

(No Model.)

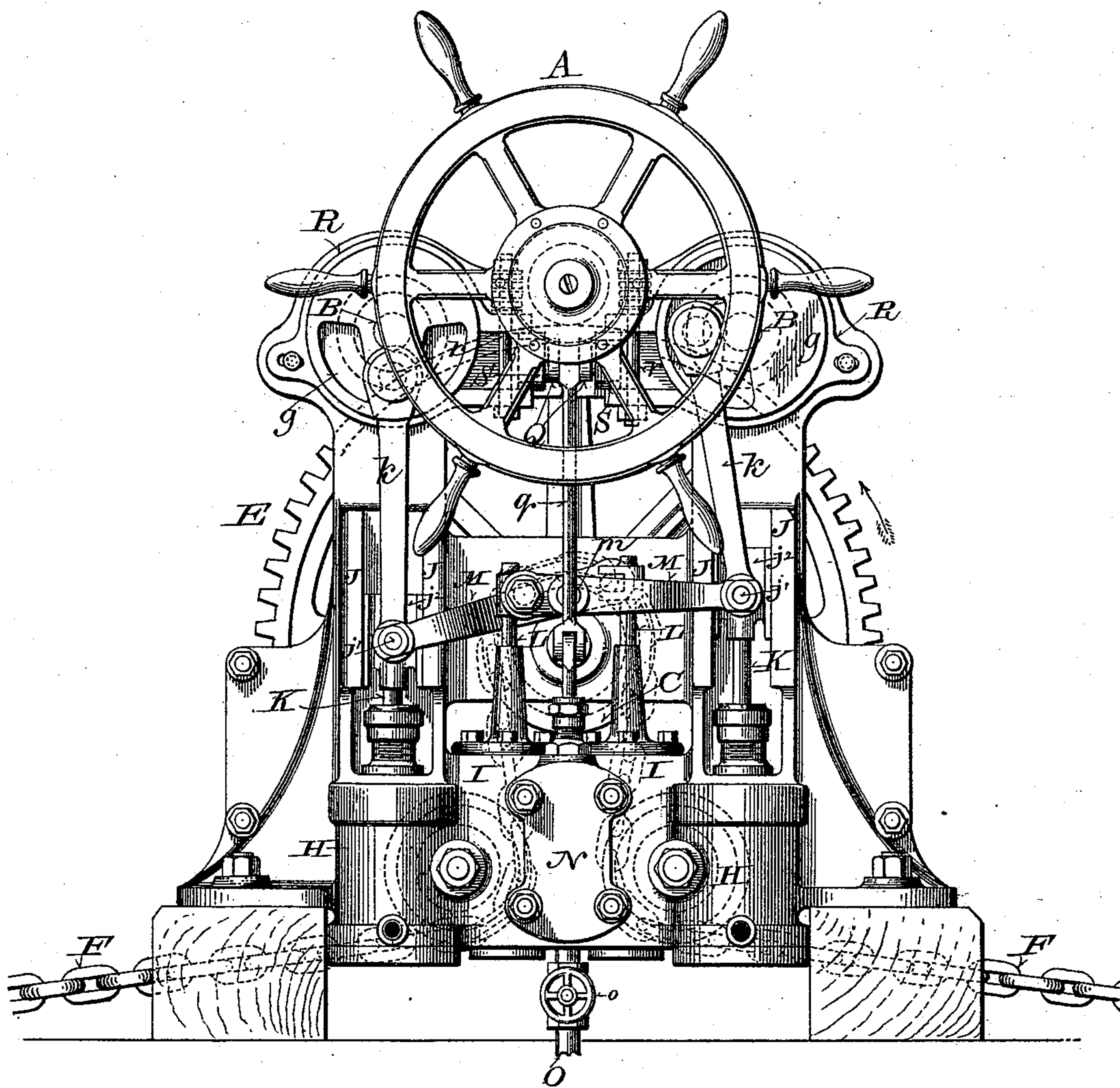
3 Sheets—Sheet 1.

M. A. BECK.  
STEERING ENGINE.

No. 528,356.

Patented Oct. 30, 1894.

Fig. 1.



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Inventor:

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(No Model.)

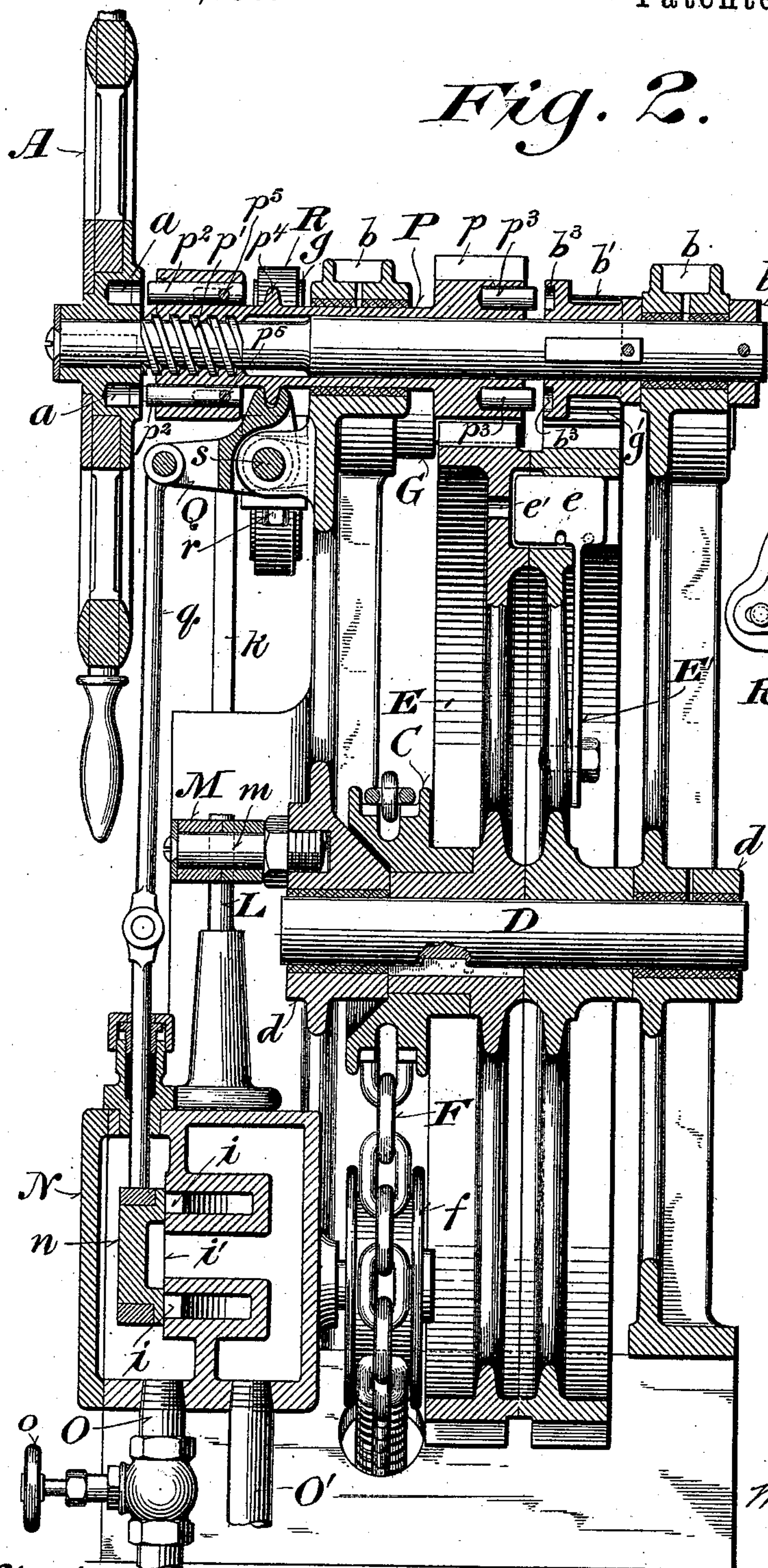
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M. A. BECK.  
STEERING ENGINE.

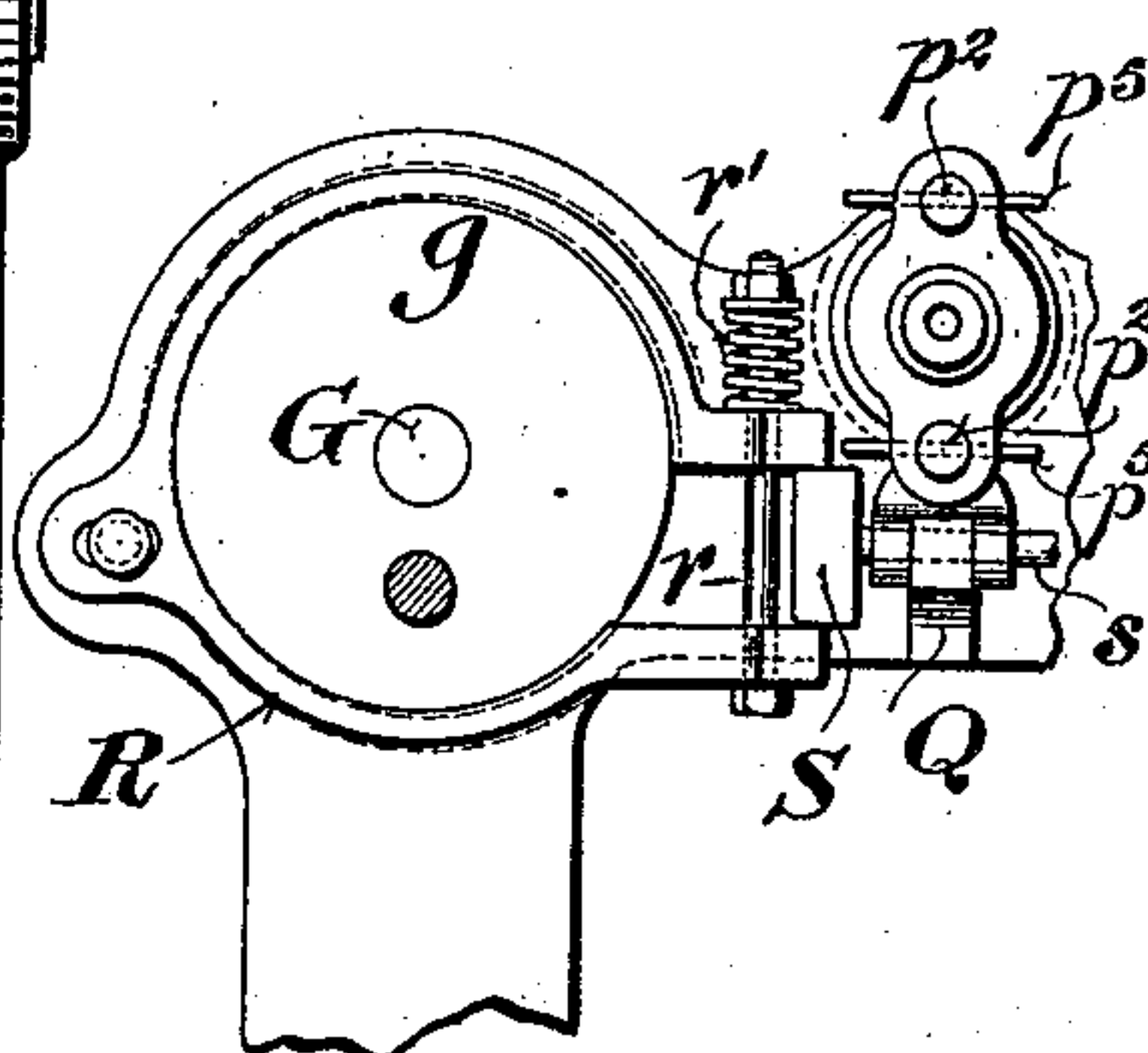
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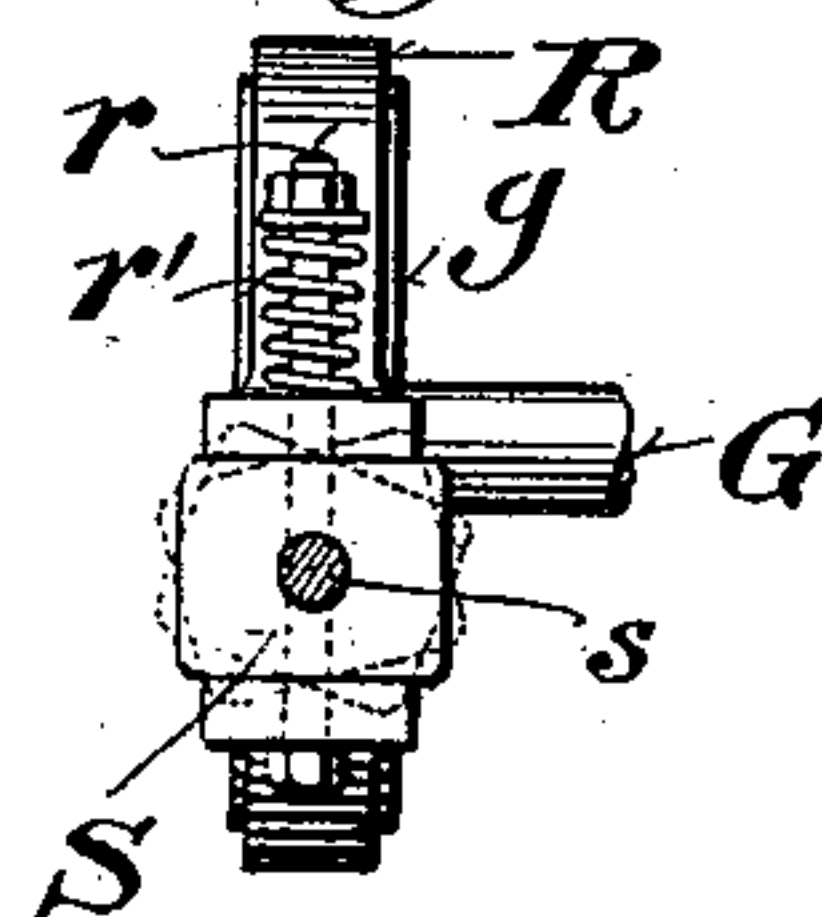
*Fig. 2.*



*Fig. 7.*



*Fig. 8.*



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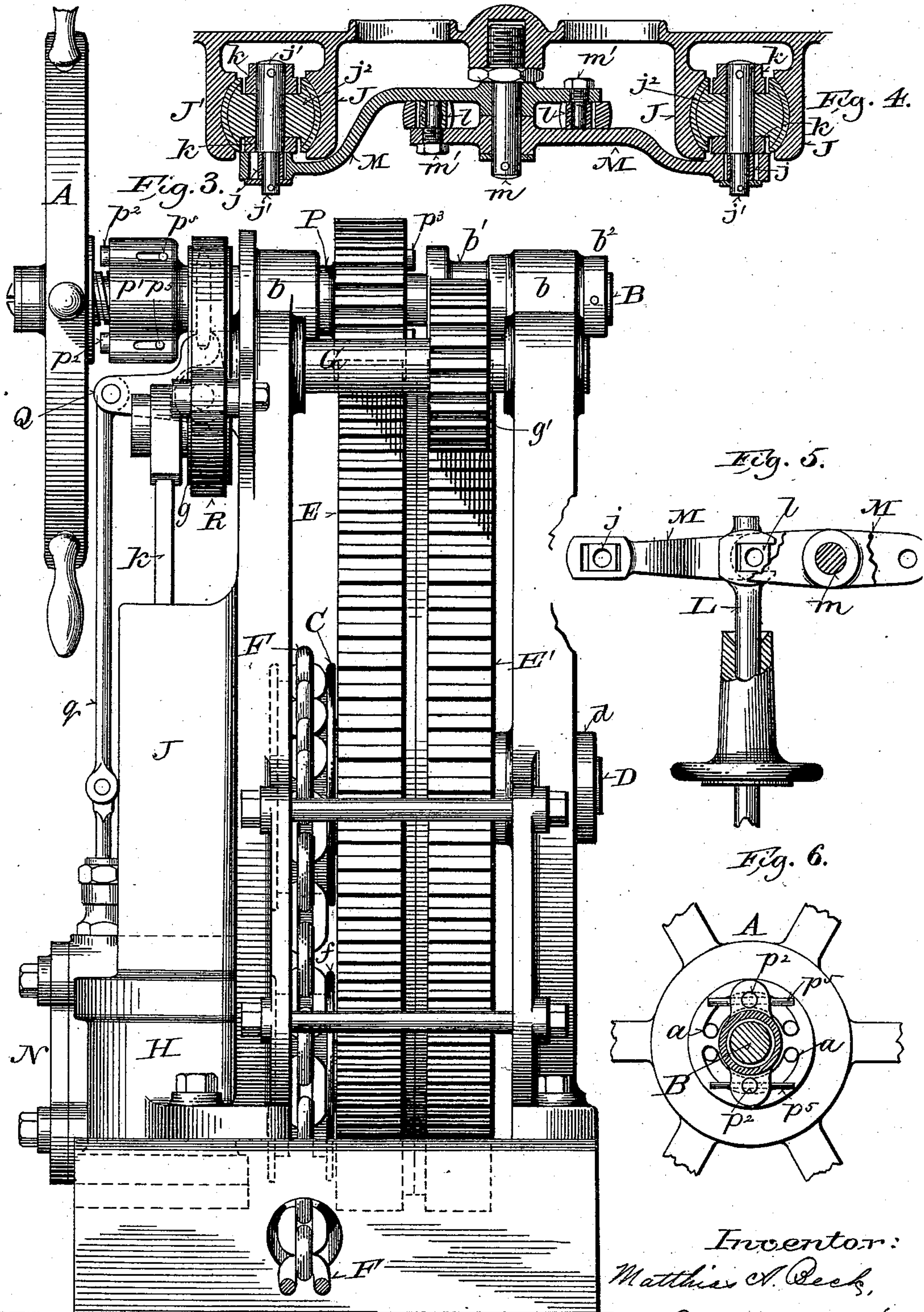
(No Model.)

3 Sheets—Sheet 3.

M. A. BECK.  
STEERING ENGINE.

No. 528,356.

Patented Oct. 30, 1894.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

MATTHIAS A. BECK, OF MILWAUKEE, WISCONSIN.

## STEERING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 528,356, dated October 30, 1894.

Application filed August 24, 1892. Serial No. 443,958. (No model.)

*To all whom it may concern:*

Be it known that I, MATTHIAS A. BECK, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain  
5 new and useful improvements in Steering-Engines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others  
10 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.

The main object of my invention is to provide for the operation of the steering apparatus of tugs, yachts, torpedo or other boats  
15 by power or by hand or by both power and hand combined, with rapidity, ease and unfailing certainty.

20 It consists essentially of the combination with a suitable drum or windlass, of a motor and a steering wheel, either of which may be connected at will with the windlass so as to actuate the same by power or by hand, or by  
25 power and hand combined; a break controlled by the steering wheel, whereby the windlass is held in any given position independently of the motor or pilot; certain peculiarities in the construction of the motor  
30 and its connections by which it is adapted to the purpose, and other novel features in the apparatus, hereinafter particularly described and pointed out in the claims.

In the accompanying drawings like letters  
35 designate the same parts in these several figures.

Figure 1 is a front elevation of a steering gear embodying my improvements. Fig. 2 is a vertical section of the same on an enlarged scale, cutting the windlass and steering  
40 wheel axially. Fig. 3 is a side elevation. Fig. 4 is a horizontal section through the valve gear of the engine. Fig. 5 is a front elevation of a portion of the valve gear. Fig. 6 is a vertical cross section of the steering  
45 wheel shaft showing a portion of the reverse side of the steering wheel and the clutch mechanism for connecting the steering wheel with the pinion loosely mounted upon its shaft; and Figs. 7 and 8 are detailed views,  
50 one being a front elevation and the other a side elevation of the automatic brake controlled by the steering wheel for holding the

windlass in any given position independently of the engine and of the pilot.

A represents the steering wheel, which may  
55 be of the usual well known form and construction. It is fixed upon the front end of a horizontal shaft B, which is supported in suitable bearings *b b*, provided therefor in the upper part of the frame. 60

C is a chain wheel fixed upon a shaft D, below and parallel with the shaft B, and supported at the ends in bearings *d d*, provided therefor in the frame. Upon the shaft D are  
65 mounted two gears E E', the first being keyed or otherwise fixed, and the other loosely mounted thereon. The chain wheel C may be formed with or mounted, as shown, directly upon the hub of the fixed gear E,  
70 with which it is designed to turn.

The tiller chain F running from opposite directions to the steering gear, passes underneath sheaves *f f*, thence upwardly over the chain wheel C, with which it engages and by  
75 which it is moved in either direction, in the usual manner. It is obvious that in place of the chain wheel C and chain F any suitable form of drum and cable may be employed.

G G are crank shafts on opposite sides of and parallel with the shaft B, supported near  
80 their ends in suitable bearings provided therefor in the frame, equi-distant from the shaft D. They are provided at their front ends with crank wheels *g g*, and between their bearings with pinions *g'*, which engage with  
85 the loose gear E' on shaft D.

For a motor to actuate the windlass, I employ a twin cylinder engine, the cylinders H H, valve chests I I and guides J J of which,  
90 may be conveniently and are preferably cast integrally with the front side of the frame.

K K are the piston rods of the engine, connected by rods *k k* with the crank pins of the wheels *g g*.

L L are the valve rods, parallel with and  
95 located between the piston rods K K, with which they are connected by levers M M, fulcrumed upon a stud *m*, projecting from the front side of the frame, as shown in detail in Figs. 4 and 5. These levers cross each other,  
100 each connecting the valve rod on one side of the engine with the piston rod on the opposite side.

The arc motion of the levers is provided for



by pivot blocks  $j j$ , inserted in slotted openings in their outer ends and mounted upon extensions of the pins  $j' j'$ , joining the connecting rods  $k$  and the cross heads  $j^2$  of the piston rods, and by pivot blocks  $l l$ , mounted upon pins  $m' m'$  in the inner ends of said levers, and inserted in transverse slots in the upper ends of the valve rods. This form of valve gear, requiring little space, is particularly well adapted for the purpose, it being quite essential that the engine should occupy no greater space than is allowed in the pilot house for ordinary forms of steering gear. By keeping the engine within the limits of such a space, it can be readily placed in boats which have been equipped with the ordinary style of hand steering gear.

$N$  is the reversing valve case, which is formed in connection with and adjacent to the main valve chests  $I I$ , with which it communicates through the ports  $i i$ , as shown in Fig. 2, and with the exhaust chamber through the port  $i'$ .

$n$  is the reversing valve controlling the several ports mentioned and the admission of steam into and its exhaust from the main valve chests  $I I$ .

$O$  represents the steam supply pipe, provided with a valve  $o$ , easily accessible to the pilot at the wheel, and  $O'$  is the exhaust pipe.

$P$  is a sleeve loosely mounted upon the steering wheel shaft  $B$ . It is formed or provided with a pinion  $p$ , engaging with the fixed gear  $E$ , and with a nut  $p'$  engaging with a screw thread on shaft  $B$ . The shaft  $B$  is restrained from endwise movement by collars  $b' b^2$ , on opposite sides of one of its bearings  $b$ , but the sleeve  $P$  is capable of a limited endwise as well as rotary movement thereon. The sleeve  $P$  is provided at its front end with extensible pins  $p^2$  and at its rear end with pins  $p^3$ , adapted to engage with the ends of arc-shaped slots  $a a$  and  $b^3$ , in the hub of the steering wheel and in the collar  $b'$ , when the steering wheel is turned a certain distance in either direction, the pins  $p^2$  engaging the slots in the hub of the steering wheel when it is turned to the right, and the pins  $p^3$  engaging with the slots in collar  $b'$  when the steering wheel is turned to the left.

It will be understood of course, that the steering wheel  $A$  and the collar  $b'$  are keyed or otherwise securely fastened upon the shaft  $B$ , and that the pins  $p^2 p^3$  in the adjacent ends of sleeve  $P$ , constitute therewith, clutches for connecting and disconnecting the steering wheel and its shaft with said sleeve  $P$  and its pinion  $p$ .

$Q$  is a bell cranked lever fulcrumed to the front side of the frame directly underneath the shaft  $B$ , and having its horizontal arm connected by a rod  $q$  with the stem of the reversing valve  $n$ . Its vertical arm is forked and engages a circumferential rib  $p^4$  on sleeve  $P$ . In this way the endwise movement of said sleeve produced by turning the thread on shaft  $B$  in either direction, operates to

shift the reversing valve  $n$ . When the sleeve  $P$  is in its middle position upon the shaft  $B$ , as shown in Fig. 2, the valve  $n$  is also in its middle position, covering both the ports  $i i$ , and cutting off steam from both cylinders.

Referring to Figs. 7 and 8 in connection with Figs. 1 and 2,  $R R$  are brake straps placed around the peripheries of the crank wheels  $g g$ , and bolted on one side thereof to the frame. On the inner sides of said wheels, adjacent to the lever  $Q$ , they are divided and the ends extended and perforated vertically in line with each other. Bolts  $r$ , are inserted through these perforated ends and provided with springs  $r'$ , which tend to force the straps together against the peripheries of the crank wheels. Between the extended ends of the straps  $R R$  are placed cams or blocks  $S S$ , fixed on the ends of the pin  $s$ , upon which the bell crank lever  $Q$  is fastened and fulcrumed. Whenever the lever  $Q$  is turned in either direction from the position in which it is shown in Fig. 2, the blocks or cams  $S$  are tilted, as indicated by dotted lines in Fig. 8, thereby spreading the brake straps  $R$  and releasing the crank wheels  $g$ .

When the motor is employed to actuate the windlass or chain wheel  $C$ , the gear  $E'$  with which the pinions on the crank shafts engage, is locked with the gear  $E$  by a spring latch  $e$ , as shown in Fig. 2. When however, it is desired to disconnect the motor for any reason from the steering gear, the latch  $e$  is thrust back and held out of engagement with the gear  $E$  by passing a pin through a perforation or notch therein and a corresponding perforation in the web of gear  $E'$ . For the purpose of disengaging the latch  $e$  from the gear  $E$ , a perforation  $e'$  is formed in said gear, through which a pin or rod may be inserted by the pilot to force the latch back. For the purpose of rigidly connecting the steering wheel with the sleeve  $P$  and its pinion  $p$ , when it is desired to operate the steering gear in the ordinary manner through the steering wheel, the pins  $p^2$  are made to be projected outwardly into engagement with sockets formed for their reception at the ends of the arc-shaped slots  $a$ , and they are provided with cross rods or pins  $p^5$ , which project outwardly through slots in the sleeve  $P$ , in which they are held, as shown in Figs. 2, 3 and 6.

My improved steering gear operates as follows: When the steering wheel  $A$  is turned in either direction, as for instance, to the right, the sleeve  $P$  is moved by the screw on shaft  $B$  endwise thereon, and acts through the bell crank lever  $Q$ , to spread the straps  $R R$ , and release the crank wheel,  $g g$ , and to shift the valve  $n$ , and thereby admit steam into the cylinders  $N N$ . Steam being admitted to the cylinders of the engine through the proper ports to turn the crank shafts  $G$  to the right, acts through the pinion  $g'$ , gear  $E'$  and the gear  $E$  with which it is connected, to turn the windlass or chain wheel  $C$  to the left. The gear  $E$  engaging with pinion  $p$  at the same time, turns



the sleeve P to the right, thus tending to move it endwise upon the shaft B, back to its middle position, which it attains whenever the movement of the steering wheel A is arrested.

5 As soon as the sleeve P comes to its middle position, as specified, the valve *n* is also brought to its middle position, and steam is thus cut off from the cylinders of the engine and the movement of the chain wheel C instantly stopped. At the same time the brake straps R are released and allowed to engage the peripheries of the crank wheels *g*, thus preventing their being turned in either direction until they are again released. The steering wheel A is permitted to turn approximately a quarter of a revolution in either direction before the ends of the arc-shaped slots in its hub or in the collar *b'* will engage with the pins *p*<sup>2</sup> or *p*<sup>3</sup> in the ends of sleeve P, and 20 when the engine is of sufficient power to perform the duty required of it, the movement of the steering wheel A in either direction will be almost instantly followed up by that of the engine in the corresponding direction, so that actual engagement of the clutch devices on the steering wheel shaft B and sleeve P will not take place under ordinary conditions. In this way the engine, responding immediately to the movement of the steering wheel which controls the reversing valve *n*, 30 turns the chain wheel C in either direction, exactly as it would be turned by the corresponding movement of the steering wheel.

If for any cause the engine should be unequal to the duty placed upon it, hand power 35 will be automatically brought into requisition to assist it, because when the steering wheel is turned sufficiently in advance of the engine to cause the engagement of the pins *p*<sup>2</sup> or *p*<sup>3</sup> with the ends of the corresponding slots *a* or *b*<sup>3</sup>, the manual power of the pilot will be exerted through the pinion *p* and gear E to turn the chain wheel C in the same direction that the engine tends to turn it; or in case the 45 engine should suddenly fail to perform its duty, the steering gear would be actuated by the pilot through the steering wheel in the manner just explained.

In case it becomes desirable to disconnect 50 the engine and to operate the steering gear by the steering wheel in the ordinary manner, the latch *e* is moved and locked back out of engagement with the gear E, thus permitting the shaft D to turn freely in the gear E' with which the crank shafts of the engine are connected, and the pins *p*<sup>2</sup> *p*<sup>3</sup> are drawn forward by the cross rods *p*<sup>5</sup>, into engagement with the sockets at the ends of the slots *a*, in the hub of the steering wheel, thus readily 60 connecting the steering wheel with the pinion *p* which engages with and under these conditions drives, the gear E. The brake straps R being automatically closed against the peripheries of the crank wheels whenever the reversing valve is closed, lock the steering gear in any given position in which it may be stopped and firmly hold the rudder

in a corresponding position independently of the engine and steering wheel. In this way the rudder will not be displaced when struck 70 by heavy seas which would otherwise move it out of position, their force being too great to be counteracted by the engine.

Various changes in the details of construction and arrangement of the steering gear as 75 herein shown and described may be made within the spirit and intended scope of my invention.

I claim—

1. In a steering gear for boats, the combination of a windlass, a motor connected therewith, and a steering wheel capable of limited movement independently of the windlass and having a connection with the motor whereby its initial movement operates to start the motor, and a clutch automatically connecting 85 the steering wheel at the limits of its independent movement with said windlass, substantially as and for the purposes set forth.

2. In a steering gear for boats the combination of a windlass, a motor connected therewith, a steering wheel capable of limited movement independently of the windlass, and a connection between the steering wheel and motor whereby the initial movement of said 90 wheel operates to start the motor in either direction, substantially as and for the purposes set forth.

3. In a steering gear for boats, the combination of a windlass, a motor connected therewith, a steering wheel capable of limited movement without effect upon the windlass, and connections between the steering wheel and motor whereby the motor is started by the initial movement of said wheel in either 105 direction and is stopped automatically when the windlass is moved into a position corresponding with the position in which said wheel is stopped, substantially as and for the purposes set forth.

4. In a steering gear for boats, the combination of a windlass, a motor connected therewith, a steering wheel controlling the operation of the motor, and an automatic brake for holding the windlass in any given position in 115 which it is brought to rest, substantially as and for the purposes set forth.

5. In a steering gear for boats, the combination with a chain wheel or drum, of a motor connected therewith, a steering wheel having 120 a screw threaded shaft, a sleeve mounted upon said shaft in engagement with the threaded portion thereof and geared with said chain wheel or drum, a connection between said sleeve and motor, whereby the motor is automatically started and stopped by the initial movement of said wheel in either direction, and the consequent movement of the steering gear, substantially as and for the purposes set forth.

6. In a steering gear for boats, the combination with a chain wheel or drum, of an engine connected therewith, a reversing valve controlling the operation of the engine, a steering 130



wheel having a screw threaded shaft, a sleeve mounted upon said shaft in engagement with the screw thread thereon and geared with said engine or chain wheel, and a connection between said sleeve and valve, substantially as and for the purposes set forth.

7. In a steering gear, the combination with a suitable chain wheel or drum, of an engine connected therewith, a reversing valve controlling the operation of said engine, a steering wheel having a screw threaded shaft, a screw threaded sleeve mounted upon said shaft in engagement with the screw thread thereon and geared with said chain wheel or drum, an angular lever having at one end a tongued and grooved connection with said sleeve, and at the opposite end a connection with said valve, substantially as and for the purposes set forth.

8. In a steering gear for boats, the combination of a chain wheel or drum, a gear mounted upon the drum shaft, an engine connected with said gear, a reversing valve controlling the movement of said engine, a steering wheel having a screw threaded shaft, a screw threaded sleeve mounted upon said shaft in engagement with the screw thread thereon and provided with a gear engaging with the gear on the drum shaft, and a connection between said sleeve and reversing valve, substantially as and for the purposes set forth.

9. In a steering gear for boats, the combination with a suitable drum, of a gear fixed upon the drum shaft, an engine connected with said gear, a reversing valve controlling the movement of the engine, a steering wheel having a screw threaded shaft, a sleeve mounted upon said shaft in engagement with the screw thread thereon and provided with a gear engaging with the gear on the drum shaft, and with clutch formations adapted to engage corresponding clutch formations fixed upon the steering wheel shaft, and a connection between said sleeve and the reversing valve of the engine, substantially as and for the purposes set forth.

10. In a steering gear for boats, the combination of a suitable drum, a gear fixed upon the drum shaft, a similar gear loosely mounted thereon, a locking device for connecting it rigidly with the fixed gear, an engine connected with the loose gear, a reversing valve controlling the operation of the engine, a steering wheel having a screw threaded shaft, a screw threaded sleeve mounted upon said shaft in engagement with the screw thread thereon and provided with a gear engaging with the fixed gear on the drum shaft, and a connection between said sleeve and said reversing valve, substantially as and for the purposes set forth.

11. In a steering gear for boats, the combination of a suitable drum, fixed and loose gears mounted upon the drum shaft, a locking device for rigidly connecting said gears, a twin cylinder engine having two crank shafts

geared with said loose gear, a steering wheel having a screw threaded shaft, a threaded sleeve mounted upon said shaft in engagement with the screw thread thereon and provided with a gear engaging with the fixed gear of the drum shaft, and a reversing valve controlling the operation of said engine connected with said sleeve, substantially as and for the purposes set forth.

12. In a steering gear for boats, the combination with a suitable drum or windlass, of a motor having a detachable connection therewith, a steering wheel connected with and controlling the operation of said motor and also having a connection with said drum or windlass but capable of a limited movement independently thereof, and a locking device by which said steering wheel may be directly geared with said drum or windlass when the motor is disconnected, substantially as and for the purposes set forth.

13. In a steering gear for boats, the combination with a suitable drum or windlass, of a motor geared therewith, a steering wheel connected with and arranged to start said motor in either direction, a brake operating normally upon some part of the steering gear to hold the same in a given position, and a connection with the steering wheel whereby said brake is released by the initial movement of said wheel in either direction, substantially as and for the purposes set forth.

14. In a steering gear for boats, the combination with the steering wheel of a brake applied to some convenient part of the steering gear and comprising a wheel, an expansible strap placed around the periphery of said wheel and held in engagement therewith by a spring, and a cam connected with the steering wheel, the initial movement of which in either direction, operates through it to spread the brake strap out of engagement with the periphery of the brake wheel, substantially as and for the purposes set forth.

15. In a steering gear for boats, the combination with a suitable drum or windlass, of an engine connected therewith, a reversing valve controlling the operation of the engine, a steering wheel connected with said drum or windlass but capable of a limited movement independently thereof, a brake operating normally upon some part of the steering gear to hold it immovable in a given position, and connections between said brake and reversing valve and the steering wheel whereby the initial movement of the latter in either direction operates first to release said brake and then to open said valve, substantially as and for the purposes set forth.

16. In a steering gear for boats, the combination with a suitable drum or windlass of two crank shafts geared therewith, a vertical twin cylinder engine having its piston rods connected with said crank shafts, and valve actuating levers fulcrumed to a fixed support and connected at opposite ends with the



piston rods and main valve rods of the engine, substantially as and for the purposes set forth.

17. In a steering gear for boats, the combination with a suitable drum or windlass and a steering wheel, of a vertical twin cylinder engine, having its piston rods connected by suitable gearing with said drum or windlass, valve actuating levers fulcrumed to a common fixed support and connected at their opposite ends with the piston rods and main

valve rods of the engine, and a reversing valve controlling the operation of the engine connected with said steering wheel, substantially as and for the purposes set forth.

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

MATTHIAS A. BECK.

Witnesses:

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CHAS. L. GOSS.