

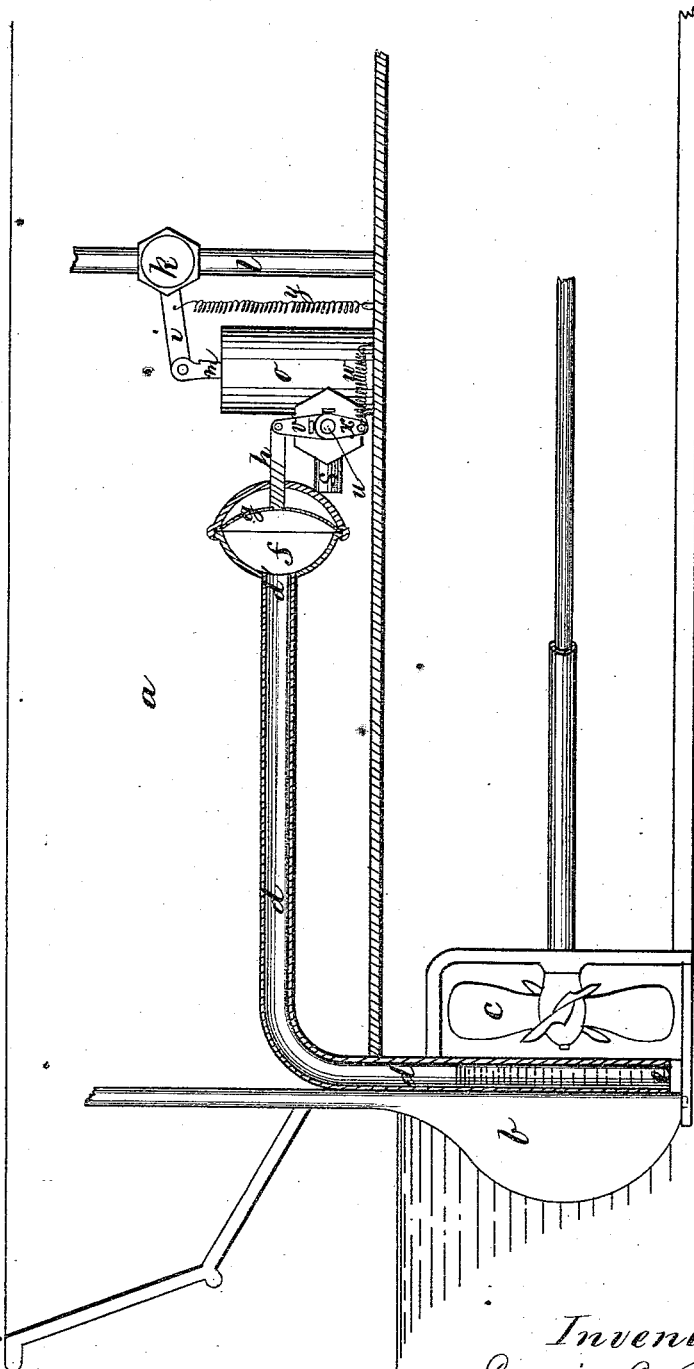
E. E. BEAN.

Speed Regulator for Propellers.

No. 161,376.

Patented March 30, 1875.

Fig. 1



Witnesses:

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D. M. Foster

Inventor:

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Fig. 3.

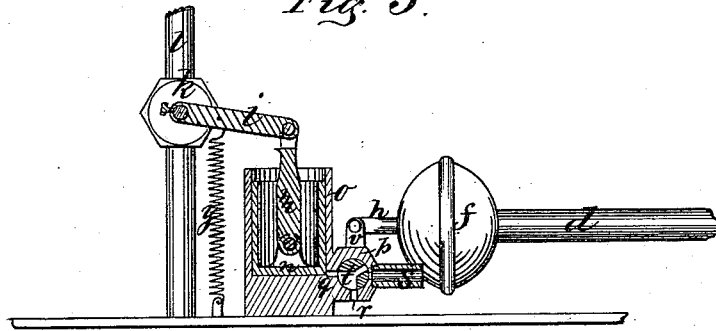
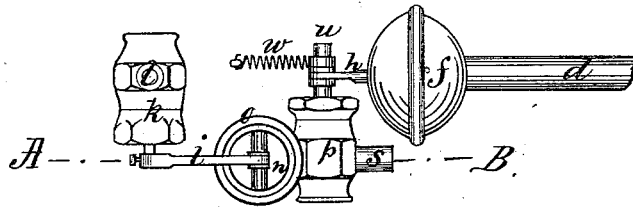


Fig. 2.



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# UNITED STATES PATENT OFFICE.

EDWIN E. BEAN, OF BOSTON, MASSACHUSETTS.

## IMPROVEMENT IN SPEED-REGULATORS FOR PROPELLERS.

Specification forming part of Letters Patent No. **161,376**, dated March 30, 1875; application filed March 15, 1875.

*To all whom it may concern:*

Be it known that I, EDWIN E. BEAN, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Speed-Regulators for Propellers; and I 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 pertains 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.

My invention relates to improvements in regulators for the speed of propellers, for the purpose of obtaining a uniform speed of the propeller, its shaft, and engine of a steamboat, whether the propeller is wholly submerged beneath the surface of the water, or when a portion of it works above the water during the progress of the steamboat, which conditions constantly follow each other when a propeller steam-ship is traveling through heavy seas, and by which changes the engine, shaft, and propeller are very liable to serious damages.

My invention is so arranged that the slightest change in the draft of water at the stern of a vessel is instantly communicated to a flexible diaphragm through the medium of a pipe containing air or gas, which pipe is open in its extreme end that projects below the propeller and close to it. The flexible diaphragm is arranged in an air-tight case that is in direct communication with the aforesaid pipe. A suitable connecting mechanism is arranged from the rod that is attached to the aforesaid flexible diaphragm to the throttle-valve or cut-off on the steam-supply pipe for the steam-engine, as will now be herein more fully shown and described.

On the drawings, Figure 1 represents a sectional elevation of my invention as arranged in a propeller steamboat. Fig. 2 represents a ground plan of the regulating apparatus, and Fig. 3 represents a longitudinal section on the line A B, shown in Fig. 2.

Similar letters refer to similar parts wherever they occur on the drawing.

A represents the hull of a propeller steamboat, on which *b* is the rudder, and *c* the screw,

in the ordinary way. The regulating apparatus consists of a pipe, *d*, having its lower end *e* open and projecting below the propeller-shaft and close to the propeller *c*, as shown in Fig. 1. The opposite end *d'* of the pipe *d* is in open communication with a receptacle, *f*, that is covered with a flexible diaphragm, *g*, as shown in Fig. 1. The lower end of the pipe *d* contains water, but the remainder of said pipe, as well as the receptacle *f*, is filled with air or gas of the ordinary atmospheric pressure, or compressed additionally, as may be desired. The rise and fall of the stern of the vessel acts instantly on the air or gas in the pipe *d* in such a manner that if the stern of the vessel is lifted up the air or gas in the pipe *d* is rarefied, and the elastic diaphragm *g* is drawn into the receptacle *f*, and if the stern of the vessel sinks lower in the water the air or gas in the pipe *d* is compressed in a corresponding ratio, by which the diaphragm *g* is bulged out from the receptacle *f*.

In this manner it will be seen that any change in the draft of water at the stern of the vessel is instantly communicated to the rod *h*, that is attached to the flexible diaphragm *g*. It therefore only remains to connect said rod *h* in a suitable manner to the handle or lever *i* of the steam-supply-pipe valve or cut-off *k*, arranged on the steam-pipe *l*, that leads from the boiler to the engine, so that when the stern is depressed the rod *h* shall act upon the lever *i* and let on more steam to the engine; and if the stern is raised up, that said rod *h* shall act upon said lever *i* and shut off the steam partially, so as to obtain a uniform speed of the engine, no matter how much the vessel is tossed up and down in heavy seas.

The immediate connecting mechanism between the rod *h* and valve-lever *i* consists of a connecting-rod, *m*, hinged to the end of the valve-lever *i*, and to a piston or plunger, *n*, that is made to move up and down in a cylinder, *o*, without much friction. To the lower part of the said cylinder *o* is connected a shell, *p*, having three openings, *q r s*, and in which shell a three-way cock, *t*, is operated. The cock-spindle *u* is provided with an arm, *v*, that is jointed to the diaphragm-rod *h*, as shown. The pipe *s* is in communication with a force or donkey

pump, from which a stream of water is conveyed to the cock *t* as long as the engine is working. A spiral spring, *w*, is arranged between the end of an additional lever, *x*, on the spindle *u*, and the stationary bed-plate of the mechanism for the purpose of facilitating the operation of the cock *t* when the stern of the vessel is raised in the water. The operation of this mechanism is as follows: The water forced from the donkey-pump through the pipe *s* is, by the joint operation of the diaphragm *g*, rod *h*, arm *v*, and cock *t*, made to act upon the under side of the piston or plunger *n* more or less, according to the rise or fall of the stern of the vessel, by which I am able to obtain a sufficient force on the lever *i* for the operation of the valve or cut-off *k* under any and all circumstances. A spring, *y*, connecting the lever *i* to the bed-plate of the apparatus is made to automatically operate the lever *i* when the water is shut off from the cylinder *o*. The opening *r* in the shell *p* is the escape through which the water flows back from the cylinder *o* when shut off more or less from the force-pump.

In this manner I am able to obtain any desired pressure for the operation of the steam-valve or cut-off *k*, and all the labor that the diaphragm *g* has to perform, when acted upon

by the compressed or rarefied air or gas in the pipe *d* as the stern of the vessel is lowered or raised in the water, is to turn the small and frictionless cock *t*, by which a sufficient water-pressure is conveyed to the aforesaid piston or plunger *n*, that is directly connected to the valve or cut-off lever *i*.

The advantage of this my regulator is, that the rise and fall of the vessel itself automatically and instantly regulates the speed of the engine, so that a uniform and constant speed is obtained on the propeller, no matter whether it is wholly or partially submerged in the water.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent, and claim—

The combination, with the pipe *d*, receptacle *f*, flexible diaphragm *g*, of the cock *t*, cylinder *o*, piston *n*, connection *m*, lever *i*, and cut-off *k*, as and for the purpose herein shown and described.

In testimony that I claim the foregoing as my own invention I have affixed my signature in presence of two witnesses.

EDWIN E. BEAN.

Witnesses:

ALBAN ANDRÉN,  
JOHN R. HEARD.