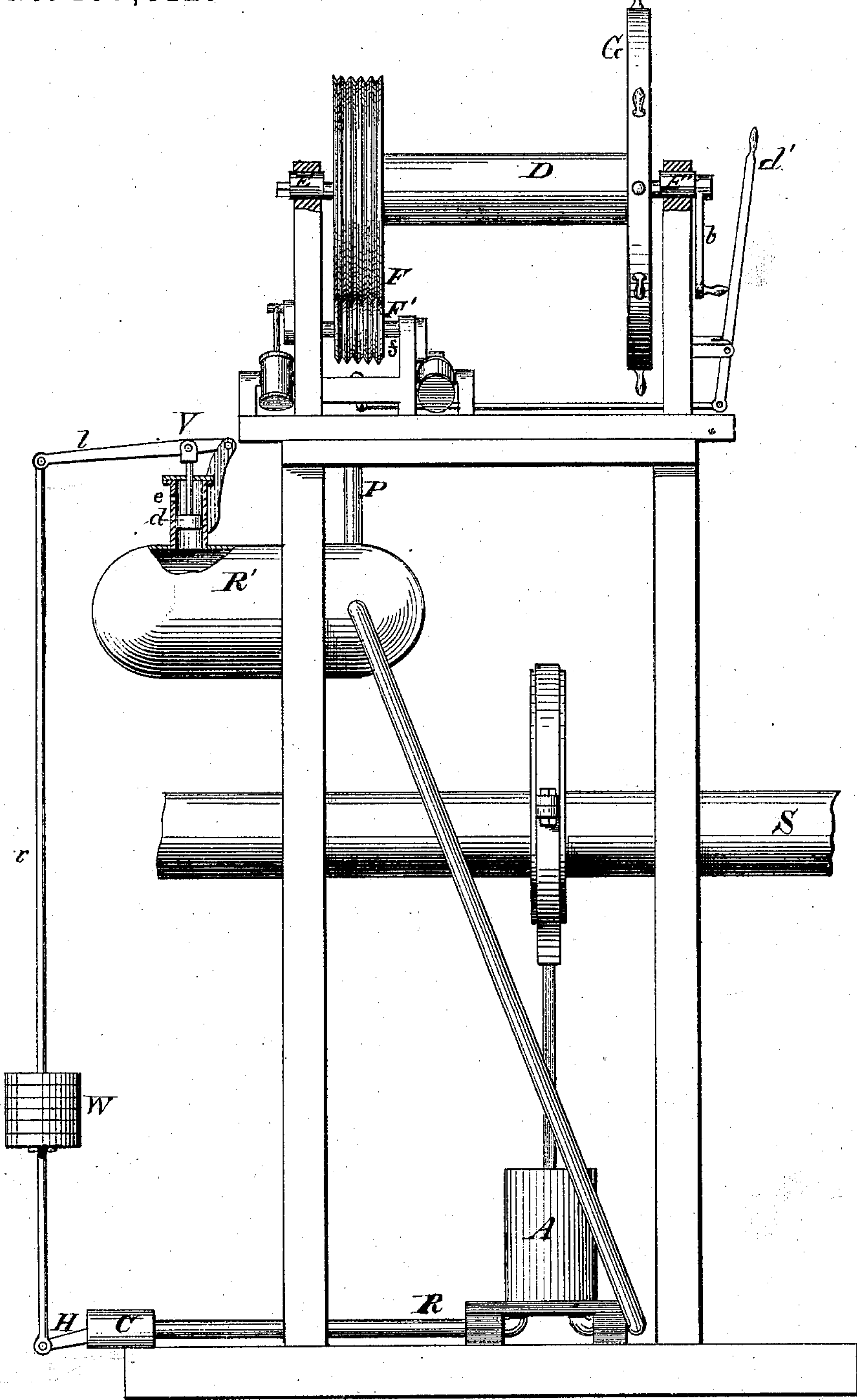


G. W. BAIRD & J. C. LEWIS.

PNEUMATIC STEERING APPARATUS FOR SHIPS.

No. 169,612.

Patented Nov. 9, 1875.



WITNESSES;

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IMPROVEMENT IN PNEUMATIC STEERING APPARATUS FOR SHIPS.

Specification forming part of Letters Patent No. **169,612**, dated November 9, 1875; application filed September 28, 1875.

To all whom it may concern:

Be it known that we, G. W. BAIRD, an officer of the Engineer Corps of the United States Navy, and JOSEPH C. LEWIS, of Washington city, in the District of Columbia, have invented certain new and useful Improvements in Pneumatic Steering Apparatus for Ships; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention consists of an air-pump actuated by the propeller-shaft, whether operated by the main engine or by the pressure of the water on the blades of the propeller. It also consists of a reservoir for storing up air, to which is attached a safety-valve, with levers connected to a cock in a receiving-pipe to regulate the pressure; and it further consists in certain gearing, and other mechanism to control the rudder with certainty and ease, and to have it under complete control.

We will now more definitely describe the parts of our apparatus, reference being had to the accompanying drawing and letters of reference marked thereon.

In the drawing, A is the air-pump, which is worked by the propeller-shaft S, whether the shaft be revolved by the pressure of the water upon the blades of the propeller or by the main engine. R is a receiving-pipe, having at any point a valve or cock, C, which may be opened or closed by a handle, H, or rod *r*. R' is a reservoir, in which the air, supplied by the air-pump, is stored. Attached to this reservoir is a safety-valve, V, having an outlet-opening at *e*, and the motion of whose piston *d* actuates the lever *l* and rod *r*, with weights W and cock C. The object of this safety-valve is twofold: first, the piston rises by sufficient pressure in the reservoir and closes the cock C, thus shutting off the supply of air to the air-pump, and is thus an automatic arrangement for regulating the pressure in the reservoir; second, in case of a greater increase of pressure the piston will be raised

still higher, and permit the air to escape through the opening *e*, thus forming a safety-valve. A drum, D, is mounted upon and moves freely on an axis or shaft, which may be elevated or lowered by means of the eccentrics E E'. Upon said drum is also arranged a grooved or corrugated friction-gear, F, moved by another small gear-wheel or pinion, F', on a crank-shaft, *f*, which is operated by an engine similar to a steam-engine. The ordinary ropes are used to connect the tiller with the drum D.

The object of the friction-gear is threefold: first, in case of a heavy stock upon the rudder, either by a wave or by solid matter, this gear will slide before it will break; second, it may be thrown in and out of gear at any point of its revolution, it having no teeth to interfere; third, it is noiseless.

The engine which drives the gearing is driven by compressed air from the reservoir R' through the pipe *p*. The wrench or handle *b*, for elevating the drum, or more properly for engaging and disengaging the gearing, and the lever *d'* for reversing the engine, are situated in front of the machine, where one man may manage them and observe the compass at the same time.

The operation is as follows: The vessel being in motion, and the screw-shaft revolving, the air-pump draws air through the cock C, and forces it into the reservoir R'. Then, by shifting the lever *d'* forward, the engines are caused to rotate, which in turn revolves the friction-gear, and moves the rudder. By pushing the lever *d'* backward the opposite motion is imparted to the apparatus and to the rudder. The lever *d'* simply reverses the engines, and, when in mid-position, the valve-ports being closed, no air can be admitted into the cylinders.

In case the gears are pressed tightly together, and a heavy sea should strike the rudder, the engines will be pushed backward until the pressure upon the pistons balances that upon the rudder, forming a highly-elastic resistance.

In case the vessel is under sail, the propeller-shaft S is uncoupled from the engines of the ship, (as is the custom in all modern war-

vessels,) when, by pressure of the water upon the blades of the screw, caused by the vessel's speed through the water, the screw and shaft S revolve, which in turn works the air-pump that supplies power for the steering-engines.

In case the speed of the vessel is not sufficient to revolve the screw, the weather being calm, the steering may easily be done by one man, and also without danger.

To steer the vessel by hand, the man first turns the handle *b*, which operates the eccentrics *E E'*, and raises the drum *D*, with the large friction-wheel, sufficiently high to disengage it from the pinion *F'*, and he can then steer by the hand-wheel *G*.

We do not wish to confine ourselves exclusively to compressed air for working the steering-gear, for it may be worked by any other gas, or by steam; nor to the precise arrangement of parts herein described and shown.

Having fully described our invention, we claim—

1. An air-pump, *A*, operated by the revolu-

tions of a propeller-shaft, for forcing air or gas into a reservoir to give sufficient pressure to move a ship's rudder, through the intervention of an engine, substantially as set forth.

2. The combination of an automatic piston or valve, *d*, with lever *l* and rod *r*, for opening or closing a cock or valve, *C*, for the supply of the air or gas pump, substantially as set forth.

3. In an air, gas, or steam steering apparatus, the combination of the drum *D*, provided with the grooved friction-gear *F* and the pinion *F'* on the crank-shaft *f*, operated by the engine, whereby sudden concussions on the rudder are compensated for, substantially as described.

In testimony that we claim the foregoing as our own, we hereby affix our signatures in presence of two witnesses.

G. W. BAIRD.

JOSEPH C. LEWIS.

Witnesses:

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