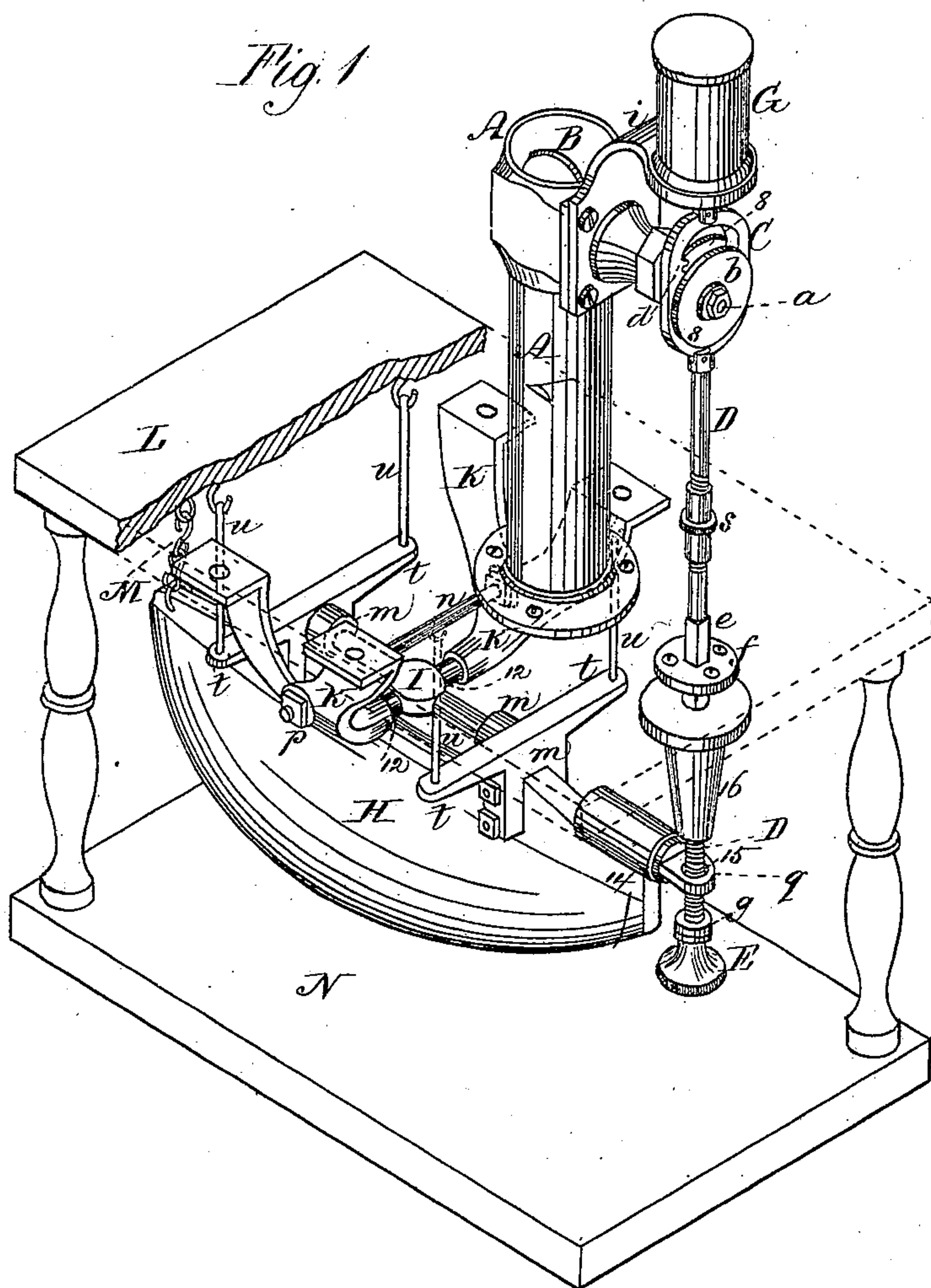


(No Model.)

2 Sheets—Sheet 1

W. U. FAIRBAIRN.  
Governor for Marine-Engine.  
No. 228,252. Patented June 1, 1880.



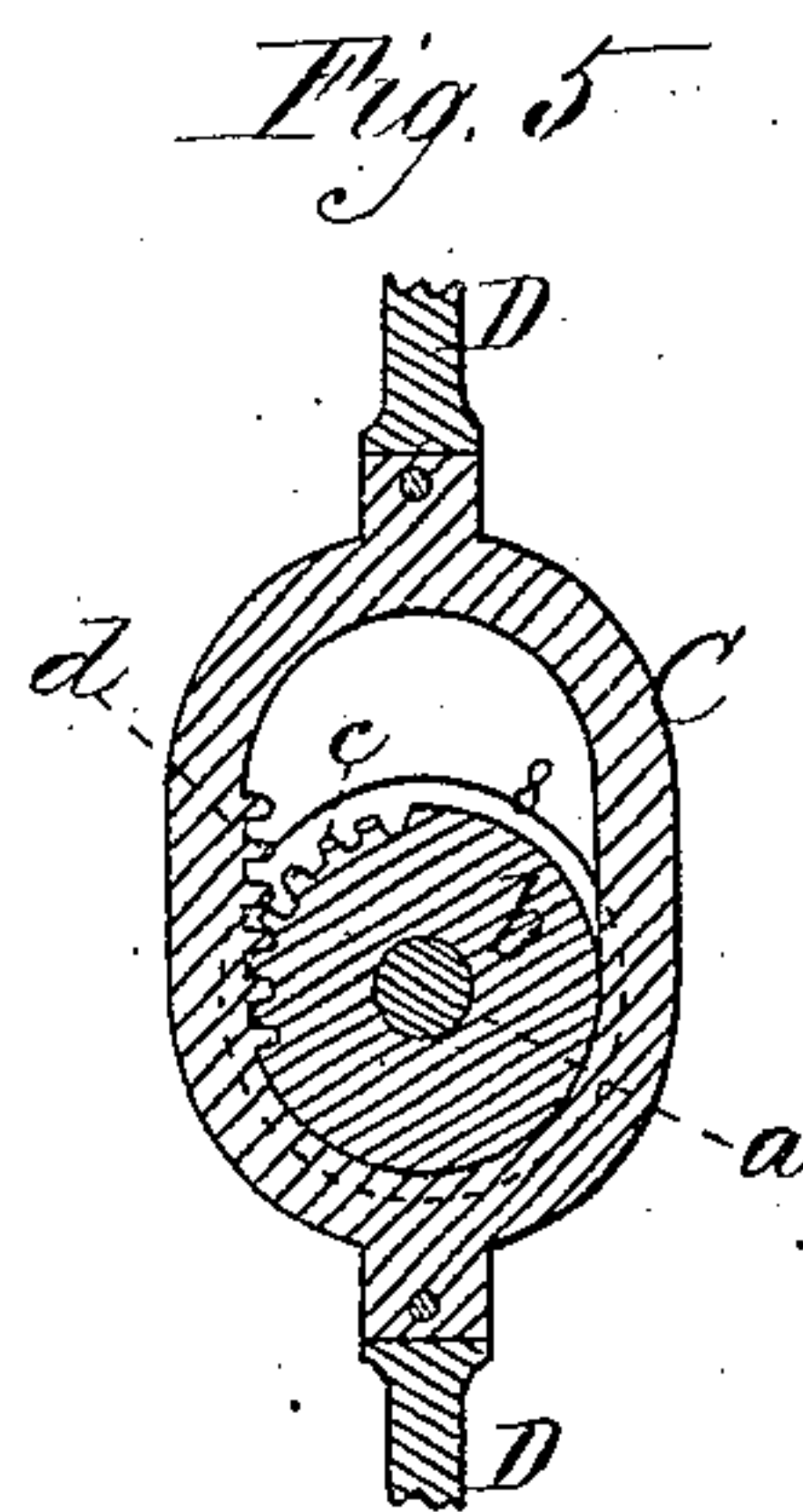
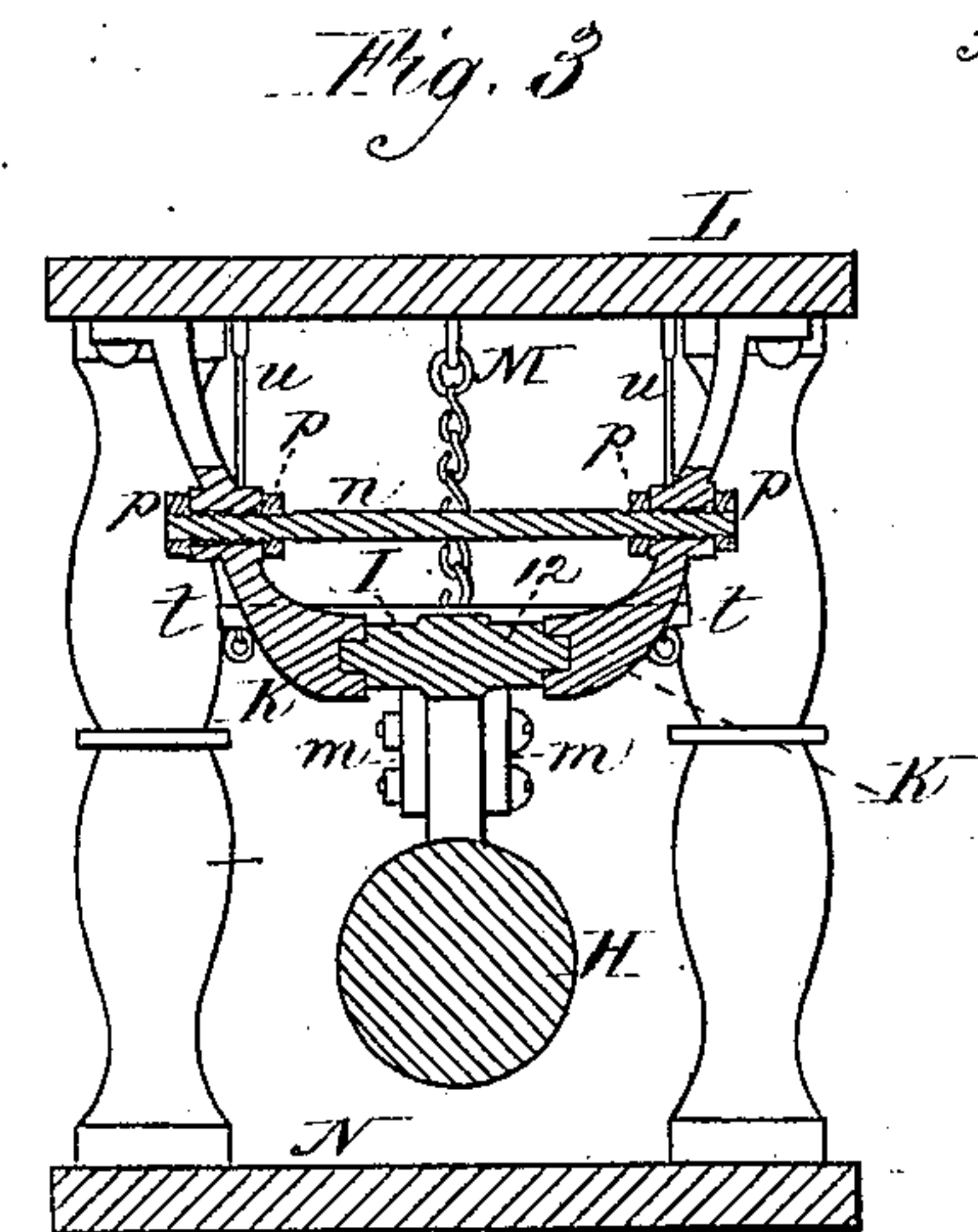
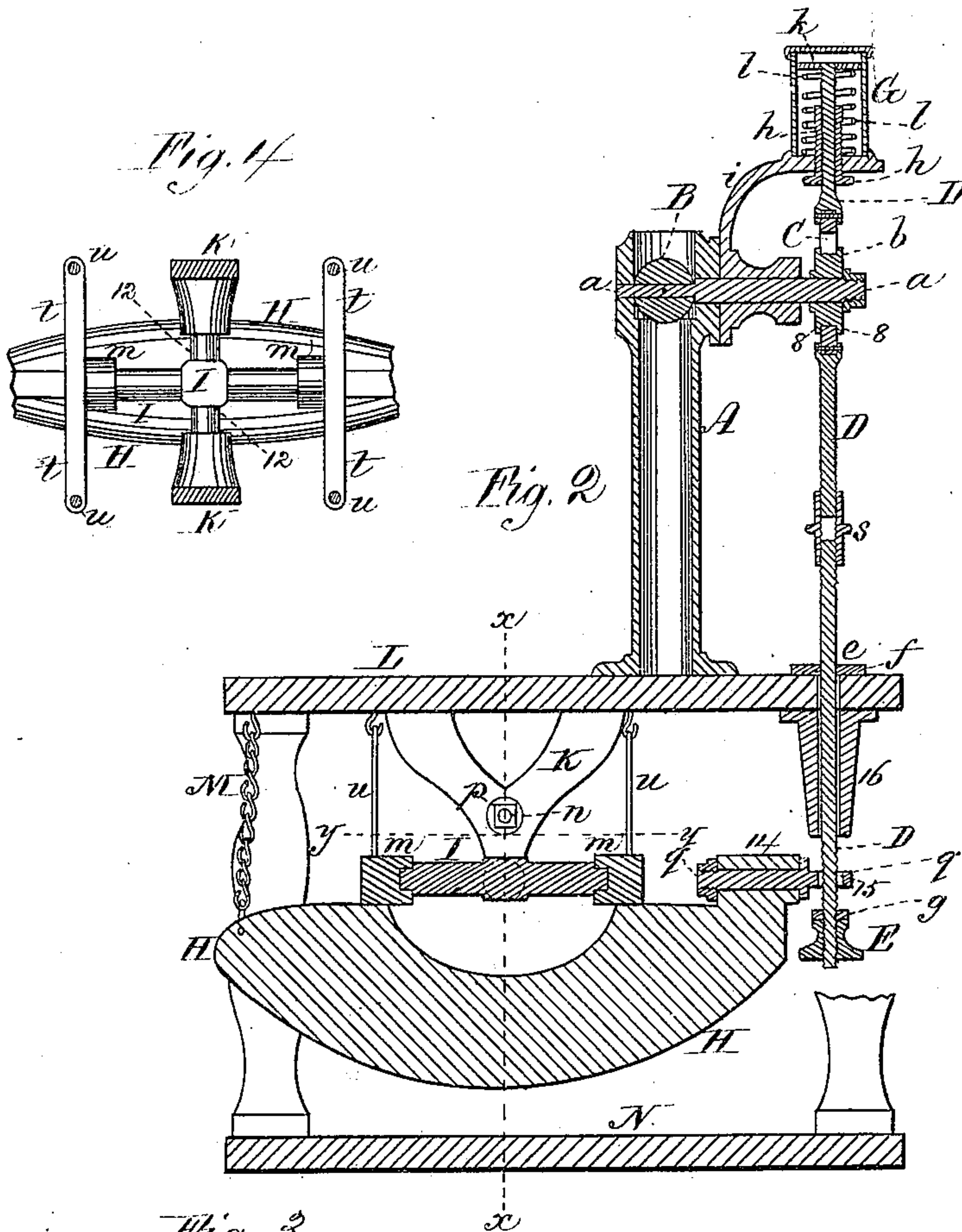
Witnesses  
W. J. Cambridge  
Chas. E. Griffin

Inventor,  
William U. Fairbairn  
per J. E. Stechemacher  
Atty

(No Model.)

2 Sheets—Sheet 2.

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Att'y



# UNITED STATES PATENT OFFICE.

WILLIAM U. FAIRBAIRN, OF HYDE PARK, ASSIGNOR TO HIMSELF, WILLIAM H. INGERSOLL, OF SAME PLACE, AND HENRY T. McCLEARN, OF DEDHAM, MASSACHUSETTS.

## GOVERNOR FOR MARINE ENGINES.

SPECIFICATION forming part of Letters Patent No. 228,252, dated June 1, 1880.

Application filed March 5, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM U. FAIRBAIRN, of Hyde Park, in the county of Norfolk and State of Massachusetts, have invented certain  
5 Improvements in Governors for Marine Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making a part of this specification, in which—

10 Figure 1 is a perspective view of a marine-engine governor constructed in accordance with my invention. Fig. 2 is a longitudinal vertical section through the center of the same. Fig. 3 is a transverse vertical section  
15 on the line *x x* of Fig. 2. Fig. 4 is a horizontal section on the line *y y* of Fig. 2. Fig. 5 is a sectional detail enlarged.

My invention relates to that class of governors for marine engines in which a vibrating  
20 weight or weighted arm actuated by the pitching or rolling movement of the vessel is connected with a throttle-valve in the steam-pipe in order that the valve may be automatically closed or opened to regulate the supply of  
25 steam in proportion as the propeller or wheel is raised out of or immersed in the water, thereby preventing the "racing" of the engine.

In governors of this description as heretofore constructed the throttle-valve has been  
30 so connected with the vibrating arm or weight that any motion of the latter, however slight, was instantly communicated to the valve, which resulted in the supply of steam being constantly varied, even though the propeller  
35 or wheel was sufficiently immersed in the water to prevent racing; and in consequence of the valve being thus unnecessarily kept in almost constant motion it became impossible to properly regulate the supply of steam and maintain a uniform pressure in the cylinder or cylinders of the engine as required, which proved  
40 to be a serious objection to the use of governors of this construction.

My invention has for its object to overcome  
45 this difficulty; and it consists in so connecting the oscillating weight or weighted beam to the rod which actuates the throttle-valve that the weight can vibrate within certain limits without moving the valve, the rod being provided

with an adjustable stop, against which the  
50 weight, or a piece projecting therefrom, comes into contact so as to move the rod and close the valve only when the vessel is inclined at such an angle as to raise the propeller or wheel  
55 out, or nearly out, of the water, and render it necessary to shut off the steam to prevent racing, the valve being otherwise allowed to remain undisturbed; and my invention also consists in certain details of construction, to be  
60 hereinafter described and specifically claimed.

In the said drawings, A represents the steam-pipe of a marine engine, through which the steam passes from the boiler to the cylinder or cylinders. This pipe A, which is provided,  
65 as usual, with an ordinary stop or shut-off valve, (not shown,) is also furnished with a butterfly throttle-valve, B, Figs. 1 and 2, the stem or spindle *a* of which has secured to its  
70 outer end a grooved wheel or disk, *b*, one side of which is provided with teeth *c*, Fig. 5, which engage with the teeth of a rack, *d*, formed on  
75 one side of the interior surface of a strap, C, which surrounds the disk *b*, the flanges *8* of which overlap the inner edges of the strap and serve as guides to keep the parts closely  
together and prevent play.

To the strap C is secured a vertical rod, D, which, when drawn down in a manner to be  
80 hereinafter described, causes the teeth of the rack to rotate the disk and close the throttle-valve, an upward movement of the rod producing a rotation of the valve-spindle in the  
opposite direction for the purpose of opening the valve.

The rod D is of rectangular form at *e*, as is  
85 also the corresponding portion of the upper guide, *f*, through which it passes, which prevents the turning of the rod upon its axis. To the lower end of the rod D, which is provided  
90 with a screw-thread, is fitted a screw-nut, E, which forms an adjustable stop, at the top of which is a washer, *g*, of rubber or other suitable  
95 elastic material. That portion of the rod D above the strap C extends up through an adjustable guide or thimble, *h*, into a cylindrical box or casing, G, attached to the  
outer end of an arm, *i*, projecting out from the steam-pipe A; and to the top of the rod D is



secured a head or piston, *k*, between which and the bottom of the casing, and surrounding the rod, is a spiral spring, *l*, which is compressed when the rod is drawn down to close the valve, and serves to raise the rod the instant it is released, and thus open the valve and maintain it in this position until it is again closed by the descent of the rod.

The guide *h* is provided with a screw-thread, and may be turned so as to cause its upper end to project more or less into the casing *G*, this end serving as a stop against which the head *k* comes into contact on the descent of the rod *D*, thus limiting the downward movement of the rod and preventing the throttle-valve *B* from being entirely closed, which is essential in order to prevent the engine from stopping on the center; and by thus adjusting the position of the upper end of the guide *h* the extent to which the valve is allowed to remain open when the rod *D* is drawn down may be varied as desired.

The contact of the bottom of the strap *C* with the grooved disk *b* serves to stop or limit the upward movement of the rod *D*, and insures the throttle-valve being wide open when the rod *D* is raised to its full extent by the spring *l*.

*H* is a heavy weight or weighted beam, of the form seen in Figs. 1 and 2, which is provided on each side of its center with a projecting piece, *m*, and between these two projections *m* is pivoted a cross-piece, *I*, the transverse portion 12 of which is pivoted within the sides of a frame or hanger, *K*, which is bolted to the under side of the engine-deck *L*, the two portions of the hanger being braced firmly together by means of a transverse rod, *n*, the ends of which are provided, both on the inner and outer sides of the frame, with screw-nuts *p*, by means of which the two parts of the frame may be held immovably at the required distance apart; and by thus supporting or hanging the weight *H* on two pairs of journals arranged in lines at right angles to each other it is permitted to oscillate freely in both longitudinal and transverse direction, so as to preserve its equilibrium as the vessel pitches or rolls, thus reducing the friction and wear to a minimum, while no obstacle is presented to the free swinging movement of the weight to accommodate itself to any position or inclination which the vessel may assume.

To the end 14 of the weight *H* is secured, in a suitable bearing, a horizontal swiveling rod, *q*, the outer end of which is provided with an eye or aperture, 15, through which passes the threaded portion of the vertical rod *D*, the aperture 15 being of such size as to allow the swivel to move freely over the rod without binding or coming into contact with the screw-thread, and by means of this swivel the sides of the eye or aperture 15 are prevented from binding against the rod *D* when the weight *H* is vibrated in a transverse direction.

When the parts are in the position seen in Figs. 1 and 2 it will be seen that, should the vessel pitch to a moderate extent only, or not sufficient to cause the propeller to be raised out, or nearly out, of the water, the weight *H* will not oscillate sufficiently to bring the swivel *q* into contact with the adjustable stop *E*, the lost motion produced by the swivel playing freely up and down upon the rod *D* allowing the weight to vibrate within certain limits without moving the throttle-valve *B*, which is thus allowed to remain open and undisturbed until the vessel is inclined to such an angle as to cause the propeller to be raised out, or nearly out, of the water, when the swivel *q* will be brought into contact with the stop *E*, causing the rod *D* to be drawn down against the resistance of the spring *l*, to close the throttle-valve *B* by means of the connections previously described, thus shutting off the steam and preventing the engine from racing when the propeller is out, or nearly out, of the water and encounters but little resistance—an occurrence which often occasions breakage or injury of the machinery; and it will thus be seen that by means of this construction the steam is not shut off until it is absolutely necessary to prevent racing, the valve at all other times remaining in its normal position, instead of being constantly affected by the slightest pitching of the vessel, as has hitherto been the case with governors of this description. On the stern of the vessel being again carried down so as to immerse the propeller the weight *H* is oscillated in the contrary direction, which carries the swivel *q* away from the stop *E* and releases the rod *D*, which is then instantly drawn up by the action of the spring *l*, causing the throttle-valve *B* to be opened to again admit the steam, as required.

By adjusting the stop *E* on the end of the rod *D*, so as to vary its position with respect to the swivel *q* when the vessel is on an even keel, the amount of vibration of the weight *H* necessary to shut off the steam may be changed or regulated with a great degree of nicety to suit the conditions or requirements of the vessel in which the governor is placed, these conditions varying in different vessels drawing more or less water and in the same vessel when lightly or heavily loaded, this feature of adjustability being of vital importance to the successful operation of the governor, without which it would be of no practical value, while the peculiar method described of hanging the weight *H* allows it to move freely under all conditions, rendering the action of the valve certain and reliable.

The rod *D* below the strap *C* is divided into two portions, which are united by a screw-sleeve, *s*, by turning which the effective length of the rod can be varied in order to adjust the distance between the swivel *q* and the stop *E* without the necessity of descending into the bilge to adjust the stop *E*; but it is evident



that the sleeve may be dispensed with if desired.

M is a stop-chain which limits the longitudinal movement of the weight H and prevents unnecessary oscillation in one direction, which might cause the swivel *g* to bind against the rod D or be brought into contact with the lower end of the lower guide, 16, to the injury or breakage of the parts.

From the projections *m* extend out on each side arms *t*, to the outer ends of which are secured two pairs of rubber or other suitable springs, *u*, the opposite ends of which are attached to the deck L above, the springs, when thus arranged, serving to steady the weight H and render it less tremulous or sensitive, while they also assist in returning it quickly to its normal position and bringing it to a state of rest should the pitching movement of the vessel suddenly cease, a lateral or transverse movement of the weight in either direction causing a tension to be brought upon the two springs on one side only of the weight, while a longitudinal movement in either direction will bring a strain upon the pair of springs at either one end or the other of the weight, as the case may be, and by the employment of these springs the necessary stability is given to the oscillating weight, which is nevertheless free to swing and preserve its equilibrium as the vessel pitches or rolls.

If desired, the supporting-frame K may be reversed and secured to the floor of the lower deck, N, instead of to the under side of the engine-deck L, as shown, and the points of attachment of the springs *u* may be changed to suit the requirements of the case.

I do not confine myself to the employment of the mechanism shown for transmitting the movements of the rod D to the valve B, as it is evident that a crank or other suitable mechanical device may be employed for this purpose without departing from the spirit of my invention.

The above-described governor may be placed in any convenient or suitable position in the vessel, and may be adapted for use in side-wheel steamers as well as in propellers.

I do not claim operating the throttle-valve of a marine engine by means of an oscillating weight; neither do I claim, broadly, the employment for this purpose of a weight arranged to oscillate both transversely and longitudinally; but

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

1. The oscillating weight or beam H, loosely connected with the rod D, which operates the throttle-valve B, so as to be capable of moving independently thereof, in combination with the adjustable stop E on the rod D, which is acted upon by the weight to close the valve, whereby the amount of vibration of the weight necessary to produce a movement of the valve may be varied to suit different requirements, substantially as set forth.

2. The combination, with the throttle-valve B, its actuating-rod D, and adjustable stop E, of the oscillating weight or beam H, supported on a cross-piece, I, pivoted thereto and to a frame or hanger, K, in lines at right angles to each other, substantially as and for the purpose set forth.

3. The combination, with the throttle-valve B and its operative mechanism and the adjustable stop E, of the oscillating weight or beam H, supported on two pairs of journals arranged in lines at right angles to each other, and provided with springs *u*, to prevent undue oscillation, substantially as described.

4. The combination, with the valve-actuating rod D, with its head *k* and spring *l*, of the adjustable stop *h*, for the purpose of preventing the throttle-valve from being entirely closed when the rod D is drawn down, substantially as described.

5. The combination of the swivel *g* with the oscillating weight or beam H, the rod D, and the stop E, constructed to operate substantially in the manner and for the purpose set forth.

6. The combination, with the valve-rod of the throttle-valve of a marine engine, of a spring and weight adapted to actuate said rod in opposite directions, said weight being adapted to oscillate and vibrate in transverse planes lengthwise and crosswise of the vessel, and also to convert all the motions of the vessel or weight except the vertical motion due to the rise of the propeller or wheel from the water into lost motions with regard to said valve-rod, substantially as described.

Witness my hand this 1st day of March, A. D. 1880.

WILLIAM U. FAIRBAIRN.

Witnesses:

P. E. TESCHEMACHER,  
W. J. CAMBRIDGE.