

(No Model.)

2 Sheets—Sheet 1.

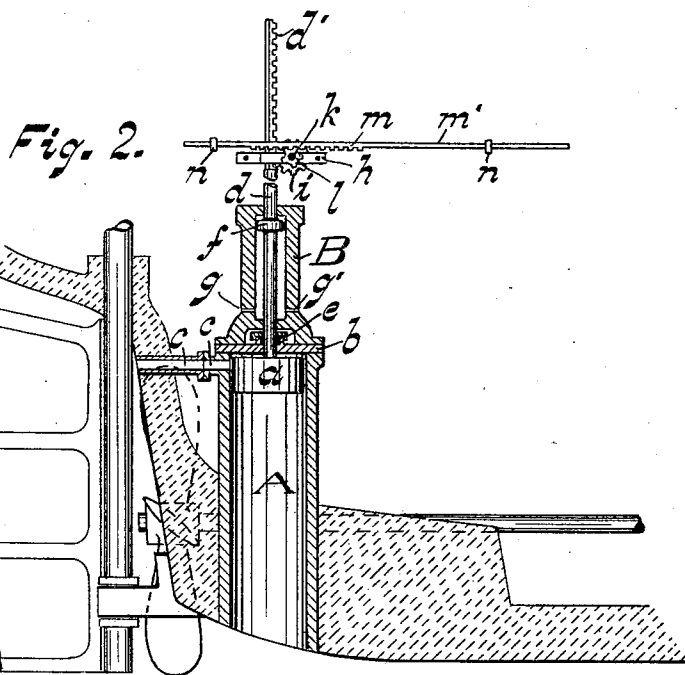
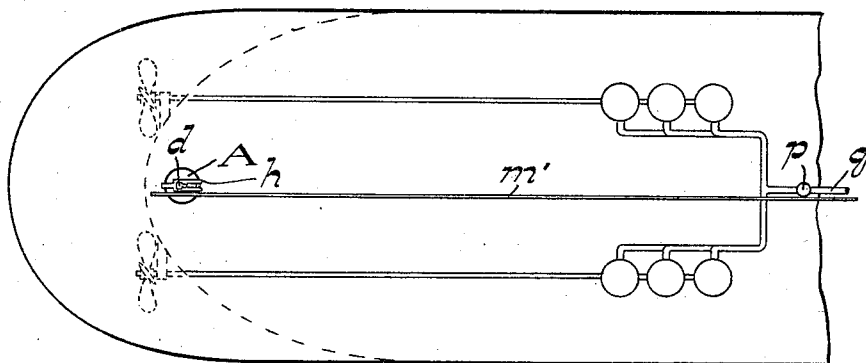
F. BITTNER.

CUT-OFF APPARATUS FOR MARINE ENGINES.

No. 586,893.

Patented July 20, 1897.

Fig. 1.



Witnesses

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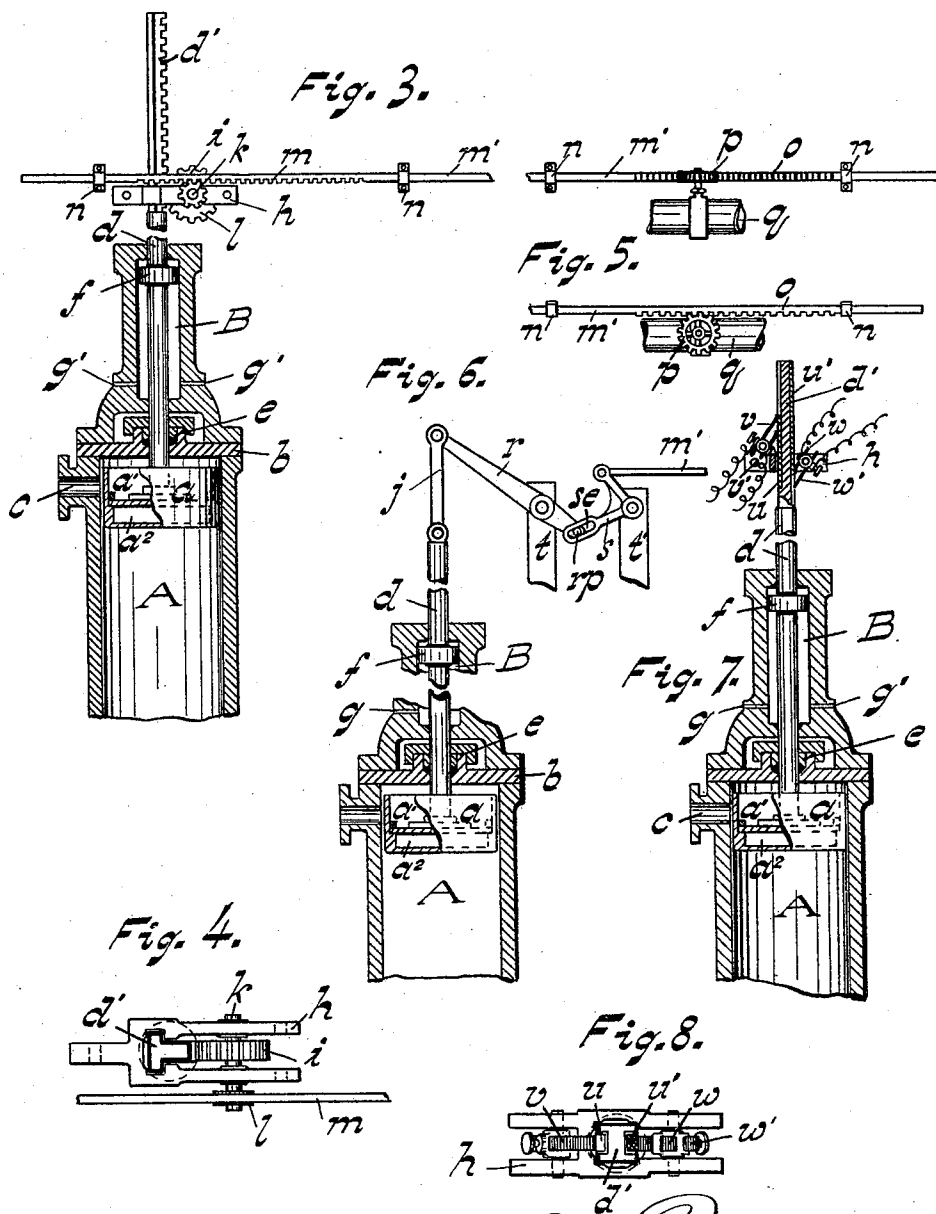
By *Schreier, Van Oderstine*
& *Mathews* his Attorneys.

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UNITED STATES PATENT OFFICE.

FRANZ BITTNER, OF NEW YORK, N. Y.

CUT-OFF APPARATUS FOR MARINE ENGINES.

SPECIFICATION forming part of Letters Patent No. 586,893, dated July 20, 1897.

Application filed March 5, 1897. Serial No. 626,042. (No model.)

To all whom it may concern:

Be it known that I, FRANZ BITTNER, a subject of the Emperor of Austria-Hungary, and a resident of New York, county and State of New York, have invented certain new and useful Improvements in Cut-Off Apparatus for Marine Engines, of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings, wherein--

Figure 1 is a plan of the stern part of a ship, showing the location of my cut-off apparatus in the body of a ship and its connection with the valve. Fig. 2 is a sectional view thereof drawn on an enlarged scale and showing the operating parts of the apparatus. Fig. 3 is a sectional view, partly in elevation, showing details of the apparatus. Fig. 4 is a top view thereof. Fig. 5 is a top view of the mechanism for moving the cut-off valve. Fig. 6 is a similar view to that shown in Fig. 3, showing a modified arrangement of the mechanism for moving the valve. Fig. 7 is a similar view showing a modified construction for operating the valve electrically. Fig. 8 is a top view of the modified construction shown in Fig. 7.

Similar letters of reference indicate corresponding parts in all views of the drawings.

My invention relates to ships propelled by steam-power; and it consists of an apparatus for automatically and instantly cutting off the supply of steam to the engines whenever the propeller of the vessel is lifted out of the water, to prevent racing of the propeller, and the resulting increased friction and shaking of the ship's body and of its machinery are obviated.

The apparatus consists of a hollow cylinder A open on its lower end and closed by plate *b* on its top, hollow piston *a*, piston-rod *d*, air-cylinder B, piston *f*, and some suitable mechanism connected with piston-rod *d* for transmitting the motion of the piston *a* to the valve-gear.

The air-cylinder B is mounted concentrically upon the top of the cylinder A and is bolted to it. The piston-rod *d* passes through this air-cylinder and piston *f* is secured to it. The air-cylinder B is slightly longer than the stroke of the piston *a* and is provided near its base with outlet-passages *g* and *g'*, connecting the interior of the air-cylinder with

the outside air. These outlets are so located that the piston *f* will close them when nearing the lower end of the cylinder.

Cylinder A is set centrally near the stern in the body of the ship and extending from its keel upward to a point somewhat above the periphery of the propeller, and is provided near its top with the outlet *c*, connected to discharge-pipe *c'*.

The piston *a* is hollow and is composed of two parts *a'* and *a''*, part *a'* being open on top and part *a''* being air-tightly closed. This piston is loosely fitted into the cylinder A and the air-tightly-closed space is of such dimension as to slightly overbalance the weight of the piston *a* when immersed in water. The piston will thus have a tendency to move upward when immersed in water.

In a normal position of the ship when the propeller is immersed in the water in its most efficient position the piston *a* will be forced by the pressure of the water upward in its position shown in Fig. 2. This is the normal position of the apparatus, the mechanism controlling the valve being then in such position to hold the main steam-supply pipe *q* open.

When the ship is thrown upward (pitching) and lifted so far out of the water that the plates of the propeller will project above the surface, the water in the cylinder A will rapidly recede from underneath the piston *a*, and the weight of the water filled in the upper part of the piston will force it downward so far until its weight is again balanced. When the vessel sinks back in its normal position, the water rising in cylinder A will drive piston *a* upward. Outlet *c* prevents congestion of water between the top plate *b* and piston *a* that may occur in apparatuses of smaller vessels sailing through chabby seas.

The upper end *d'* of the piston-rod *d* is shaped into a rack and operates cog-wheel *i*, set on shaft *k*, pillowed in bracket *h*. To the same shaft *k* is rigidly keyed another cog-wheel *l*, engaging with the rack *m*, secured to or made in one piece with connecting-rod *m'*, sliding in bearings *n*. On the other end of the connecting-rod *m'* is secured to it (or made in one piece therewith) rack *o*, gearing with the cog-wheel *p*, keyed to the stem of the cut-off valve, set in the steam-supply pipe *q*.

The motions of the piston *a* are communi-

cated by rod *d* and rack *d'* to the cog-wheel *i*, and cog-wheel *l*, rotating in the same direction, will move connecting-rod *m'*, transmitting this motion to cog-wheel *p*, set on the stem of the main valve of the steam-supply pipe, and will turn this valve rapidly or slowly, in accordance with the motions of the ship, thereby turning on or cutting off, partly or wholly, the supply of steam to the engine.

In Figs. 6 and 7 I have shown another mechanism for operating the cut-off valve in accordance with the motion of the piston *a*. The mechanism shown in Fig. 6 consists of a link *j*, hinged to the top of the piston-rod *d*, lever *r*, fulcrumed to post *t*, and of bell-crank lever *s*, pivoted to post *t'* and having one arm, provided with an elongated eye, connected by bolt *rp* to the shorter arm of lever *r*, the other arm being hinged to connecting-rod *m'*. On the other end of the connecting-rod *m'* a rack may be provided, operating in the same manner as shown in Fig. 5, or if the cut-off valve be a slide then the rod may be directly connected to it. Lever *r* oscillates on its fulcrum-bolt correspondingly with the motion of the piston *a*, and bolt *rp*, engaged in the eye *se*, moves bell-crank *s*, transmitting the motion to the connecting-rod *m'*, which operates the valve in the manner described above.

The apparatus shown in Fig. 7 is designed for operating the cut-off valve electrically. For this purpose there are two strips *u* and *u'*, of copper, set in corresponding grooves on the opposite sides of the piston-rod *d*. These strips are embedded in insulating material and only their outer surfaces are bare. Brushes *v* and *v'* and *w* and *w'* are secured to a bearing, guiding the movement of the rod in such position that when piston *a* is in its highest position, as shown in Fig. 7, the electrical circuit through brushes *w* and *w'* is interrupted, whereas that one through brushes *v* and *v'* is closed. Both currents are connected to an electric motor operating the cut-off valve. The corresponding brushes are so arranged in relation to the armature of the motor that the current circulating through brushes *r* and *v'* drives it to open the valve.

When the piston *a* moves downward, strip *u* comes into contact with both brushes *w* and *w'*, thereby closing their circuit, whereas the opposite circuit (through *v* and *v'*) is interrupted. The current passing through the brushes *w* and *w'* drives the motor to close the cut-off valve. When again the piston *a* moves upward, returning to its normal position, the motion of the motor is again reversed, the current through *w* and *w'* closing the valve, being interrupted and the other driving the motor in opposite direction, opening the valve closed. The contact-strips *u* and *u'* are arranged in such position relatively to each other that there is always an interval between the change from one action to the other. This is provided to prevent rapid changes in operating the valve.

The function of the air-cylinder B and piston *f* is to regulate the motions of piston *a* and to prevent hard striking and consequent destruction of the apparatus in heavy seas. It will be observed that during its upward stroke, when the ship falls back into its normal position and the water rushing into the open end of cylinder A drives piston *a* forcibly upward, piston *f* will continue to compress the air underneath the top of cylinder B, thereby modifying the force of the stroke, whereas when piston *a* descends when the ship is lifted out of the water the air from the air-cylinder B is driven out through the passages *g* to facilitate a rapid closing of the cut-off valve.

This apparatus is very effective and reliable for its purpose, the cutting off of the supply of steam being effected promptly, either gradually or instantly, and always in strict accordance with the change in the position of the ship, consequently the more effectively the harder the ship pitches. The running of the engines is thereby regulated concurrently with the change of load (resistance of water) upon the propeller.

I claim as my invention and desire to secure by Letters Patent—

1. The combination with a cut-off apparatus, comprising a hollow cylinder open on its lower end, adapted to be secured in the hull of a steam vessel, a weighted piston balanced to float on top of the water, set within the cylinder, a rod connected to the piston and projecting through the head of the hollow cylinder and mechanism for transmitting the motion of the rod to the valve-gear, of a closed air-cylinder provided with air-passages near its base and mounted concentrically on the top of the hollow cylinder, and of a piston, air-tightly fitted in the air-cylinder, and rigidly connected to the piston-rod of the piston operating in the hollow cylinder.

2. A cut-off apparatus for marine engines comprising a hollow cylinder open on its lower end, and provided with an outlet near its closed top, a hollow piston loosely fitted in the cylinder and having an air-tight compartment and an open space above the air-tight compartment, a hollow (air) cylinder closed on both ends set on top of the open cylinder, air-passages provided in the walls of the cylinder near its base, a connecting-rod secured to the hollow piston and projecting through the closed top of the cylinder, a piston, fitted air-tightly into the air-cylinder and secured to the piston-rod, a valve or slide set in the steam-supply pipe and means for transmitting the motion of the hollow piston to the valve.

3. A cut-off apparatus for steam vessels comprising a hollow cylinder open on its lower end, and provided with an outlet near its closed top, a hollow piston loosely fitted in the cylinder and having an air-tight compartment and an open space above the air-tight compartment, a hollow (air) cylinder closed

on both ends set on top of the open cylinder, air-passages provided in the walls of the cylinder near its base, a connecting-rod secured to the piston and projecting through the closed top of the cylinder, a piston, fitted
5 air-tightly into the air-cylinder and secured to the piston-rod, of a rack secured to or made in one part with the piston-rod, a guide for the rack, a spindle pillowed in the extended
10 forked ends of the guide, a cog-wheel set on the spindle and gearing with the rack, a trunnion set on the same spindle, a rack mounted in bearings and gearing with the trunnion, a

connecting-rod secured to the rack, a rack secured on the other end of the connecting-rod, and a cog-wheel set on the stem of the main valve of the engine and gearing with the rack. 15

In witness that I claim the improvements described in the foregoing specification I have
20 signed my name in the presence of two subscribing witnesses.

FRANZ BITTNER.

Witnesses:

A. W. KURZ,
HARRY CALHOUN.