

No. 769,916.

PATENTED SEPT. 13, 1904.

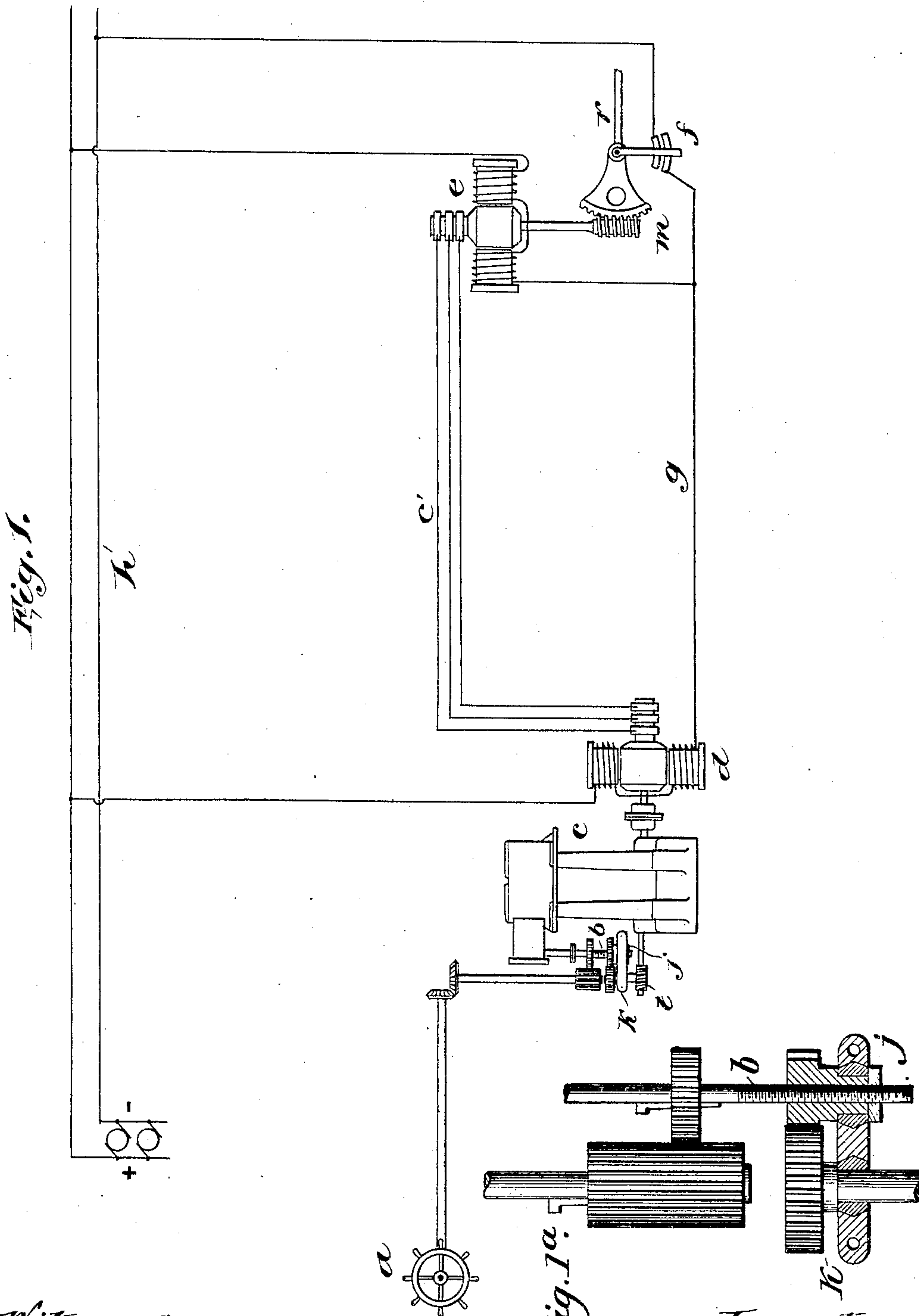
M. PFATISCHER.

TELEMOTOR FOR STEERING SHIPS OR OTHER USES.

APPLICATION FILED DEC. 21, 1900.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:
 C. M. Benjamin
 Henry S. Norton.

Inventor,
Matthias Pfaticher.
by Thos. W. Brown atty

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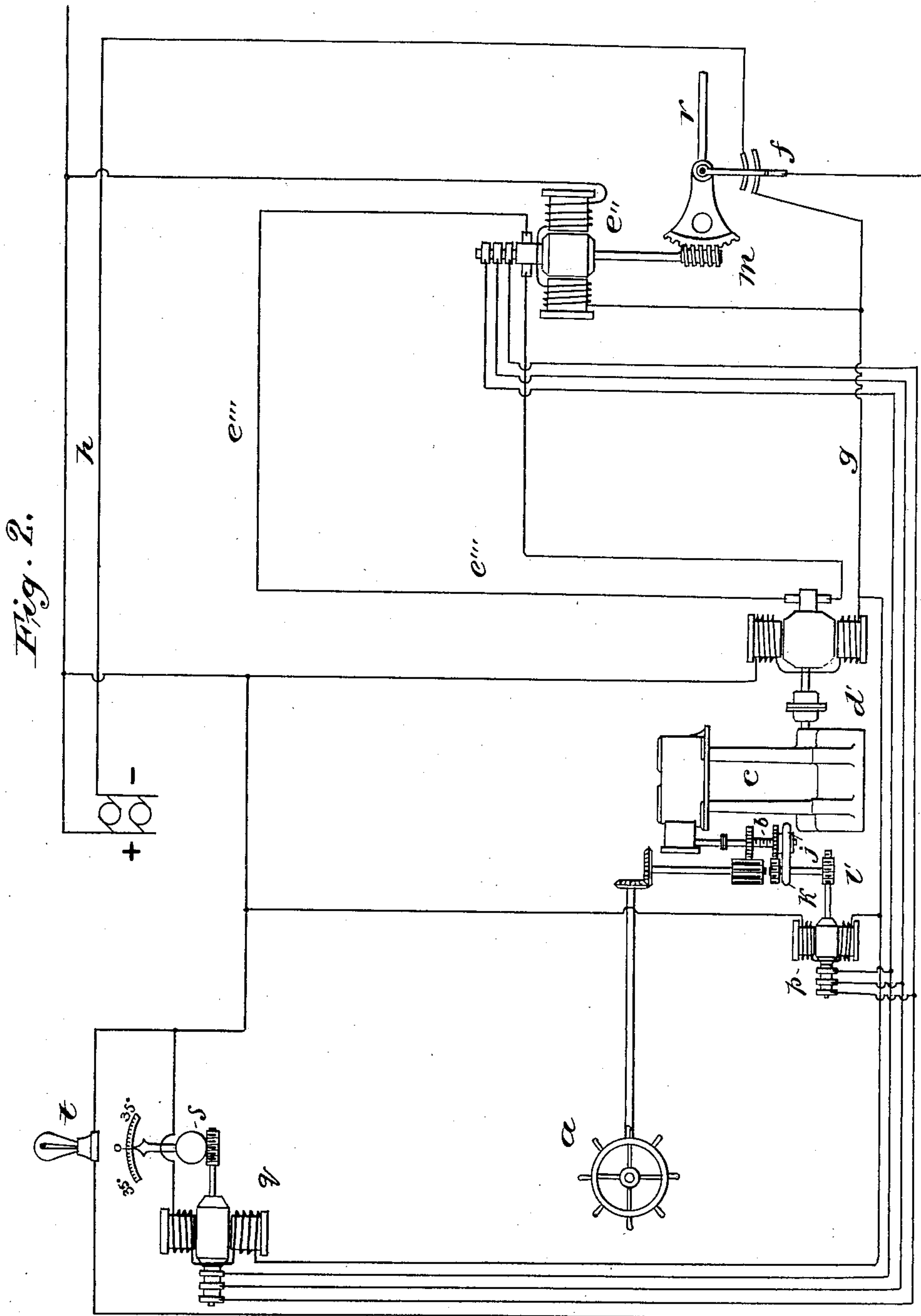
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2 SHEETS—SHEET 2



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UNITED STATES PATENT OFFICE.

MATHIAS PFATISCHER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO THE ELECTRO DYNAMIC COMPANY OF PHILADELPHIA, PENNSYLVANIA.

TELEMOTOR FOR STEERING SHIPS OR OTHER USES.

SPECIFICATION forming part of Letters Patent No. 769,916, dated September 13, 1904.

Application filed December 21, 1900. Serial No. 40,638. (No model.)

To all whom it may concern:

Be it known that I, MATHIAS PFATISCHER, electrical engineer, of Philadelphia, Pennsylvania, have invented certain new and useful
5 Improvements in Telemotors for Steering Ships or for other Uses Where it is Desirable to Adjust Apparatus from Some Distance, of which the following is a specification.

Accompanying this specification are drawings which illustrate the invention as particularly designed and adapted for use in the steering of ships; but the invention is by no means limited to the forms and mechanisms therein shown.

15 The object of the invention is to produce apparatus which shall combine a great degree of reliability of action with ease of operation, simplicity of construction, and economy, so far as economy is consistent with these other
20 objects.

The art in which the present invention forms an improvement includes several forms in which apparatus is adjusted from a distance, not by a direct connection, but by a prime motor which produces either mechanical movement or some other form of energy, and a transmitting apparatus which transmits the energy in a convenient form—as for example, by the
30 movement of wire ropes or the movement of water, glycerin, or other fluids through pipes or the flow of current in an electric circuit—to a secondary motor which more directly controls and adjusts the apparatus that is to be adjusted. Examples of such tele-
35 motor systems are found in my own earlier United States patents, No. 559,903 and No. 559,904, both dated May 12, 1896.

The present improvement combines, with the apparatus to be adjusted and with the
40 prime motor therefor, suitable means, such as a steering-wheel, for causing the prime motor to start in either direction at will and suitable means for transmitting power derived from the prime motor and causing it to
45 control and adjust the apparatus to be adjusted.

In the drawings, Figure 1 is a diagrammatic view showing the improvement embodied

in a simple form, Fig. 1^a showing a portion in section. Fig. 2 is a further development of the same form in which certain
50 additional objects are accomplished.

For the purposes of illustration the invention is shown as designed and adapted to control the rudder *r* of a ship from the steering-
55 wheel or other suitable manual means *a* upon the bridge of the ship.

Considering first Fig. 1, a double-cylinder steam-engine *c*, with cranks set at ninety degrees and preferably located in the dynamo-
60 room of the ship, is directly connected to drive an electric generator *d*, the field-magnets of which may be excited by a branch circuit *g*, derived from the circuit of the ship's lighting plant *h* or from any other suitable
65 source. The controlling-valve of the steam-engine is directly or indirectly controlled by the hand-wheel *a*—as, for example, by the mechanical connections shown, which com-
70 prise a screw-threaded valve-stem *b*, which is turned by the hand-wheel *a*, as shown, and an internally-screw-threaded sleeve *j*, which is mounted to rotate in the fixed bearing *k*, but cannot move longitudinally
75 therein. When, therefore, the hand-wheel is turned in one direction or the other, the valve-stem *b* is rotated, and thereby screwed up or down within the sleeve *j*, so as to adjust
80 the valve in a corresponding direction, and thereby cause the generator *d* to be driven in the same direction. The common shaft of the generator *d* and the engine or prime motor *c* is provided with connections, such as the worm-wheel *l* and the gearing, as illustrated, for rotating the sleeve *j* in the direction necessary
85 to thereby adjust the controlling-valve of the engine, so as to bring it to rest. Consequently when the hand-wheel *a* is turned the engine starts to operate in a direction corresponding to the movement of the hand-wheel and continues to run and operate until the controlling-
90 valve is again closed automatically and the engine stopped by the rotation of the sleeve *j*.

The rudder *r* may be directly adjusted by the motor *e*, the field-magnets of which are
95 constantly excited, preferably from the ship's

lighting-circuit h , and the shaft of the rudder of which may be connected by a worm and worm-wheel sector to turn the rudder. The armatures of the generator d and motor e are connected by a closed circuit. The generator and motor are of the synchronous type in order that as soon as the generator is well started the motor shall operate at a corresponding speed. When the generator is started by means of the hand-wheel a and the engine or prime motor c , as described, the motor e operates to turn the rudder in a direction and to an extent corresponding to the total movement of the engine c , and therefore also corresponding to the total adjustment that has been given to the hand-wheel a . By means of this system, therefore, the movements of the wheel a will be imitated by the rudder exactly, so far as the direction of adjustment is concerned, and very nearly to a proportional or corresponding extent. While starting up the motor may lag behind the generator a few revolutions. To prevent any possibility of the rudder being adjusted or turned beyond its proper limit of movement, an emergency or stopping device is provided at f , consisting of a switch-arm connected to turn with the rudder, which moves along interposed contacts in the circuit of the field-magnet coils of the generator d or motor c , or both, as shown, so as to break the circuit when the rudder moves to its desired limit of motion in either direction.

In Fig. 2 some additional features and also some preferred modifications are shown. The rotary sleeve j is not driven directly from the generator c , but by means of a separate synchronous motor p , the field-magnet coils of which should be constantly excited and the armature of which is in synchronous connection with the armature of the motor e'' , which actuates the worm and worm-wheel sector m of the rudder r . Consequently the sleeve j moves in exact correspondence with the movement of the rudder. An indicator s , driven by a similar synchronously-connected motor q and placed upon the bridge or immediately above the steering-wheel a , indicates accurately the position of the rudder. The generator d' may be connected by the circuit e''' to drive the motor e'' without any regard to synchronism, because the engine c will be stopped by the motor p only when the rudder has reached the desired position corresponding to the movement that has been given to the wheel a , and it would not matter whether the engine c and the generator d' made many more turns than the motor e'' .

The operation of the apparatus shown in Fig. 2 is as follows: Supposing the rudder is central and it is desired to turn the ship's head to starboard, the wheel a is turned in the proper direction, and thereupon the controlling-valve of the engine is opened and the engine drives the generator d' , sending current through the circuit e''' and simultaneously ac-

tuating the three synchronously-connected motors e'' , p , and q . This causes the rudder to turn to starboard—that is to say, the helm going to port and the ship's head to starboard. This movement of the rudder continues until the motor p , turning the screw-sleeve j , shuts the controlling-valve. Meanwhile the indicator s has shown the position that the rudder has reached. If the steering-wheel a is turned farther in the same direction, the rudder will go still farther to starboard until the engine is again brought to rest. In other words, the rudder and its indicator s follow the movement of the wheel a . When the ship's head is swung sufficiently, the steering-wheel is turned back to its initial position to bring the rudder amidships. Similarly, the wheel may be turned to bring the ship to port, the operation being in all respects similar, but merely in a reverse direction than that required for starboard. In Fig. 2 it is also shown that a pilot-light t may be provided for illuminating the indicator s . The circuit of this lamp may be through the safety-switch f , so that if the rudder is turned too far in one direction or the other the lamp t will go out and notify the steersman accordingly. Any number of similar indicators s may be placed at different parts of the ship—for example, in the captain's and the chief engineer's cabins.

While the foregoing description and drawings have set forth the invention as applied particularly to the steering of a ship and the transmission of the power from the prime motor c to the rudder mechanism by electricity, I of course contemplate the use of the invention in a similar manner for training guns, controlling search-lights and signals, operating electric cranes and derricks, and for a great many other uses which will be apparent to engineers skilled in the related art. It is also obvious that under some conditions, though I believe with less advantage, hydraulic transmission, rope transmission, and other means of transmitting energy from one point to another may be employed in place of electric transmission.

By the term "motors" where used alone I do not mean to limit the sense to electric motors unless the context requires it.

The characteristic features that I claim as novel, and desire to secure in order to fully protect my invention, are the following:

1. In combination with apparatus to be adjusted, an electric motor for adjusting it, an electric generator connected to actuate the motor, means for starting the generator by power in either direction at will, and means connected to be positively actuated with the motor for stopping the generator, substantially as set forth.

2. In combination with apparatus to be adjusted, an electric motor for adjusting it, an electric generator connected to actuate the motor, means for starting the generator at

will, and an electric motor synchronously connected with the said motor and having positively-actuated connections for stopping the adjusting operation, substantially as set forth.

5 3. In combination with apparatus to be adjusted, an electric motor for adjusting it, an electric generator connected to actuate the motor, means for starting the generator at will, and an indicating device and motor there-
10 for connected synchronously with the said motor for indicating the adjustment, substantially as set forth.

4. In combination with apparatus to be adjusted, an electric motor for adjusting it, an
15 electric generator connected to actuate the motor, means for starting the generator at will in either direction, means for automatically stopping the adjustment, and a safety-switch connected in circuit for stopping the
20 adjustment at a fixed limit, substantially as set forth.

5. In combination with apparatus to be adjusted, an electric motor for adjusting it, an electric generator connected to synchronously
25 operate with the said motor, means for starting the generator at will, and means connected to be actuated with the motor for stopping the generator, substantially as set forth.

6. In combination with apparatus to be ad-
30 justed, and with a prime valved motor therefor, means for adjusting the valve of the motor to start it, electrical means for converting and transmitting energy therefrom, a second motor connected to be actuated by the said trans-
35 mitted energy for adjusting the said apparatus to be adjusted, and automatic means for positively readjusting the said valve to stop the said valved motor, substantially as set forth.

7. In combination with apparatus to be ad-
40 justed, and with a prime valved motor therefor, means for adjusting the valve of the motor to start it, electrical means for converting and transmitting energy therefrom, a second motor connected to be actuated by the said
45 transmitted energy for adjusting the said apparatus to be adjusted, and means for readjusting said valve substantially synchronously with the movement of the said apparatus, substantially as set forth.

50 8. In combination with apparatus to be adjusted, and with a prime valved motor therefor, means for adjusting the valve of the motor to start it, means for converting and transmitting energy therefrom, a second motor
55 connected to be actuated by the said transmitted energy for adjusting the said apparatus to be adjusted, and a third motor connected to be actuated simultaneously with the said second motor, and positively connected to ad-
60 just the said valve to stop the said valved motor, substantially as set forth.

9. In combination with apparatus to be ad-
justed, and with a prime valved motor there-
for, means for adjusting the valve of the motor
to start it, means for converting and trans- 65
mitting energy therefrom, a second motor
connected to be actuated by the said trans-
mitted energy for adjusting the said apparatus
to be adjusted, and a third motor connected
to be actuated simultaneously with the said 70
apparatus to be adjusted, and an indicating
device controlled thereby, substantially as set
forth.

10. In combination with apparatus to be ad-
justed from a distance, a prime motor there- 75
for, electrical means for transmitting motion
from the motor to the said apparatus to be ad-
justed, a manually-actuated mechanism for
starting and controlling the direction of op-
eration of the said motor, and positively-act- 80
ing means actuated, at least indirectly, by the
motor for stopping it, substantially as set
forth.

11. In combination with apparatus to be ad-
justed, an electric motor for adjusting it, an 85
electric generator connected to actuate the
motor; means for stopping the generator, and
means positively actuated synchronously with
the motor for operating said stopping means.

12. In combination with apparatus to be ad- 90
justed, an electric motor for adjusting it, an
electric generator connected to actuate the
motor, means for starting the generator at
will, means for stopping the generator, and a
second electric motor connected to the gen- 95
erator and actuated synchronously with said
first-named motor for positively actuating said
stopping means.

13. In combination with apparatus to be ad-
justed, a prime motor, an electric generator 100
driven by said prime motor, an electric motor
connected to said generator for adjusting said
apparatus, a second electric motor connected
to said generator, and a positively-actuated
connection between said second electric motor 105
and said prime motor for stopping the latter.

14. In combination with apparatus to be ad-
justed, a prime motor adapted to produce ro-
tation in either direction, an electric genera- 110
tor driven by said prime motor, electric mo-
tors connected to said generator for synchro-
nous operation thereby, means on one of said
motors for adjusting said apparatus, and means
on another of said motors and positively con- 115
nected with said prime motor for stopping the
latter.

Signed this 5th day of December, 1900, at
Philadelphia.

MATHIAS PFATISCHER.

Witnesses:

A. P. RUTHERFORD,

H. B. RUTHERFORD.