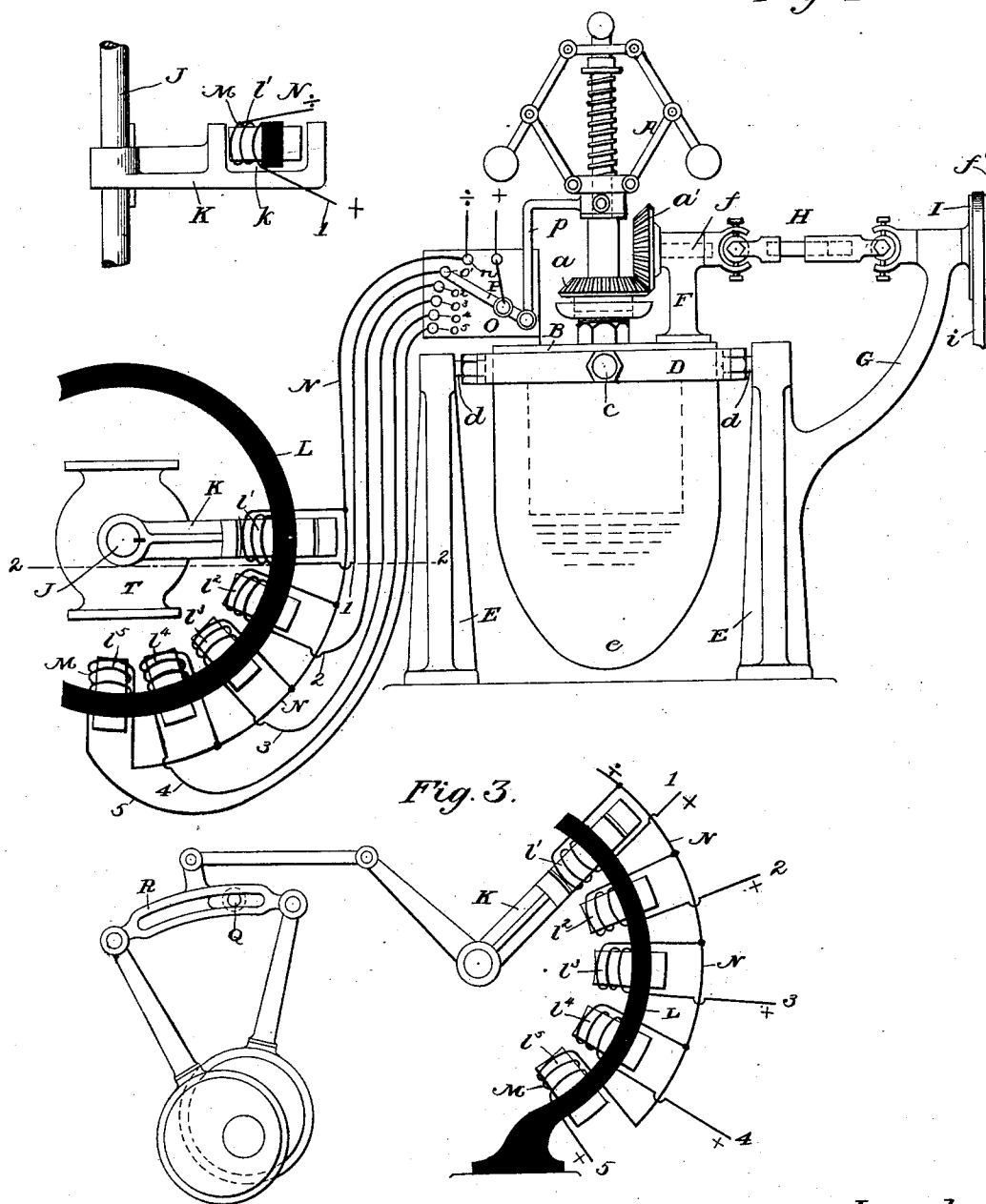


C. W. LARSON.
ELECTRIC SPEED REGULATOR.

Patented Nov. 12, 1895.

Fig. 1.



Witnesses.
Edw. P. Durall, Jr.
J. A. Paul.

Inventor.
Carl W. Larson,

By Frankland James Atty.

UNITED STATES PATENT OFFICE.

CARL W. LARSON, OF SCHENECTADY, NEW YORK, ASSIGNOR OF ONE-HALF
TO WALTER N. SHEAFF, OF LYNN, AND AMOND U. JAASTED, OF BOSTON,
MASSACHUSETTS.

ELECTRIC SPEED-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 549,874, dated November 12, 1895.

Application filed April 8, 1895. Serial No. 544,989. (No model.)

To all whom it may concern:

Be it known that I, CARL W. LARSON, a
subject of the King of Norway and Sweden,
residing at Schenectady, in the county of
5 Schenectady and State of New York, have
invented certain new and useful Improve-
ments in Electric Speed-Regulators, of which
the following is a description, reference being
had to the accompanying drawings, and to
10 the letters and figures of reference marked
thereon.

My invention relates to improvements in
engine-governors, which, while capable of
wide application, is intended more particu-
15 larly for that class of governors designed to
be applied to marine engines, or in any posi-
tion or for any use involving a moving sup-
port for the mechanism to be controlled. The
characteristic features of novelty comprise
20 the combination, with a centrifugal governor
sustained in bearings which permit it to main-
tain a vertical position unaffected by move-
ment of its support, of a series of electromag-
nets the circuits of which are controlled by
25 the governor, and an armature in the field of
the said magnets and connected to and ar-
ranged to operate controlling parts of the en-
gine or machine the operation of which is to
be regulated—as, for instance, the throttle-
30 valve or the links.

An important application of the invention
is the prevention of injurious racing in ma-
rine engines when through the pitching of
the vessel the propeller is lifted out of the
35 water. Other uses will suggest themselves.

In the accompanying drawings, Figure 1
shows the governor, its supports, and driv-
ing mechanism in elevation; also the electro-
magnets and their circuits in diagram. Fig.
40 2 is an elevation, partly in section, on the
line 2 2 of Fig. 1. Fig. 3 is a diagrammatic
view of the electromagnets and their arma-
ture as applied to the operation of valve-con-
trolling links.

45 As seen in Fig. 1, A is a centrifugal gov-
ernor of any well-known type, provided in this
instance with a bevel-gear *a* and mounted in
the frame B, which is carried on oppositely-
placed pins C C, fixed to an exterior frame
50 D, which is in turn similarly mounted on pins
d d, placed at right angles to the pins C C

and secured to the fixed supports E E, form-
ing gimbals and providing for universal move-
ment of the governor and parts attached
thereto. A suitable counterweight *e* extends 55
downward between the supports E E and will
keep the governor A always in vertical posi-
tion.

Suitable driving mechanism for the gover-
nor may, as shown, comprise a bevel-gear *a'*, 60
meshing with the gear *a* and mounted upon
a shaft *f*, carried in suitable bearings in stand-
ard F, which is fixed to the base B of the gov-
ernor inside of the frame D. A correspond-
ing shaft *f'*, normally in line with shaft *f*, is 65
mounted in bearings at the extremity of an
arm G, extending from or moving with the
fixed supports E E. An extensible univer-
sal joint H connects the shaft *f f'*, and the
latter is provided with a pulley I, to which ro- 70
tation is imparted to drive the governor by a
belt *i*, sprocket-chain, gears, or the like, con-
nected with some suitable part of the engine
in the ordinary manner.

It will be apparent that when arranged sub- 75
stantially as just described the governor will
remain vertical and respond to the variations
in speed of its engine through a wide range
of change of position.

J, Figs. 1 and 2, is the stem of a throttle- 80
valve, to which is affixed the armature-lever
K, the outer end of which is of magnetic
metal and preferably formed with a recess *k*.

L is a bar curved to the radius of the path 85
of the lever K and is of insulating or insu-
lated material.

Any desired number of separate electromag-
nets, five only being shown, *l' l'' l''' l'''' l'''''*, are se-
cured to the bar L in such proximity that
the attractive force of one magnet when fully 90
magnetized will be sufficient to draw the ar-
mature into its field when its immediate
neighbor is demagnetized, thereby moving to
the desired extent the controlling part of the
engine to which it is attached. As illustrated, 95
the cores of the electromagnets are sufficiently
shorter than the recess *k* to pass freely there-
through, allowing the ends of said recess to
extend up in front of the poles of said mag-
nets to close the magnetic circuit. I do 100
not, however, confine myself to the details of
the construction shown, as many substantial

equivalents will suggest themselves to the electrician, should change in form be necessary or desirable.

The electromagnets l' , &c., are wound with magnetizing-coils M, the inner ends of which are all connected to a common return N, which is represented on the switchboard O, also carried by and moving with the frame which supports the governor by contact n , connected to the negative side of the supply-circuit. Conductors 1 2 3 4 5, connected to the outer terminals of successive magnetizing-coils M, lead to the contacts $O^1 O^2 O^3 O^4 O^5$ on the said switchboard. A pivoted lever P, itself connected to the other side of the supply-circuit, is arranged to make contact with the terminals on the switchboard and is connected to the vertically-moving part of the governor A by link P, the governor and switchboard being in fixed relation. As the balls of the governor move in or out, according to variations of speed, the link p will move the lever P onto or away from the contacts O' , &c., and if, for example, the speed be progressively increased beyond the maximum for which the governor is set the lever P will be moved progressively, closing the circuit of one magnet after the other and opening the circuit of the one just passed. This will result in moving the armature K from in front of one magnet to the next to suitably adjust the position of the block Q in the link R, Fig. 3, or close or partly close the throttle T, Fig. 1, and vice versa.

The above-described construction may be modified by those skilled in the art to meet special conditions of structure or location without departing from the invention.

Having described my invention, what I claim is—

1. The combination with an engine, of a counterbalanced governor therefor mounted in universally moving bearings upon a fixed support, yielding power connections between

the engine and the governor, and means actuated by the governor for controlling the speed or power of the engine.

2. The combination with an engine carried upon a movable or moving support, as a marine engine, of a counterbalanced governor mounted in universally moving bearings upon supports in fixed relation to its engine, yielding power connections between the engine and governor, a series of electro magnets, an armature therefor, means for controlling the engine connected to the armature, and a switch lever actuated by the governor to open and close the circuits of the electro magnets and vary the position of the armature in accordance with the movements of the governor.

3. The combination with a marine engine, of a counterbalanced governor mounted in universally moving bearings upon a fixed support, and flexible and extensible power connections between the engine and governor.

4. The combination with a marine engine, of a counterbalanced governor mounted in universally moving bearings upon a fixed support, and yielding power connections between the engine and governor.

5. In combination, an engine, an armature lever connected with a controlling part thereof, a series of electro magnets arranged in the path of said armature, a switch board having insulated terminals, circuit connections between each electro magnet and the switchboard terminals, a switch lever adapted to engage the terminals on the switchboard and connected to a source of current, a counterbalanced speed governor for the engine, and connections between the governor and switch lever.

In testimony whereof I hereto affix my signature in presence of two witnesses.

CARL W. LARSON.

Witnesses:

C. G. HULTH,

ERASTUS C. CLEIMSHIRE.