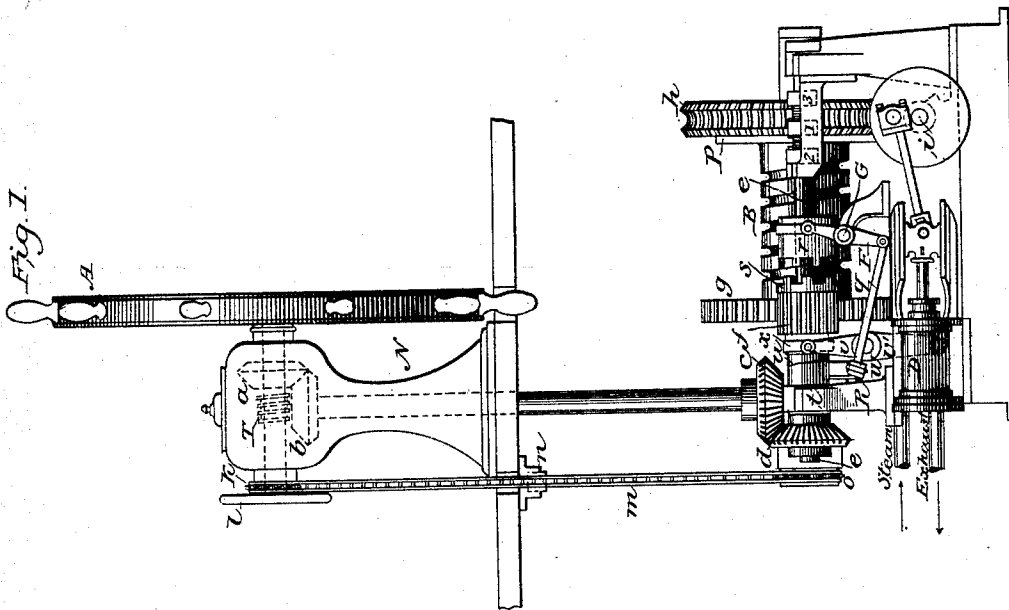


(No Model.)

W. C. WILLIAMSON.
STEERING APPARATUS FOR SHIPS.

No. 486,007.

Patented Nov. 8, 1892.



Witnesses.
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STEERING APPARATUS FOR SHIPS.

SPECIFICATION forming part of Letters Patent No. 486,007, dated November 8, 1892.

Application filed May 4, 1892. Serial No. 431,855. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. WILLIAMSON, of the city and county of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improvement in Steering Apparatus for Ships or Vessels, which invention or improvement is fully set forth and illustrated in the following specification and accompanying drawings.

The object of this invention is to facilitate change from steam or other power steering device to steering by hand-power, and vice versa.

The invention will first be described in detail and then set forth in the claims.

In the accompanying drawings, Figure 1 shows in side elevation an apparatus fitted with the improvement constituting my invention. Fig. 2 shows Fig. 1 in end elevation looking to the right. Fig. 3 shows certain parts of the apparatus detached embodying the improvements constituting this invention.

In said figures the several parts are indicated by reference letters and figures as below described.

The same hand-wheel A operates or governs the steering-drum B, on which the rudder-chains are wound, when either the steam-power or the hand-power is applied to move the rudder in steering the ship.

The connections of the several parts and their mode of operation are as follows: First, to steer by steam-power. Motion being imparted by the helmsman to the wheel A, located for convenience in the pilot-house, the bevel-gearing *abcd*, connected, as shown, by suitable shafting, imparts a rotary motion to the hand-shaft *e*, provided with a spur-pinion *f*, which gears with a gear-wheel *g*, attached to or forming part of the steering-drum B, each loosely mounted on the shaft C. To said shaft is secured fast the worm-wheel *h*, driven by a crank worm-shaft *i* by the engines D E. On the end of an extension of one of the bearings of the hand-wheel shaft *j* is secured a sprocket-wheel *k*, provided with a small hand-wheel *l*. A sprocket-chain *m* connects said sprocket-wheel after passing on guide-pulleys *n* with a sprocket-wheel *o* on the framing in line with the main shaft C. The object of this sprocket-gearing is to move the

clutch *p*, forming part of the steering-drum B, into and out of contact with the worm-wheel *h*, said drum, the spur gear-wheel *g*, and the clutch *p* being constructed so as to all slide together on the shaft C. This sliding is effected by said sprocket-gearing by means heretofore used and forming no part of the invention herein described. Said means are therefore not herein shown, but consist of a rod and connections placed within the shaft C, which is bored out for the purpose of receiving said rod and connections. The act of throwing the drum B into contact with the worm-wheel *h* by turning the sprocket-gearing by the hand-wheel *l* also throws out of gear the sliding clutch *r* on the shaft *e*, which travels on a feather or equivalent device on one part of said shaft. The other part or mate *s* of said clutch is loosely mounted on said shaft and secured to the spur-pinion *f*. The contact of drum and worm gear-wheel will remain until by the same sprocket-gearing the drum B is drawn forward, with its clutch *p*, out of contact with the worm-wheel *h*, the act of which withdrawal couples up or puts in mesh the clutch-coupling *rs* on the hand-shaft *e*, thus locking the spur-pinion *f* on the shaft *e*, so that said pinion will revolve when said shaft is rotated. All, therefore, that is required when steering by steam is to throw the steering-drum B into contact with the worm-wheel *h* by a few revolutions of the small wheel *l* on the shaft *j* of the large wheel A, and when desiring to steer by hand all that is required is to reverse by a few turns said wheel *l* until the drum B is thrown out of contact with the worm-wheel *h*, which act throws in gear the clutch *rs* on the hand-shaft *e*. Thus but one wheel is required to be operated—the large wheel A—in steering either by steam or by hand, the movement of the small wheel *l* being only required for a moment to change from steam-steering to hand-steering, and vice versa. The worm or threaded gear T (shown in dotted lines on the shaft *j*) is a convenient means of giving motion to a pointer or tell-tale (not shown) in the top of the hollow column N, in which the shaft *j* is mounted, the angle of the tell-tale indicating the angle of the rudder with the keel of the

ship whenever the rudder is moved by the turning of the steering-wheel A. This tell-tale arrangement forms no part of the invention herein claimed.

5 When steering by steam, the clutch *r* being uncoupled, the rotation of the bevel-gearing *abcd* by the hand-wheel A rotates an inclined or spiral collar *t*, fast on the shaft *e*, which forces from it its fellow incline *u*, secured to the spur-pinion *f*, loose on the same shaft, which movement of the incline *u* in turn moves the forked lever *v*, fast on its fulcrum-shaft *w*, the lower arms *v'* on said shaft operating the valves which start, reverse, and stop the steering-engines, and the forked lever *v* being articulated to a loose collar *x* on the incline *u*. This valve-operating device has been heretofore used, and forms no part of the invention herein described. It is therefore unnecessary to describe said device in detail. It will be understood that when the drum B is rotated by the engine the spur-wheel *g* rotates the spur-gear *f*, secured to or forming part of the spiral or incline *u*, and both loose upon the shaft *e*. This motion shuts off the steam automatically by pushing back to the neutral point the arms *v'*.

When steering by hand, with the clutch *rs* coupled and the drum B out of contact with the worm-wheel *h*, the coupling of the clutch *rs* on the shaft *e* locks the spur-pinion *f* fast to the hand-shaft *e* and also prevents any motion between the inclines *t u*, so that the rotation of the bevel-gearing *abcd* by the hand-wheel A rotates the shaft *e*, and with it the spur-pinion *f*, which being in mesh with the gear-wheel *g* rotates it and with it the steering-drum B, and thus moves the rudder by hand-power alone.

40 In Fig. 3 the drum B, shaft C, shaft *e*, clutch *rs*, spur-pinion *f*, and inclines *t u* are shown arranged out of the lines shown in the other figures for the purpose of more clearly illustrating the relations and connections of the several parts. It can now be clearly seen from Fig. 3 that when end motion is imparted to the shaft C in either direction by the sprocket-gearing shown in the other figures the lever *z*, fulcrumed at *y*, will, through the connecting-rod *q*, impart motion to the lever F, fulcrumed at G, which lever will move in and out the clutch *rs* on the shaft *e*. It will be understood that one arm of the lever *z* and one arm of the lever G, where said arms connect to the shafts C and *e*, are so connected through the intervention of loose collars on said shafts so that said shafts can rotate within said collars.

It will be observed that the fulcrum *y* of the lever *z* is mounted on a stud H, supported

in bearings in the frame K of the machine, said stud being provided with a spiral spring M. The object of mounting the fulcrum *y* upon a yielding or spring stud is to prevent danger of breaking some of the parts which operate the clutch *rs*. If an attempt be made in the pilot-house by turning the wheel *l* to throw the part *r* of the clutch into mesh with the part *s*, the faces of said parts may not register—that is, they may abut without coupling until by the revolution of the shaft *e* their faces register; but before this happens, while endeavoring to force the coupling, the lever *z* or some of its connections may be broken by the strain brought upon them. If, therefore, the faces of the clutch should fail to couple, the persistent turning of the wheel *l* will force back the fulcrum *y* by the yielding of the stud H until the faces of the clutch couple, when the stud H will be forced out to its proper position, and with it the fulcrum *y*, preventing all danger of breakage and safely permitting the coupling and uncoupling of the clutch from the pilot-house without requiring the presence of an attendant at the engines below deck.

The numbers 1 2 3 in Fig. 1 indicate an automatic arrangement for stopping the engines when the rudder has been brought "hard over" to either side. Said arrangement, however, forms no part of this invention.

Having thus fully described my said invention, I claim—

1. In a combined steam and hand steering apparatus for ships, in combination with a driving-shaft provided with a gear-wheel and a steering-drum, a hand-power shaft provided with a gear-pinion mounted loosely thereon, and a clutch for coupling and uncoupling said shaft and pinion, and mechanism for connecting and disconnecting the steering-drum and the steering-engine and for simultaneously coupling or uncoupling the clutch on the hand-power shaft, so that said steering-drum may be driven either by the steering-engine or by the hand-power shaft, substantially as set forth.

2. In a combined steam and hand steering apparatus for ships, in combination with a hand-power shaft provided with a gear-pinion mounted loosely thereon, and a clutch for coupling and uncoupling said shaft and pinion, a lever for coupling and uncoupling said clutch, fulcrumed on a yielding or spring support, substantially as set forth.

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