No. 711,743.

Patented Oct. 21, 1902.

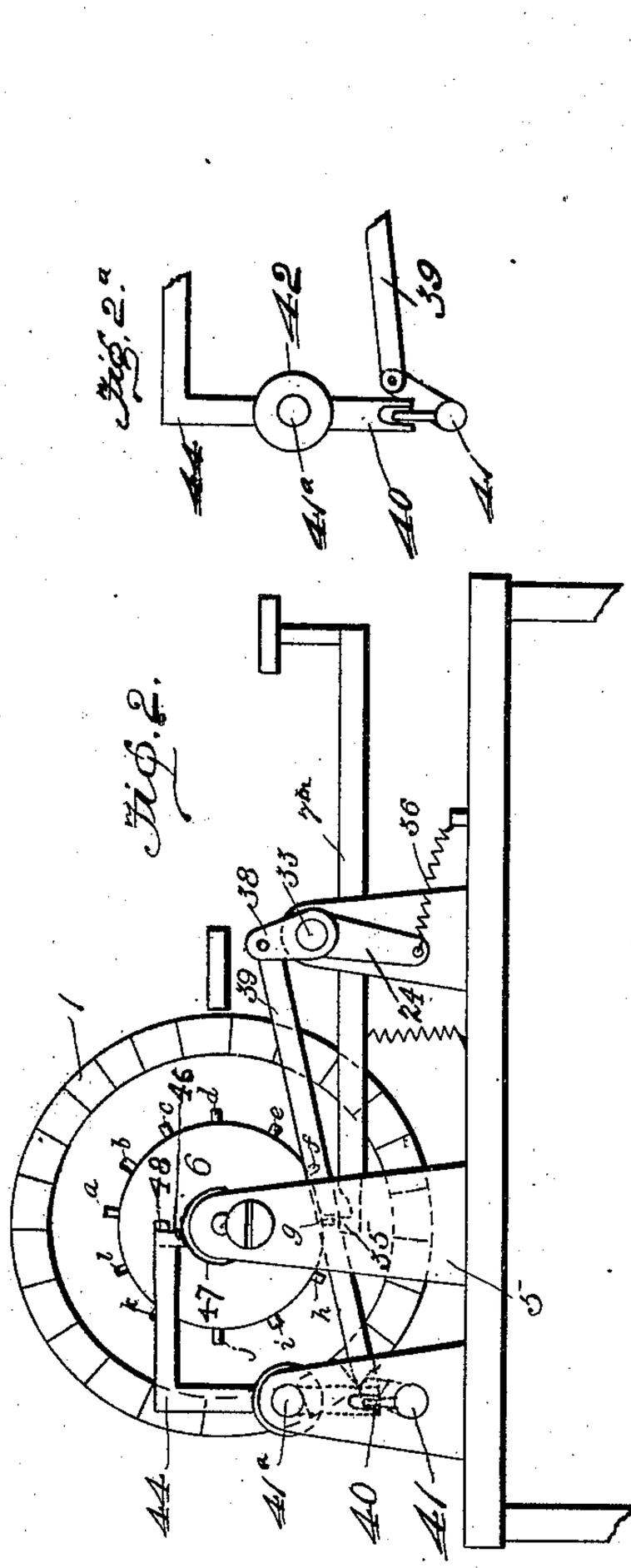
H. SHOEMAKER.

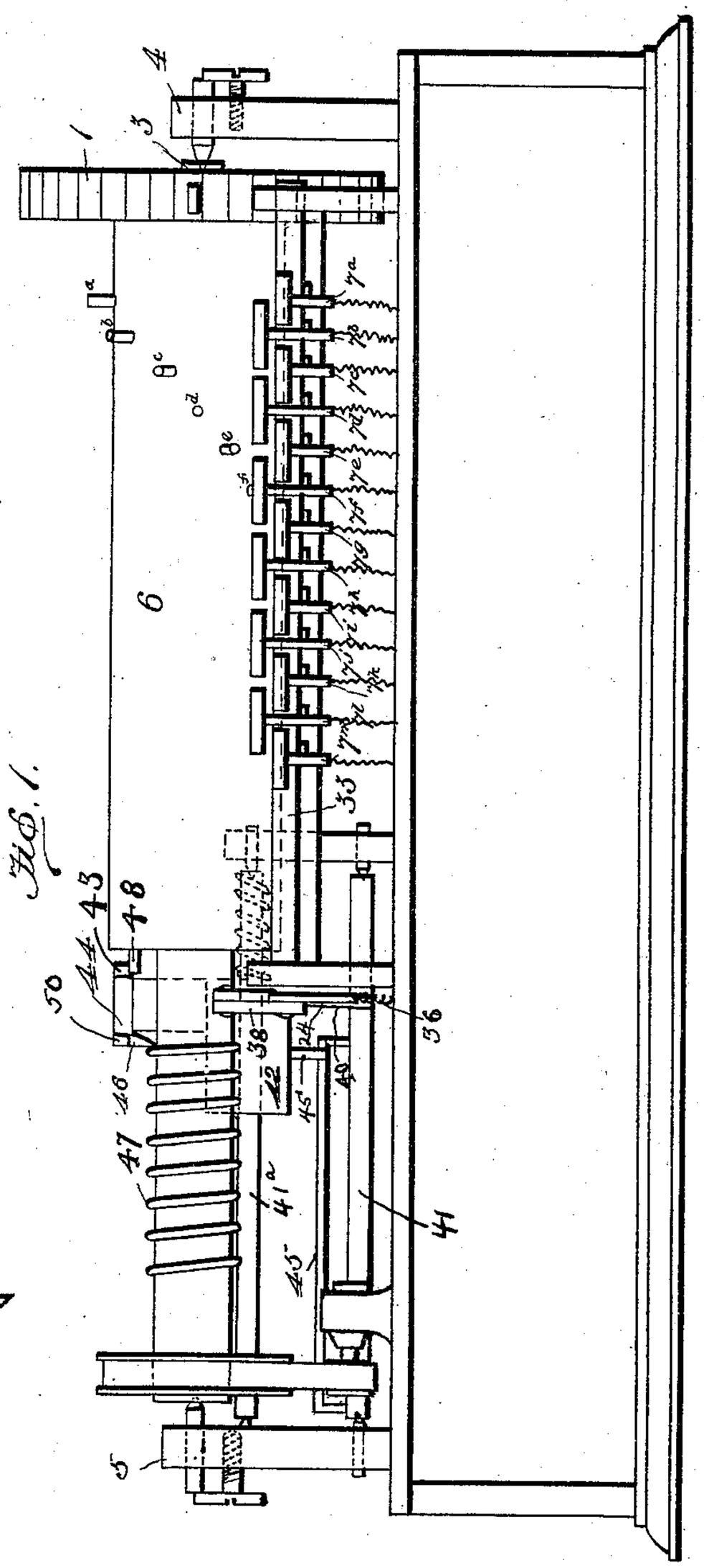
TELAUTOMOTOR.

(Application filed Apr. 12, 1901.)

(No Model.)

8 Sheets—Sheet 1.





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8 Sheets—Sheet 2.

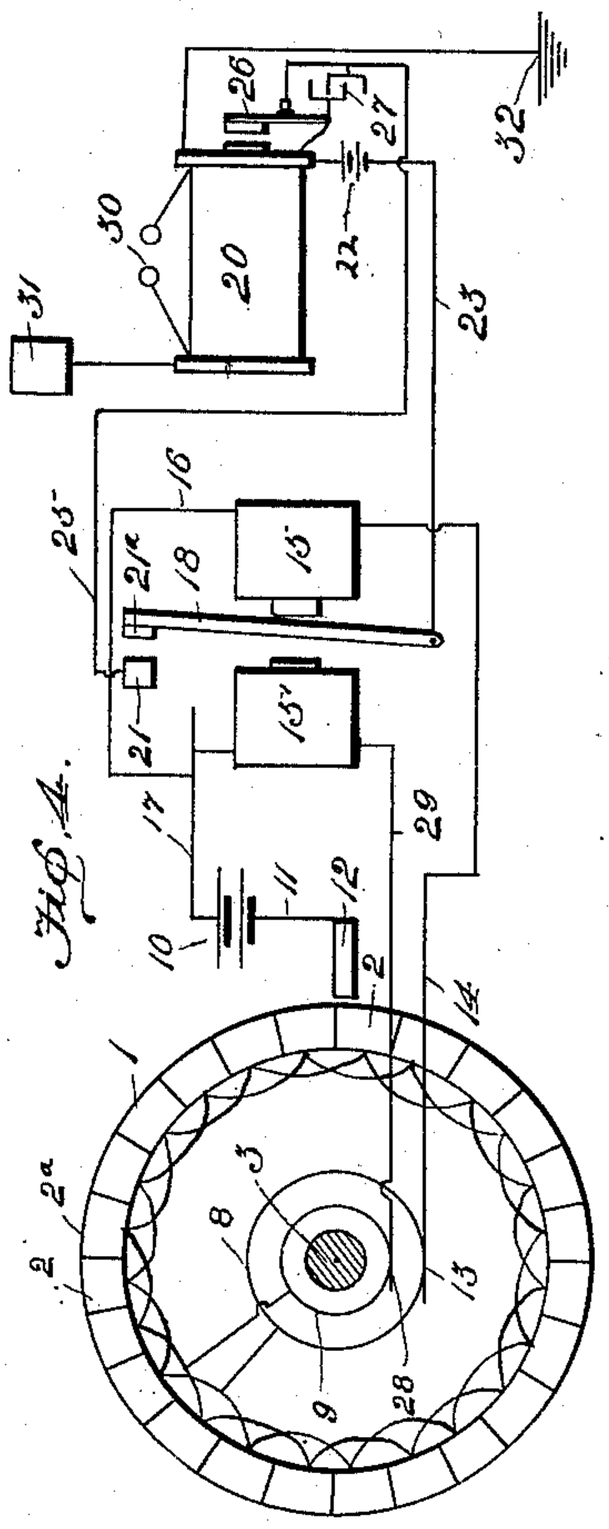

Fig. 4.

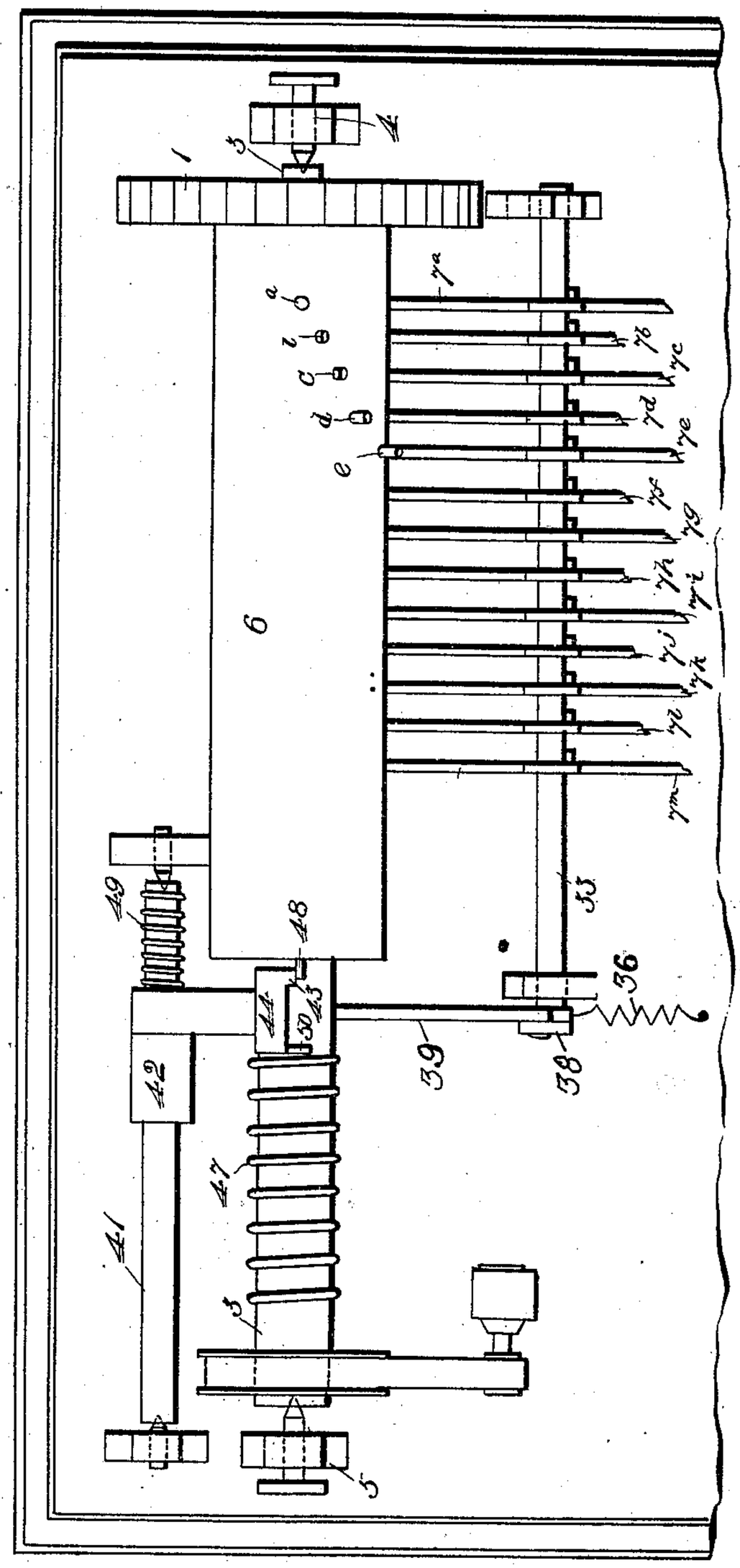

Fig. 5.

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(No Model.) 8 Sheets—Sheet 3.

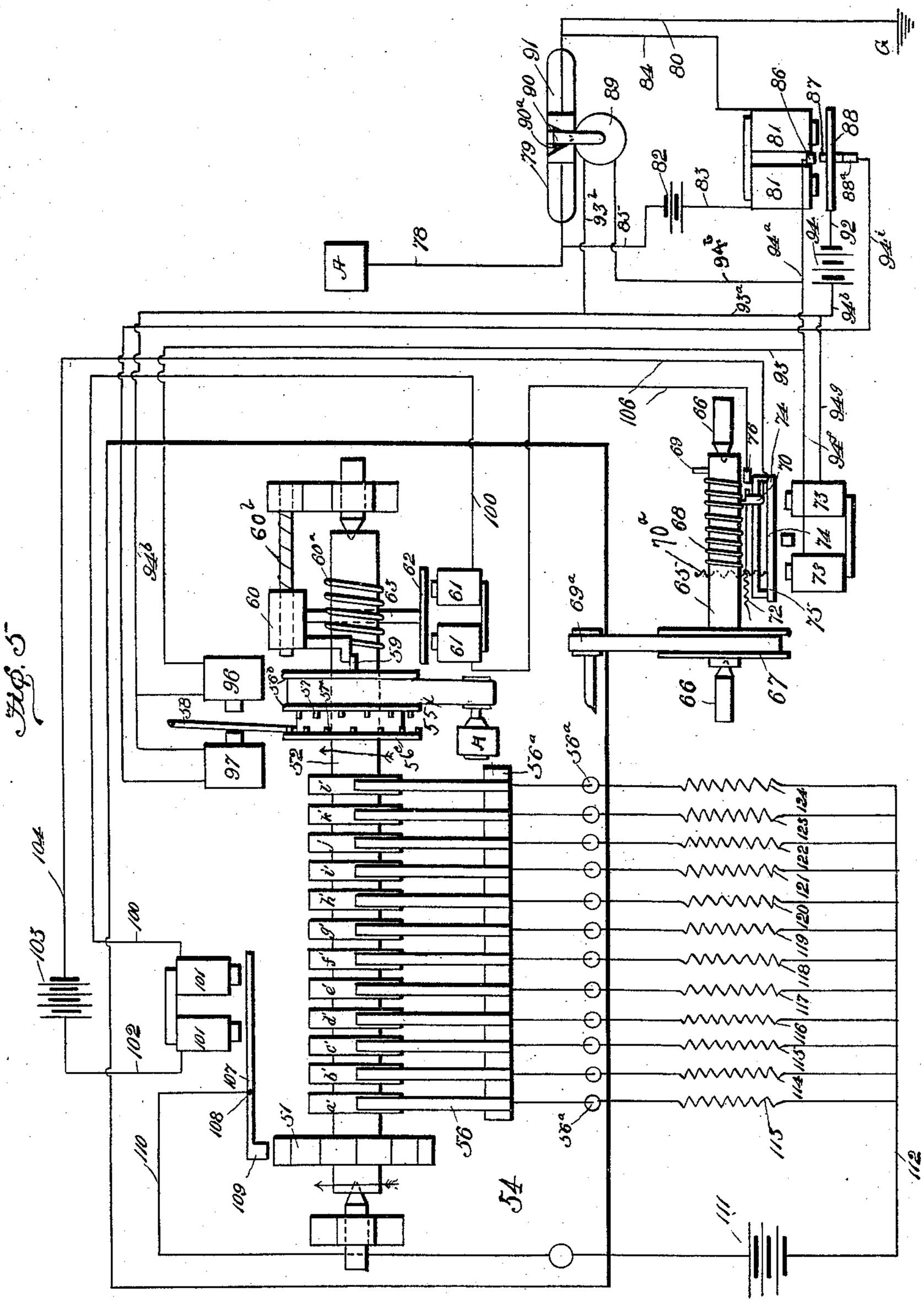

Fig. 5.

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(Application filed Apr. 12, 1901.)

(No Model.) 8 Sheets—Sheet 4.

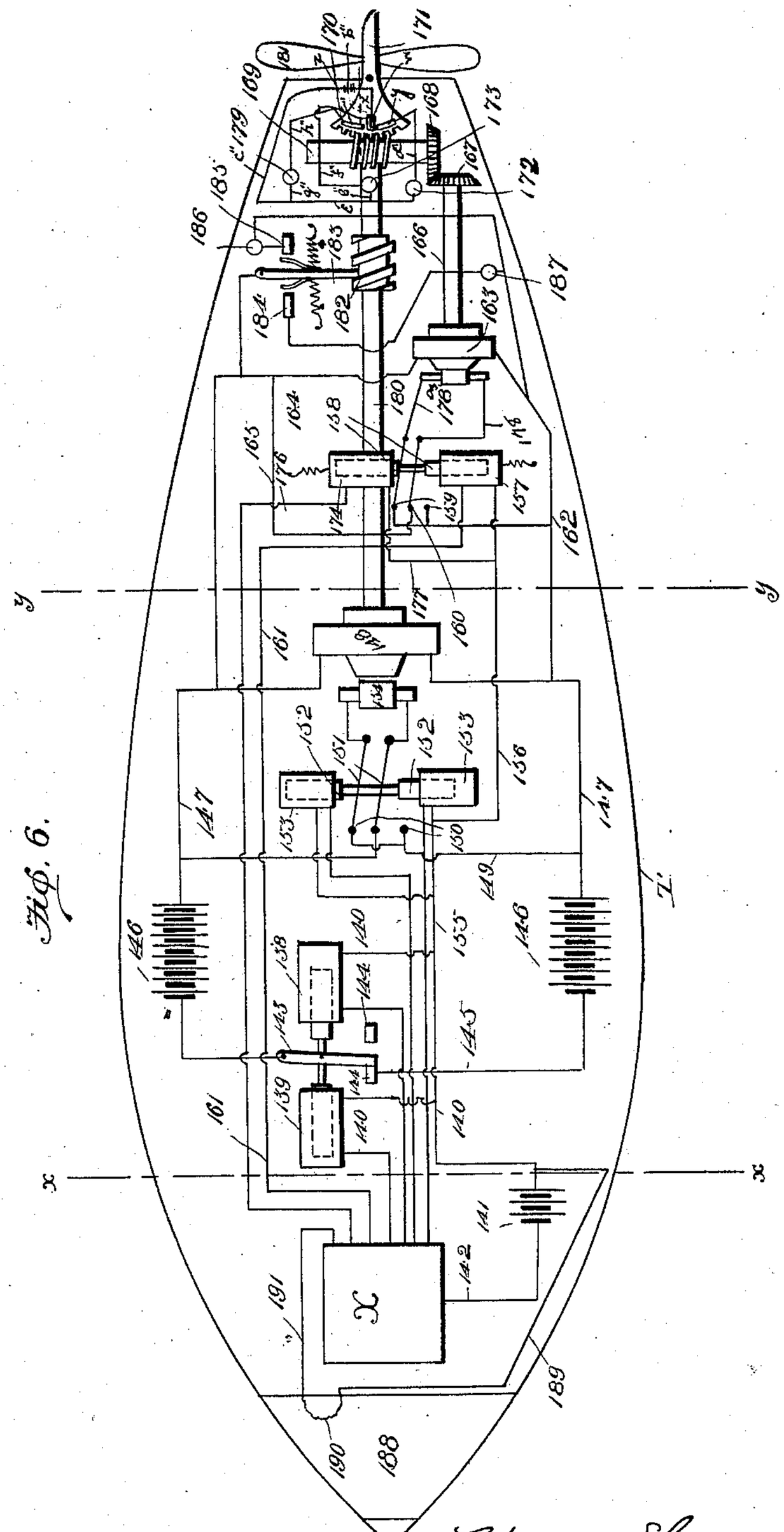

Fig. 6.

Witnesses
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(Application filed Apr. 12, 1901.)

(No Model.) 8 Sheets—Sheet 5.

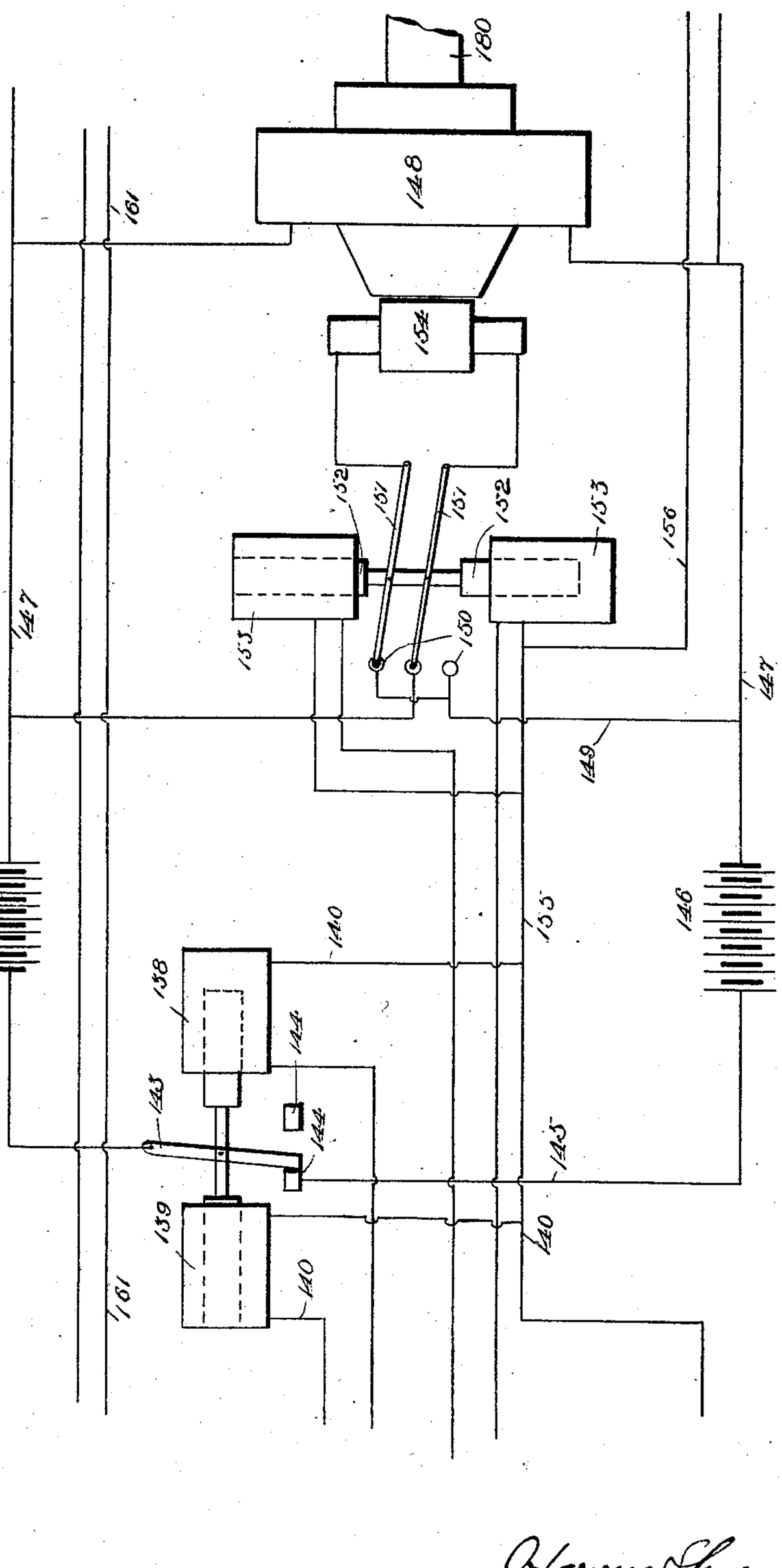

Fig. 7.

Witnesses
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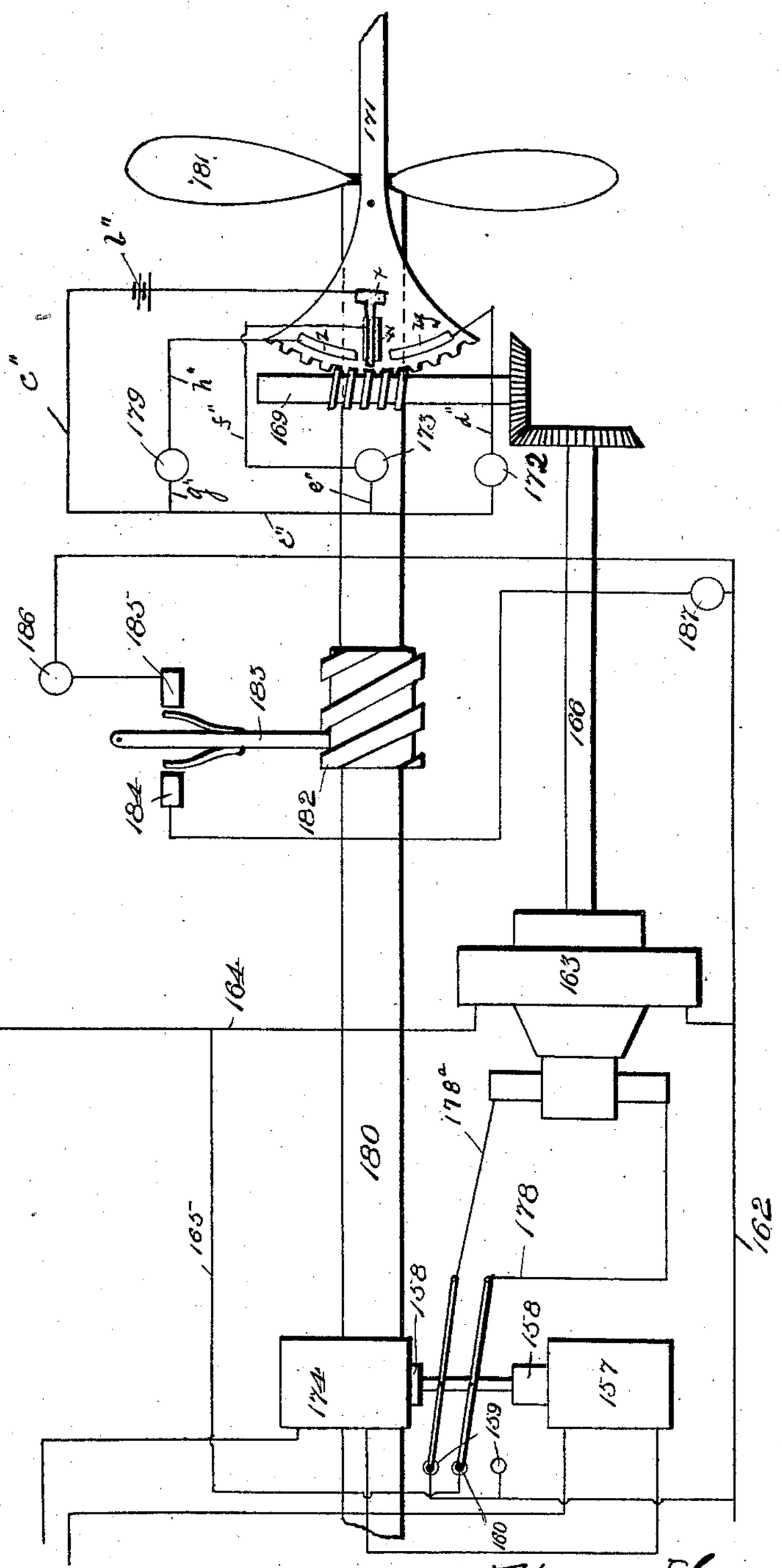
TELAUTOMOTOR.

(Application filed Apr. 12, 1901.)

(No Model.) 8 Sheets—Sheet 6.

Fig. 8.



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TELAUTOMOTOR.

(Application filed Apr. 12, 1901.)

(No Model.)

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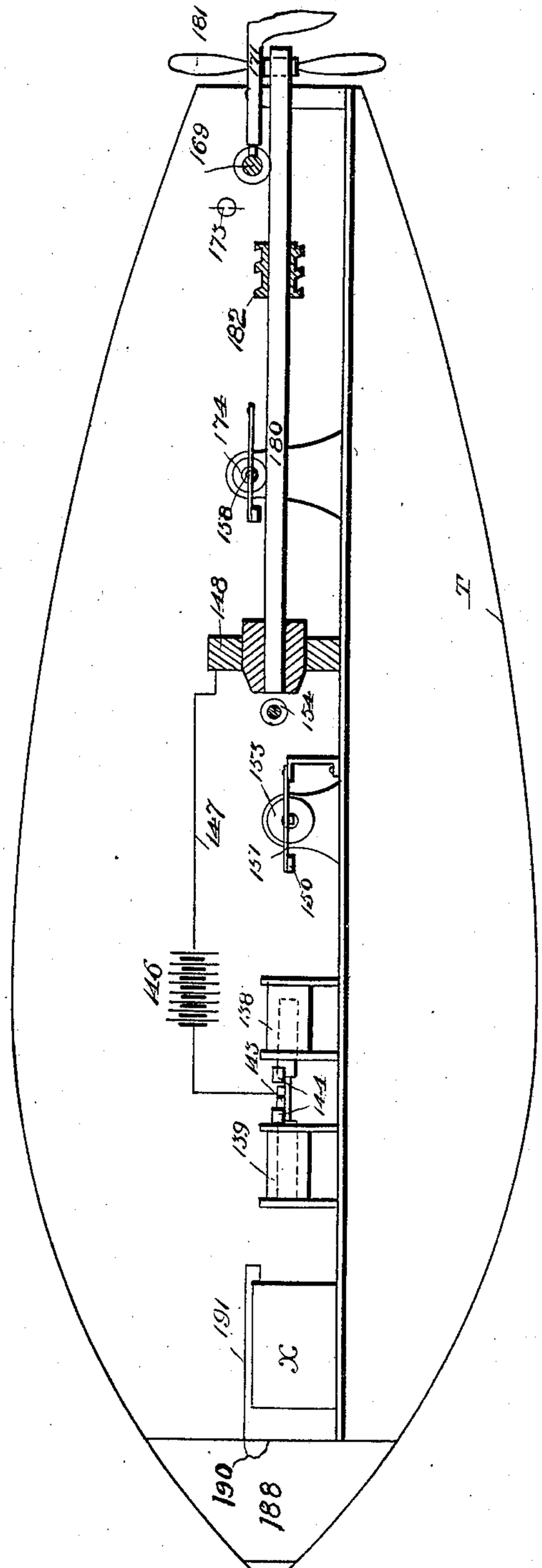
Fig. 9.



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No. 711,743. Patented Oct. 21, 1902.

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TELAUTOMOTOR.

(Application filed Apr. 12, 1901.)

(No Model.) 8 Sheets—Sheet 8.

Fig. 10.

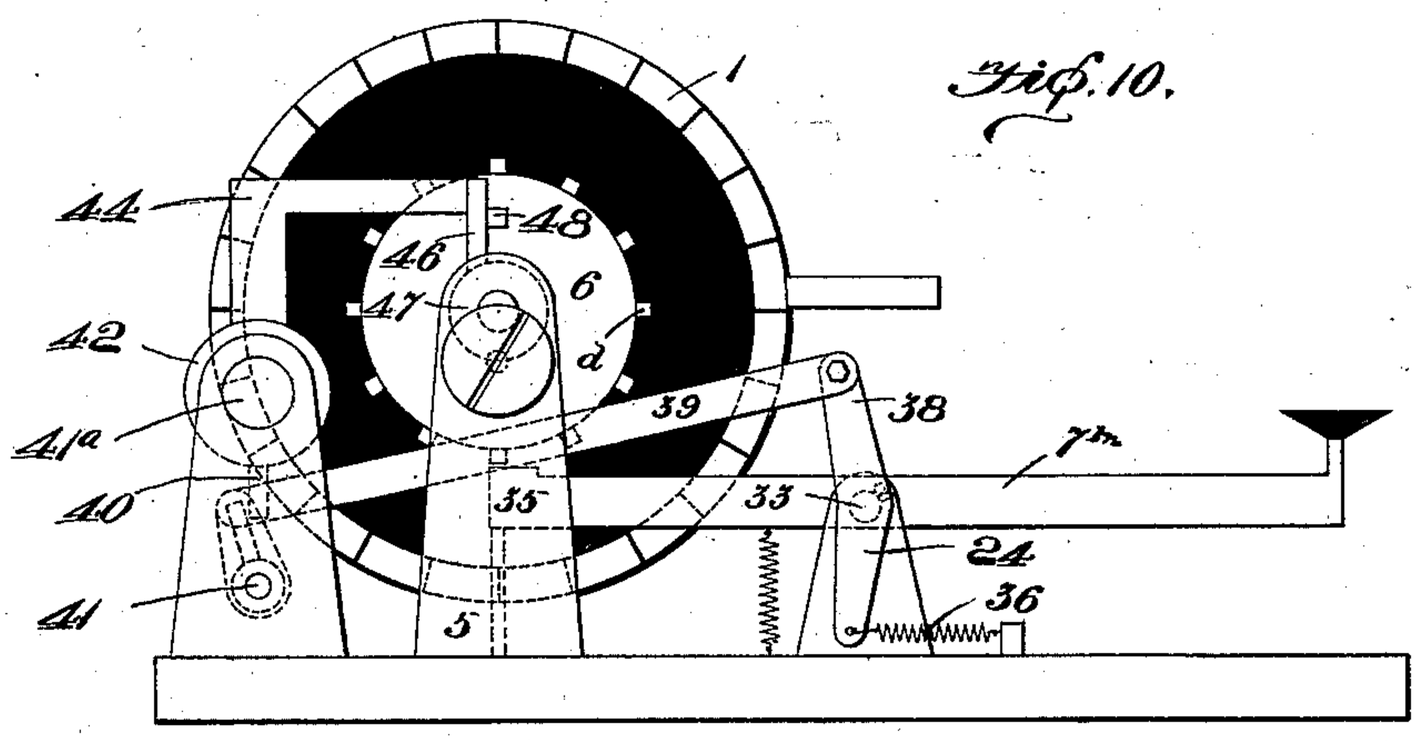
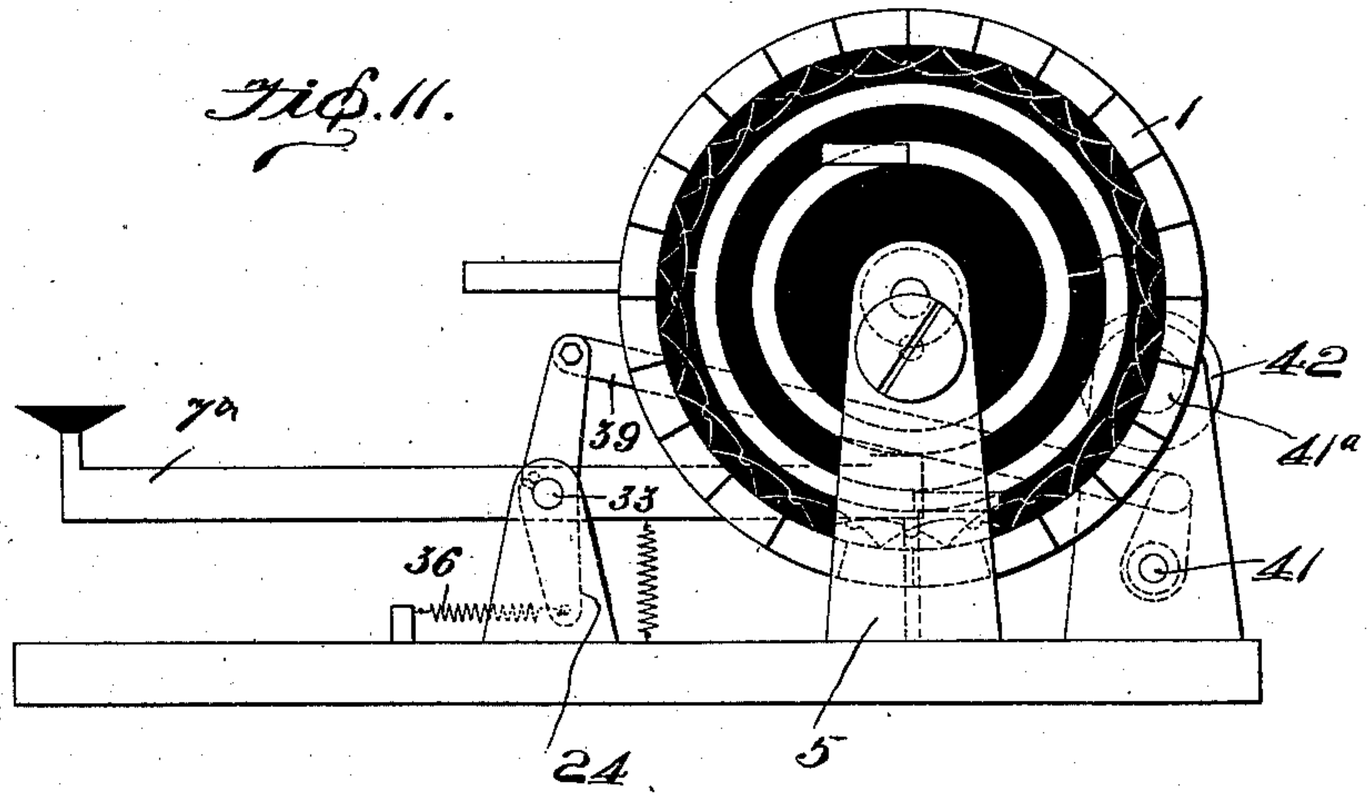


Fig. 11.



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UNITED STATES PATENT OFFICE.

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TELAUTOMOTOR.

SPECIFICATION forming part of Letters Patent No. 711,743, dated October 21, 1902.

Application filed April 12, 1901. Serial No. 55,454. (No model.)

To all whom it may concern:

Be it known that I, HARRY SHOEMAKER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Telautomotors, of which the following is a specification.

My invention has special reference to an apparatus for the control of the movements and actions of boats or other moving bodies at a distance, said apparatus being controlled by electricity without the employment of any intervening wires.

My invention also has for its object a provision of a correcting or synchronizing device which will put the instruments at the receiving and at the transmitting ends in exact synchronism should they get out of such a state for any reason.

The main object of my invention is to provide a wireless-telegraph system which will control the operations of the motive power, the steering power, either one of which can be reversed, and exploding means when a torpedo is employed.

To attain the desired objects my invention consists of a "telautomotor" controlled by a novel system of wireless telegraphy embodying novel features of construction and combination of parts substantially as disclosed herein.

This application is a perfected form and is an improvement over my application for autotorpedo filed February 1, 1901, Serial No. 45,585.

In the drawings, Figure 1 is a front elevation of the transmitting-commutator and its connections. Fig. 2 is an end view thereof. Fig. 2^a is a detail view of the carriage 44 and immediate connections for resetting the same. Fig. 3 is a top plan view of Fig. 1. Fig. 4 is a detail end view of the commutator with the electrical connections and remainder of the transmitting-station in diagram. Fig. 5 is a diagrammatical view of the receiving apparatus. Fig. 6 is a sectional view of a torpedo with my invention applied thereto. Fig. 7 is an enlarged detail view between the lines $x\,x$ and line $y\,y$ of Fig. 6. Fig. 8 is an enlarged view from line $y\,y$ of Fig. 6 to the rear of the torpedo, and Fig. 9 is a longitudinal section of a torpedo embodying my invention. Fig. 10 is an end view similar to that shown in Fig. 2, but more plainly setting forth the construction of the shaft 41 and its connections; and Fig. 11 is a similar view taken from the opposite side of the commutator.

Referring by numeral to the drawings, the numeral 1 designates the commutator having twenty-four segments, which are divided into two series 2 and 2^a, and these segments are insulated from each other. This commutator is mounted on the shaft 3, which is held between the bearings 4 and 5 and has mounted thereon a cylinder 6, carrying pins a, b, c, d, e, f, g, h, i, j, k, and l—twelve in number. These pins are adapted to be engaged by the key-bars 7^a 7^b 7^c 7^d 7^e 7^f 7^g 7^h 7^i 7^j 7^k 7^l, thus causing the cylinder to be stopped when one bar engages its respective pin. In Fig. 4 it will be noticed that the commutator-segments are connected together in two sets, the first being connected to the collector-ring 8 and the second to the collector-ring 9.

The current passes from the battery 10 through the conductor 11, brush 12, segment 2, ring 8, brush 13, wire 14, magnet 15, wire 16, wire 17 to the battery 10, thus energizing the magnet 15 and moving the armature 18, which is pivoted at 19, thus breaking the local circuit of the induction-coil 20 at the points 21 and 21^a. This break acts the same as a key acts in a wireless-telegraph system. The circuit of the coil is from battery 22, wire 23, lever or armature 18, points 21 and 21^a, wire 25, break 26, and the primary of the coil 20, the condenser 27 bridging the break 26.

If the commutator moves so that one of the segments 2^a contacts brush 12, then the current flows by wire 11, brush 12, segment 2^a, ring 9, brush 28, wire 29, magnet 15, wire 17, battery 10, thus energizing the magnet 15, which moves the lever 18 so as to operate the circuit through the coil. This causes sparks at the gap 30, thus causing a wave from the plate 31 and the ground 32.

If the commutator be continually revolved, it will cause the lever 18 to vibrate, and thus cause sparks with a short space between them,

transmitting a series of dots at the receiving-station, the same as wireless telegraphy. The commutator and shaft are revolved by any well-known power, and the keys are so arranged that the commutator can be stopped at a certain point, so that a series of sparks can be started and stopped at will by the different keys. The keys are mounted on the shaft 33 and when pressed upon cause their pins 35 to engage the pins on the cylinder, thus stopping the cylinder in its revolution every time one of the key's pins engages its proper pin on the cylinder.

In Fig. 2 the spring 36 pulls the shaft back through the medium of the lever 24, thus returning the key to its original position when released. On the shaft 33 is a crank 38, which operates the connecting-rod 39, which in turn operates the crank 40, which is connected on a shaft 41. The shaft 41^a carries a frame 42, which has a right-angle arm or carriage 44, which is provided with a pin 43 and rod 45, which is carried by the shaft 41, engaging a lug 45′, which projects below the frame 42 in order that the carriage may be properly guided in its motion. This carriage carries a knife-edged plate 46, which engages the screw 47 on the main shaft 3, and this carriage is adapted to stop the shaft 3 by engaging the pin 48. In Fig. 3 is seen the spring 49, which pushes the carriage 44 against the stop 50 when the plate 46 is not engaged in the screw 47, as when a key is pressed by reason of the frame 42 engaging the pin 43 and in turn raising the plate out of contact with the screw. The spring 49 tends to hold the plate in contact with the screw by reason of its tension.

When a key is pressed, the plate 46 is raised out of contact with the screw and allows the carriage to slide back against the stop, and when the key is released the plate again engages the screw and is carried toward the stop-pin 48; but if another key is pressed before this reaches 48 the plate is again released, and thus the shaft will have to be revolved a certain number of times without being stopped in order to allow the carriage 44 to engage the pin 48 and stop the shaft 3, and consequently the commutator. The pin 48 is so placed that the commutator is stopped to close the contact at 21 and 21^a and keeps the coils sparking, the object of which will appear in the description of the receiving-station. When the keys are pressed, the commutator is stopped in such a position that the contact at 21 and 21^a is held open, and all sparking in the coil ceases.

In Fig. 5, 51 is a commutator similar in construction to the one in Fig. 1, but only having twelve sections. It is mounted on a shaft 52, which carries twelve insulated collector-rings a' b' c' d' e' f' g' h' i' j' k' l', each connected respectively to their proper segments and mounted on the stand 54, and contacting the rings are the brushes 56, which are in turn connected to the posts 56^a, respectively. On the shaft 52 is also mounted a stepping-wheel $55^\times$, which is composed of two disks 56^b and the single 56^c, carrying the teeth 57 and 57^a, mounted on the inner faces and staggered so that the tongue or lever 58 can move or vibrate between the disks and at each vibration step the wheel two points. The disks 56^b form a pulley by which the shaft 52 is driven in the direction indicated by the arrow by means of a spring-motor or any suitable power A.

59 is a stop-pin. 60 is a carriage which is adapted to be operated or lifted off the screw 60^a by the magnet 61, which operates the armature 62 and the rod 63, which in turn lifts the carriage 60. This mechanism is similar to the correcting mechanism used in the transmitting-station and is operated by a motor in the same manner. The screw 60^a is so arranged that six revolutions of the shaft 52 cause the carriage 60 to engage the pin 59, which stops the shaft and the commutator. A shaft 65 is journaled between the bearings 66 and carries the pulley 67, the screw 68, and the pin 69. This shaft is revolved by any well-known power, such as a motor 69^a. A plate 70 is adapted to engage the screw 68 and is carried by the armature 74, which is normally held from engagement with the magnet 73 by means of a spring 70^a, which holds plates 70 in contact with the screw. A spring 72 is provided to pull the plate 70 back to the end of the screw the instant it is disengaged therefrom by means of the magnet 73, which operates the armature 74, which carries a frame 75, that allows the plate to slide in it when disengaged from the screw. 76 represents two contact-points, which close a circuit if 70 is left in engagement with the screw long enough for it to pass to the end thereof. When the pin 69 strikes the plates 70, it stops the motion of the shaft 65 when the plate reaches the end of the screw 68. By this construction it will be seen that normally the plate 70 is in engagement with the threads of the shaft 65; but as the magnets 73 are energized the armature 74 is operated so that the plate 70 is released from engagement with the threads, the spring 72 causing said plate to slide along the frame 75 and reset the plate or carriage. The distance the plate is allowed to slide upon the frame depends upon the length of time the magnet 73 is magnetized, for as soon as it loses its magnetism the plate engages the threads, and as the shaft 65 is revolved the plate is fed forward. If it contacts the post 76, a circuit is made to energize the magnets 61, and as the carriage and feeding mechanism operated by the magnets 61 is similar to this construction the same operation is performed, and the shaft 52 is allowed to revolve or be stopped, as may be desired.

In the main part of the receiving apparatus A designates the air-plates, 78 is a wire connecting the coherer 79 with the plate, and 80 is wire connecting the coherer with the ground G. The main relay 81 is in circuit through the batteries 82, wire 83, wire 84, the coherer, and wire 85. This relay has two contacts in its

local circuit, these contacts being 86 and 87 and 88 and 88[a], respectively.

89 is a decohering-magnet with poles 90, adapted to attract the magnetic particles 90[a] in the tube 91, this magnet being energized when contacts 86 and 87 are made, its circuit being made through wire 92, contacts 86 and 87, wires 94[a] and 94[c], magnet 89, wires 93[b], 93[a], and 94[b], and battery 94. In shunt with this circuit are the magnets 73. The magnet 73 is in circuit with wires 94[f] and 94[g], battery 94, wire 92, and contacts 86 and 87.

97 is a magnet oppositely opposed to 96 and has its circuit through wire 94[b], battery 94, wire 92, contacts 88 and 88[a], and wire 94[i]. The magnet 61 has its circuit through wire 100, magnet 101, wire 102, battery 103, wire 104, contacts 76, and wires 106.

The magnet 101 is so arranged that when it is energized it attracts lever 107, which is pivoted at 108 and makes contact between the point 109 and the segment of the commutator, thus closing a circuit through said point and the commutator-segment, lever 107, wire 110, battery 111, wire 112, and any one of the controllers 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, and 124, respectively, brushes 56, and the collecting-rings and the commutator-segments, respectively. The circuit is closed through the commutator-segment and its respective circuit, which is just opposite the point 109, when the lever 107 is attracted. The object of my invention is to so control the transmitting instruments—say key 7[a]—that the commutator of the receiving-station will revolve until the proper segment is opposite the point 109, where it shall be stopped and held while the point 109 is made to contact it by action of the manget 101.

The receiving apparatus is placed in the space marked X in the forward part of the torpedo T and is adapted to operate the respective mechanisms located therein. Connected in circuit with the solenoids 138 and 139 by means of the wires 140, battery 141, and wire 142 is the proper collector-ring of the receiving-station. When the solenoid 138 is operated, the contact-arm 143 is out of use; but when the solenoid 139 is energized the contact-arm contacts the points 144, which form a circuit with the wires 145, main batteries 146, wires 147, and the propelling-motor 148. This propels the torpedo or boat forward. To reverse the mechanism, a circuit is made through the wires 149, which are connected with the posts 150 and are adapted to be contacted by the armatures 151, carried upon the plungers 152, operated by the solenoids 153, this throwing a current in the commutator 154 of the motor 148, and thus reverse the motor.

By pressure upon the proper key when it is desired to steer the boat or torpedo—say, for instance, to the left—a circuit is made through wire 142, battery 141, wire 155, wire 156, solenoid 157, which operates the plunger 158 and causes it to contact points 159 and 160, the remainder of the circuit being through wire 161 to the proper collector-ring. As the contact is made at 159 and 160 a circuit is made as follows: Starting from battery 146 at bottom of Fig. 6 it passes through 147 and 162. At 162 it divides, part of the current passing by way of field-magnet of motor 163 through 164, 147 at top of Fig. 6, 146, vibrator 143, 144, and 145 to starting-point. The other branch is by way of 162 159 178[a], armature of motor 163, 178, 160, 147, and battery 146 at top of Fig. 6 through 143 144 to battery 146 at bottom of figure. This current keeps the field-magnet of motor 163 constantly excited and permits of the reversal of current through the armature. This motor 163 revolves the shaft 166, carrying a gear 167, which meshes with a large gear 168, mounted upon a shaft carrying a feed-screw 169, which meshes with the toothed segment 170, connected to the rudder 171. The rudder 171 is turned to the left, causing the contact-points x and y to make a circuit through batteries b'', wire c'', lamp 172, wire d'', and contacts y and x to light the lamp 172. When the rudder is in its normal position, the contact-points x and w form a circuit through batteries b'', wire c'', wire e'', lamp 173, wire f'', and contacts w and x to light the central light 173, and when the rudder is turned to the right a current having been sent through the solenoid 174, wire 176, the proper collector-ring, wire 142, battery 141, wire 155, wire 156, and short wire 177, this current operating through wires 178 and 178[a] to reverse the motor 163. When this circuit is made, the contact-point z on the rudder-segment makes a circuit through batteries b'', wire c'', wire g'', lamp 179, wire h'', contacts z and x to light the light 179 to indicate that the torpedo or boat is going to the right. Mounted upon the shaft 180, carrying the propeller-blades 181, about midway of its length is a worm or feed-screw 182, which is adapted to push the lever 183 forward or backward—that is, forward when the motor is propelling the torpedo or boat forward or backward when the motor is reversed to make circuits one at a time through the points 184 and 185, respectively, to light the lights 186 and 187, respectively.

When it is desired to explode the explosive 188 of the torpedo, a proper key is pressed to make a circuit through wire 142, battery 141, wire 189, igniting the fuse 190 through wire 191, which is connected to the proper collector-ring of the receiving apparatus.

The keys 7[a] to 7[m], inclusive, are adapted to engage at the desired time their respective pins a to b, inclusive, in the transmitting apparatus, and as the stepped disks 56[b] and 56[c] are in step with these keys and pins the respective collector-rings a' through b' are operated, so that the relays 114 through 124 may be operated at the proper time to perform the desired operation, such as starting, propelling, and stopping the torpedo, steering the torpedo, or exploding the torpedo.

From the foregoing description, taken in connection with the drawings, the operation of my improved telautomotor will be readily understood and its practicability and usefulness thoroughly appreciated; but the operation, briefly stated, is as follows: The motors in both transmitting and receiving apparatuses are started and revolve the proper shafts carrying the commutators. The key 7^1 is pressed upon engaging its proper pins and stops the cylinder and also the sparks at the spark-coil, this stopping the waves from leaving the air and ground plates, the key being held long enough for the contact 70 and its post to be made in the receiver. This connection or circuit operates the lever 107 and makes contact with 109 and a segment of the commutator 51; but this circuit is dead and not complete, as I use no connection with the batteries 111. The said contacts also operate the magnet 61 and release the commutator at the pin upon the wheel 56, the lever 58, however, holding the commutator, and said contacts remain contacted until another impulse is received from the transmitter. When the key is released, the shaft carrying the cylinder and commutator revolves, and every time a segment passes the brush a spark is made that is in its proper set of segments, the other set breaking the circuit of the coil and causing a space between each spark. These sparks or impulses are received by the wireless-telegraph receiver, and every time an impulse is received the magnets 73 and 96 are energized by the local battery 94 when the contacts 86 and 87 are made. When the contacts 88 and 88^a are made, the magnet 97 is energized and operates the lever 58 and allows the disks 57 and 57^a to be moved one step. It will thus be seen that the lever 58 works in synchronism with the lever or key 24. When the lever 58 vibrates, it stops the commutator or allows it to revolve one segment every time a spark or impulse is made. Hence the commutator of the receiving apparatus is in electric synchronous movement with the commutator of the transmitting-station. When the transmitting-commutator is stopped, the other commutator is also stopped and either one of the magnets 96 and 97 is energized to hold the lever 58 and stop the commutator. Magnet 73 is deënergized and allows the plate 70 to be carried by the screw 68 to set it back at the end of the screw. Magnet 101 causes point 109 to contact a segment on the commutator, but this segment being dead does not cause any circuit through the segment. If key 7^a be pressed, the shaft continues to revolve till the proper pin on the cylinder is engaged, when the cylinder is stopped. The commutators are stopped and the plate 70 is carried up until the contacts 76 are made. This contacting resets the carriage 59. The contact 107 is then operated by the magnet 101 to cause a local circuit through a segment of the commutator 51, collector-ring *a*, brush 53, wire 55, controlling-magnets 101, wire 110, battery 111, wire 112, connected to lever 109, the wire 112 being connected with the proper mechanism in the boat or torpedo. Each one of the keys can be operated in turn to operate its respective mechanism in the torpedo or boat. It will thus be seen that as long as one key is pressed or held down their proper control-magnets are energized, but as soon as released are deënergized, and at the first impulse the plate 70 is reset, breaking the energizing-circuit. If the commutator of the receiving apparatus is allowed to make six complete revolutions without having the carriage 60 reset, the pin 59 is engaged and stops the shaft 52, and consequently the commutator—that is, if the shaft 52 continues to revolve the threads 60^a cause the carriage 60 to be moved toward the pin 59, and should the contacts 70 and 76 not be made the carriage 60 will contact the pin 59, so that the shaft will be stopped; but should the contacts 70 and 76 be made the magnet 61 becomes magnetized and operates the armature 62, which causes the carriage 60 to have its arm disengaged from the threads 60^a, so that the spring 60^b causes the carriage to be moved toward the end of the shaft, such distance being regulated by the length of time the magnet 61 is magnetized. If the commutator 1 of the transmitting-station is allowed to make seven revolutions, the carriage 44 is engaged by the pin 48, which stops the shaft 3, so that the spark-coil continues to spark, the key or lever 24 being held closed. This causes the relay 81 to vibrate and keeps the plate 70 from contacting the point 76, so that the carriage 60 is not reset.

The object of the carriages is to automatically stop the commutators after they have revolved a certain number of times, and thus prevent them from becoming too far out of step, as the transmitting-commutator is stopped after seven revolutions, while the receiving-commutator is stopped after six revolutions, the transmitting one making one complete revolution before the other starts. If a key is not pressed, the commutators revolve, respectively, seven and six times before their respective carriages stop them, and to start them after once being automatically stopped a key is pressed upon, which releases the carriage in the transmitting-station and causes the carriage to be released in the receiving-station by its electromagnet, while at the same time the springs 49 and 60^b, respectively, cause the carriages to slide, and the distance they slide is regulated by the length of time the key is pressed, for as soon as the key is released the carriages are allowed to engage the feed screw or threads and be again fed toward the commutators. Every time a key is pressed and released the carriages are disengaged, reset, and again engaged with their feed-screws.

In Figs. 7 and 8 I have simply illustrated in diagram an enlarged view of the receiving

apparatus and connections, and in Fig. 9 a longitudinal sectional view of a torpedo is shown to clearly show the positions of the parts of the apparatus located therein. By the employment of the carriages 42 and 60 and 70 and the peculiar construction of feed-screws it is absolutely possible to stop both commutators at the desired point after they are once in step, as these carriages are only allowed to be fed along certain distances upon their respective screws and every time the key is pressed are adapted to have their lugs engage the proper pin to arrest the movement of each respective mechanism, this carriage being the common construction used in telegraphic-tape machines and only being a new use for an old construction.

It is evident that I provide a boat or torpedo carrying a receiving apparatus which is in synchronous electric movement with a transmitting apparatus, which can be placed in any convenient location aboard ship or on land and which can by the manipulation of certain keys cause to be operated in the boat or torpedo a propelling-motor to either go ahead or reverse, a light being ignited to signal which operation is being accomplished; a steering mechanism which when it is revolved one way operates the rudder in one direction and by being reversed turns the rudder in the opposite direction, a green light being ignited when the boat or torpedo is steered to the right and a red light being ignited when it is steered to the left and a white light when going straight ahead, and a mechanism for forming a circuit and igniting a fuse to explode guncotton or the like stored in the explosive-compartment of a torpedo.

Thus it will be seen that I provide a thoroughly-efficient and practical telautomotor to be operated by a system of wireless telegraphy.

I claim—

1. In combination with a transmitting-station, of a torpedo or boat having a receiving-station located therein, said receiving-station consisting of air and ground plates, a coherer, a circuit, a commutator operated by said circuit, means for stopping the commutator after a certain number of revolutions in the same circuit, and circuits connected with said commutator adapted to be made one at a time to operate different mechanisms of the torpedo or boat.

2. In combination with a transmitting-station, of a torpedo or boat having a receiving-station consisting of air and ground plates, a coherer, a circuit, a commutator operated by said circuit, means to stop the commutator after a certain number of revolutions in the same circuit, and circuits connected with said commutator adapted to be made one at a time to operate propelling mechanism, steering mechanism, and signaling mechanism located in the torpedo or boat.

3. In combination with a transmitting-station consisting of a shaft, a commutator and a cylinder mounted on said shaft, means for revolving said shaft, means for stopping said cylinder and commutator, a sparker operated when the commutator revolves, and air and ground plates connected with said sparker, of a torpedo or boat containing a receiving apparatus which is in synchronism with said transmitting-station.

4. In a wireless telegraph system, a transmitting-station consisting of a shaft, a cylinder provided with pins mounted on said shaft, a commutator also mounted on said shaft, a series of keys adapted to stop said cylinder, a means to stop the cylinder after a certain number of revolutions and a sparker or coil operated by said commutator and a torpedo or boat carrying a receiving-station to set in operation its different mechanisms.

5. In a wireless telegraph system, a receiving-station, consisting of the air and ground plates, a coherer, a decoherer, a circuit, a relay in said circuit, means operated when said relay is energized, a shaft adapted to be stopped by said means, a series of collector-rings, and a commutator mounted on said shaft, and a circuit operated when said relay is deënergized to allow said shaft to revolve a space at a time at each impulse that is received, said receiving-station being carried by a torpedo or boat to operate the torpedo or boat's different mechanisms.

6. In a device of this character, a transmitting-station, having therein a shaft, a commutator mounted upon said shaft, means to revolve the shaft, a series of keys adapted to stop said shaft, means adapted to be operated after the shaft has revolved a predetermined number of times, to stop the shaft automatically, electromagnets in circuit with the commutator, a vibrating means operated by the electromagnets, and a sparking-coil adapted to be energized every other vibration of the means, and a torpedo or boat carrying a receiving-station adapted to operate its different mechanisms.

7. In a transmitting apparatus, a shaft, a cylinder provided with a series of pins mounted on the shaft, a commutator mounted on said shaft, means for revolving said shaft, a feed-screw adapted to be revolved by a motor, a carriage operated by said feed-screw to engage the cylinder to stop the shaft, keys adapted to engage the pins in the cylinder to stop the shaft, two sets of communicating segments carried by the commutator, two electromagnets adapted one at a time to be energized by its proper set of segments of the commutator, a vibrating lever operated by said electromagnet, and a sparking-coil adapted to be operated by the lever at every other vibration to cause spaces between the sparks; and a torpedo or boat carrying a receiving-station to operate the different mechanisms in said torpedo or boat.

8. In a transmitting apparatus, a commutator provided with two sets of segments, two electromagnets adapted to be energized one

at a time by its proper set of segments of the commutator, and a sparking-coil adapted to be operated by said electromagnet to make the sparks and the spaces therebetween and a torpedo or boat carrying a receiving-station to operate the different mechanisms in said torpedo or boat.

9. In a receiving apparatus, a coherer, an electrical circuit connected with said coherer, a relay energized by said circuit, a commutator provided with segments adapted to be stepped one step when the relay is energized and another step when the relay is deënergized, the whole receiving apparatus being embodied in a torpedo or boat to operate its different mechanisms.

10. In a receiving apparatus, a coherer, means for making circuits energized when an impulse is received and after it has been received, a pair of electromagnets adapted to be energized, one at a time, when an impulse is received and after it has been received, a shaft carrying a commutator, an electrical connection, and means vibrated by said electromagnets to allow the commutator to be revolved a proper number of spaces, the whole receiving apparatus being embodied in a torpedo or boat to operate its different mechanisms.

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

HARRY SHOEMAKER.

Witnesses:
DAVID P. MOORE,
BERNARD M. OFFUTT.