

No. 880,044.

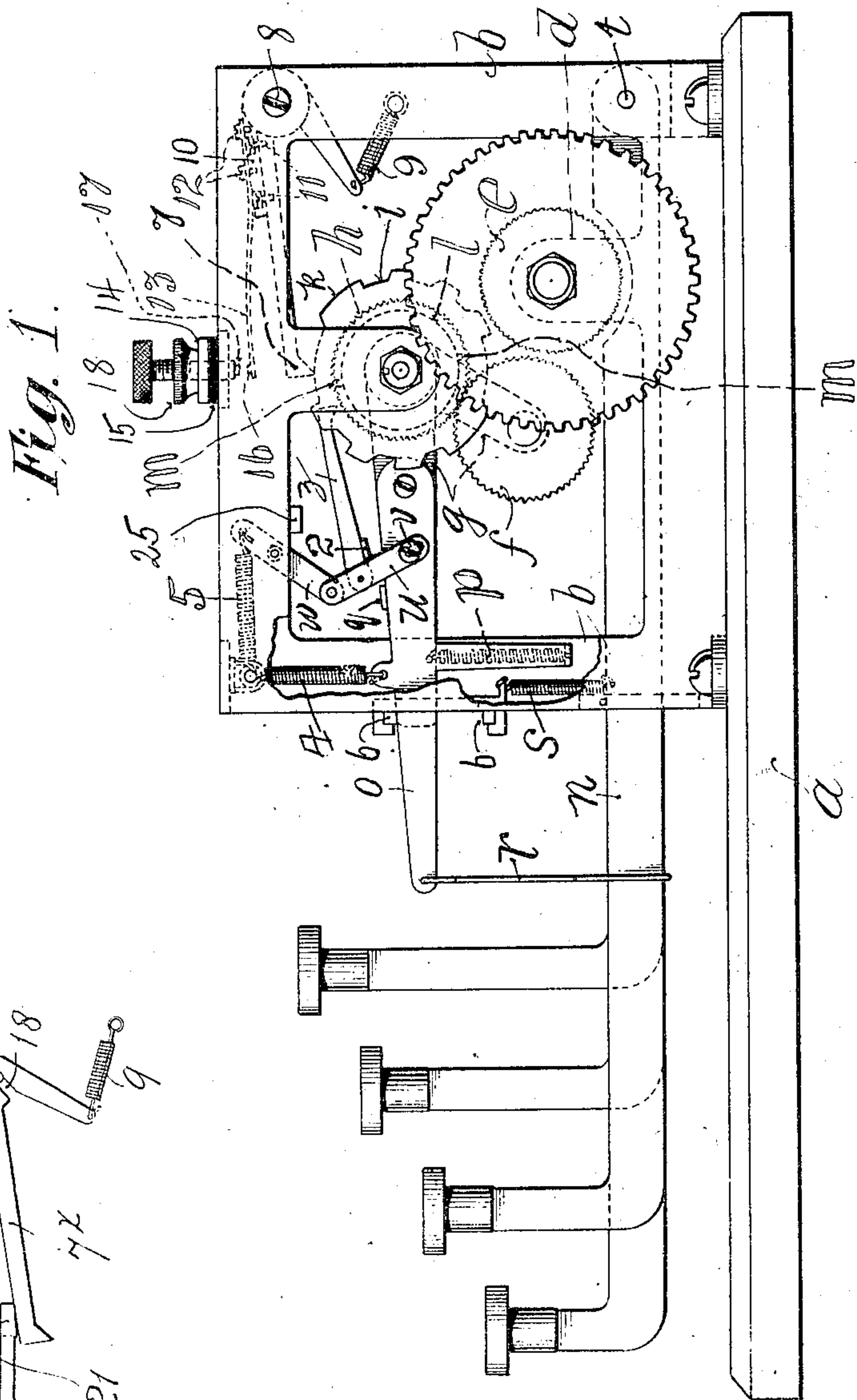
PATENTED FEB. 25, 1908.

S. W. ROTHERMEL.

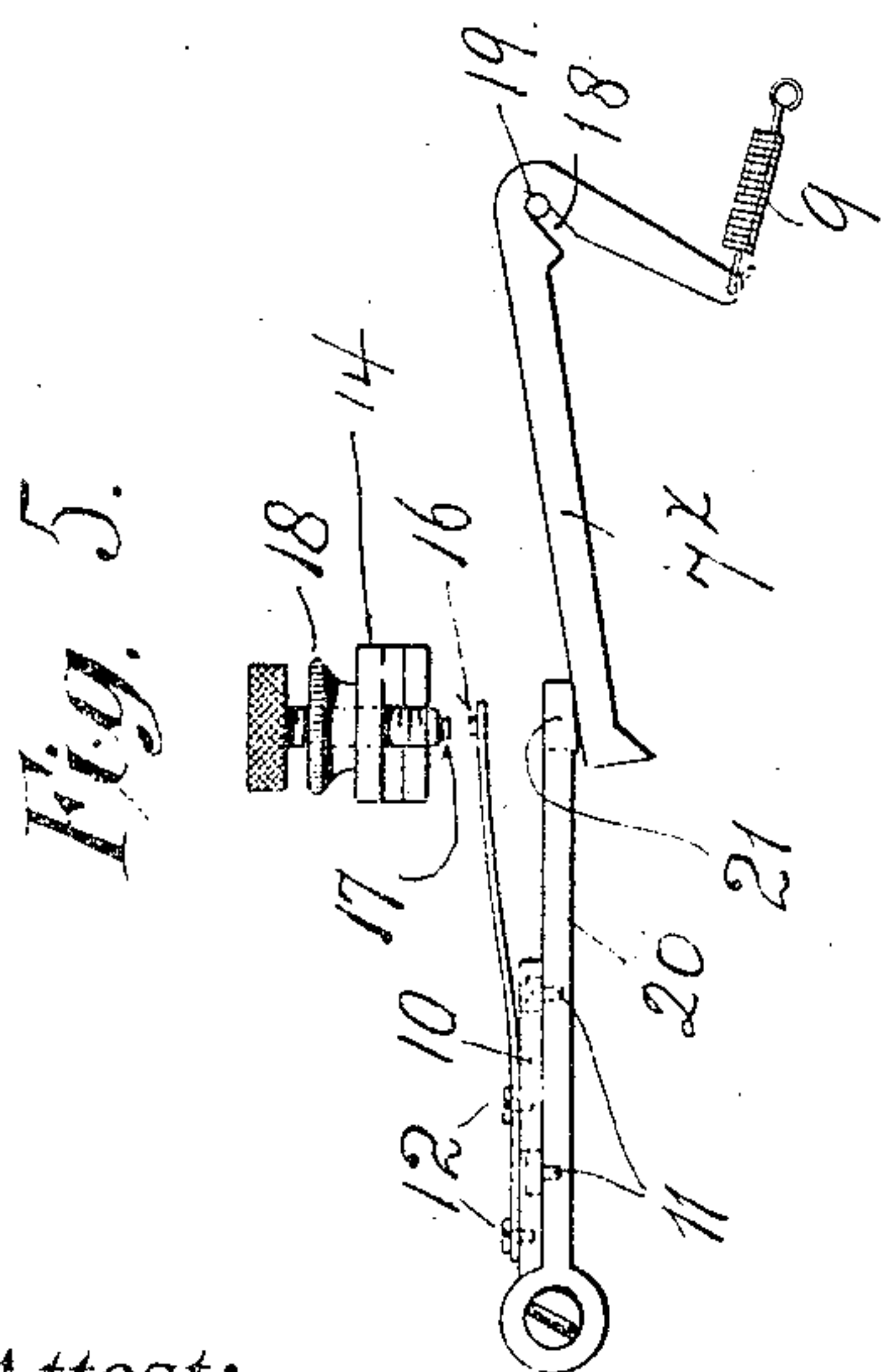
TRANSMITTER.

APPLICATION FILED JAN. 5, 1906..

3 SHEETS--SHEET 1.



161



1955

Attest:  
Edgeworth Keene  
Anna P. Crossin

Inventor:  
S. W. Rothermel,  
by Richard W. Parkley, Atty.

No. 880,044.

PATENTED FEB. 25, 1908.

S. W. ROTHERMEL.  
TRANSMITTER.

APPLICATION FILED JAN. 5, 1906.

3 SHEETS—SHEET 2.

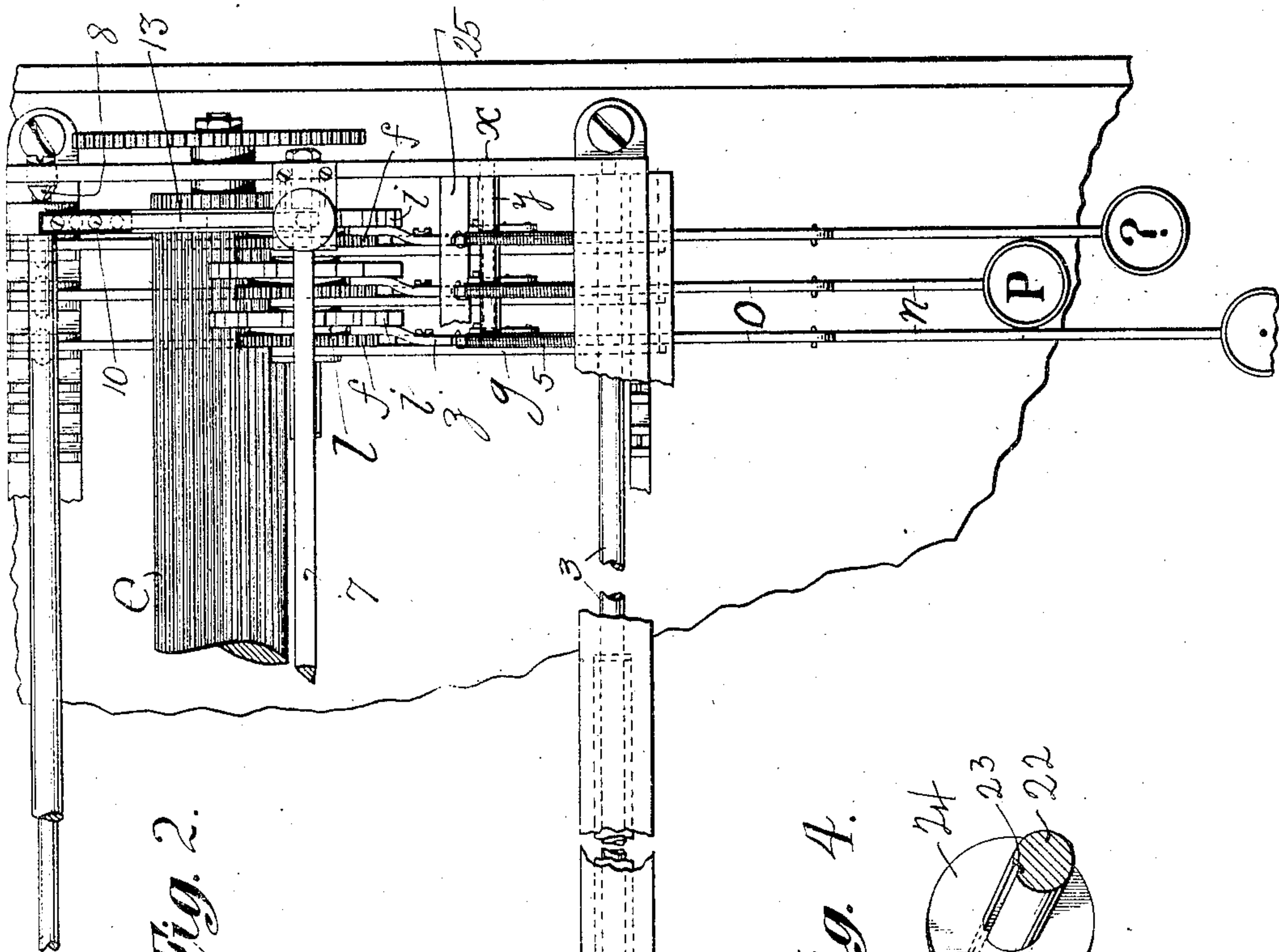


Fig. 2.

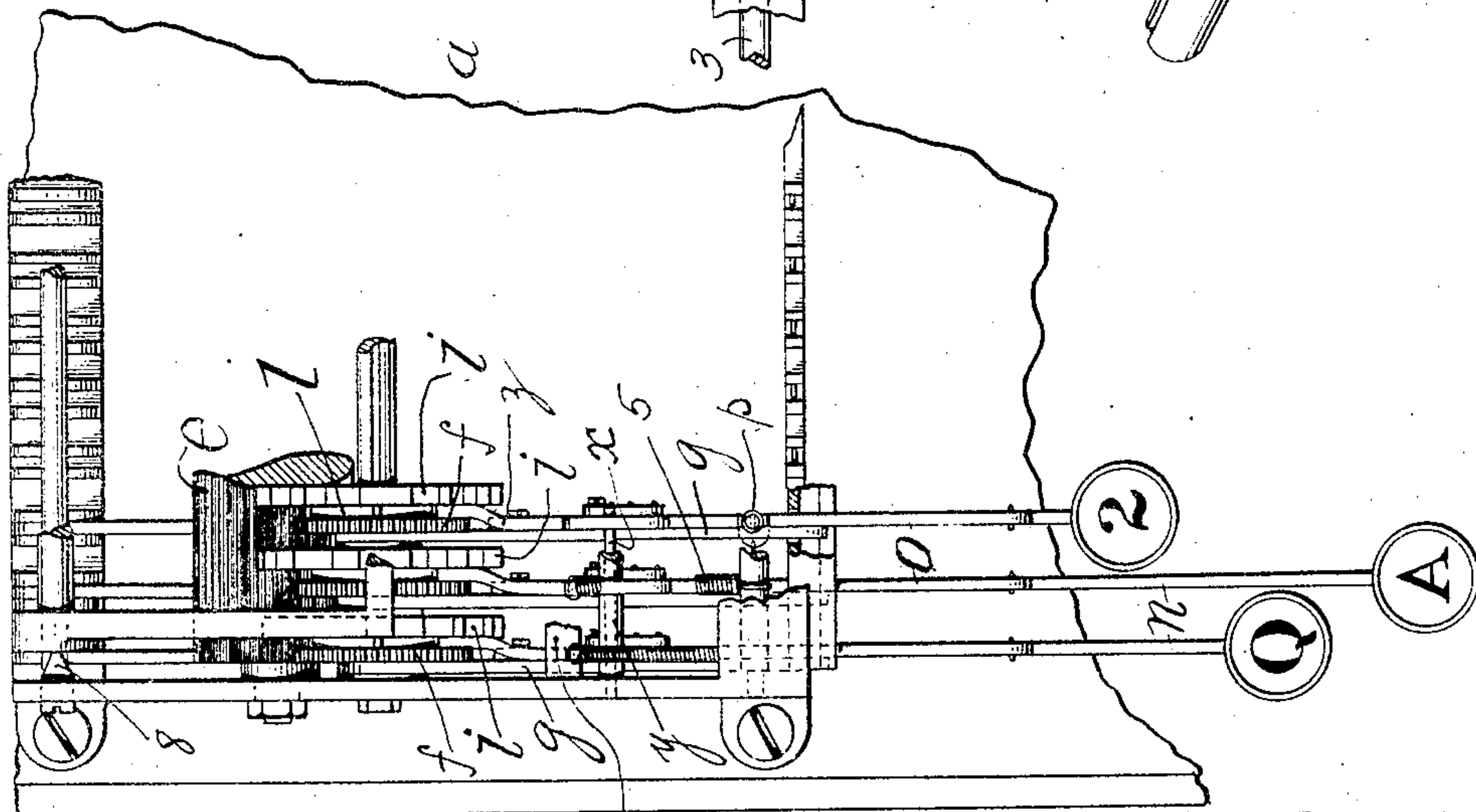


Fig. 4.

Attest:  
*Edgar W. Carson*  
Anna R. Carson

Inventor:  
S. W. Rothermel,  
by Richard W. Barkley, Att'y.

No. 880,044.

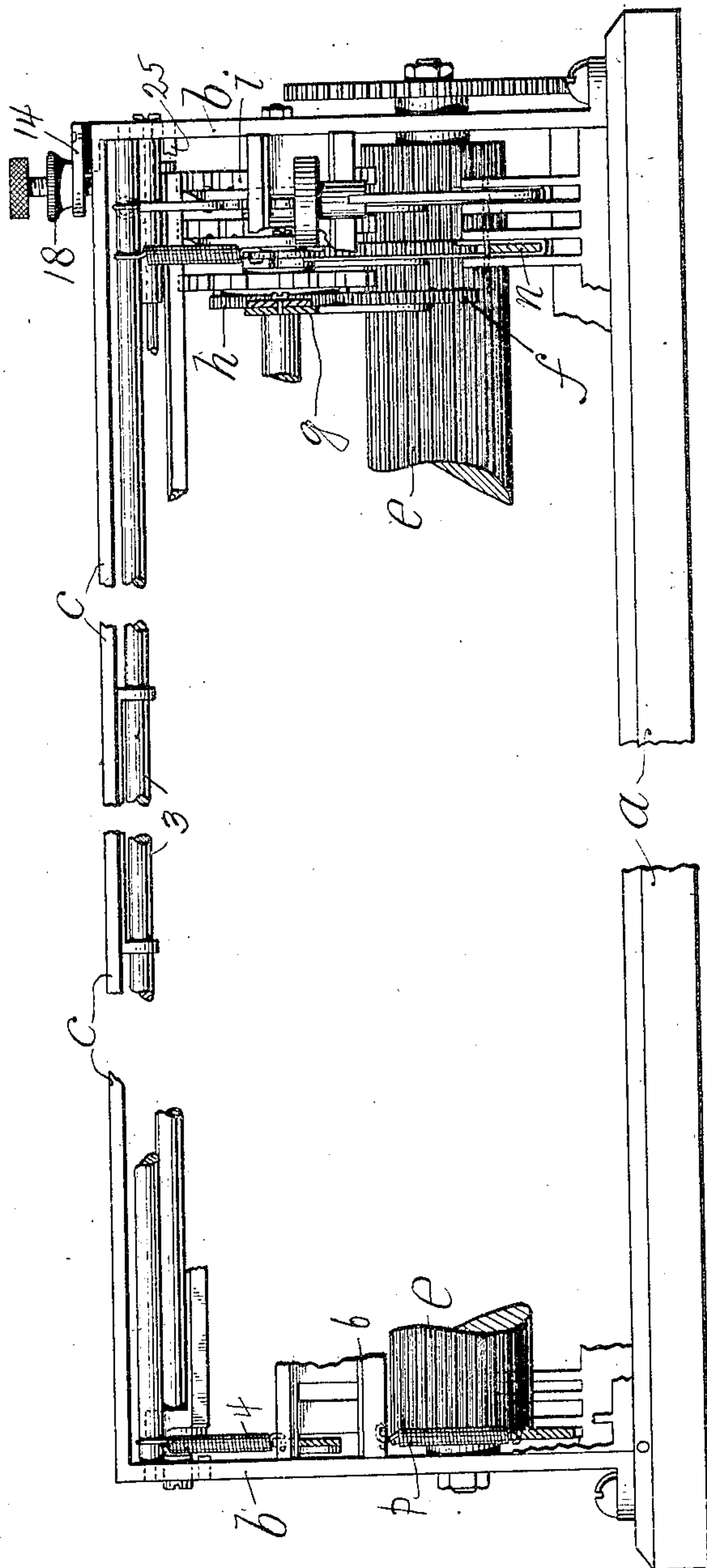
PATENTED FEB. 25, 1908.

S. W. ROTHERMEL.  
TRANSMITTER.

APPLICATION FILED JAN. 5, 1906.

3 SHEETS—SHEET 3.

Fig. 3.



Attest:  
*Edgeworth Crossin*  
*Anna R. Crossin*

Inventor:  
*S. W. Rothermel*  
by *Richard W. Barkley*, Att'y.



# UNITED STATES PATENT OFFICE.

SAMUEL W. ROTHERMEL, OF NEW YORK, N. Y., ASSIGNOR TO RICHARD W. BARKLEY,  
TRUSTEE, OF MONTCLAIR, NEW JERSEY.

## TRANSMITTER.

No. 880,044.

Specification of Letters Patent.

Patented Feb. 25, 1908.

Application filed January 5, 1906. Serial No. 294,699.

*To all whom it may concern:*

Be it known that I, SAMUEL W. ROTHERMEL, a citizen of the United States, and a resident of the borough of Brooklyn, in the county of Kings, in New York city and State of New York, have invented a certain new and useful Improvement in Transmitters, of which the following is a specification.

This invention relates to mechanical transmitters for telegraphic purposes, one object of the invention being to produce a transmitter adapted to use under all conditions of battery and line under which ordinary relays will operate; another object is to reduce the number of contact-points in transmitters; another object is to reduce the work of the operator to a minimum; other objects will appear hereinafter.

The invention consists in features of construction, arrangements, and combinations of devices hereinafter described and more particularly pointed out in the appended claims.

The invention is embodied in the machine illustrated in the accompanying drawings, forming part hereof, in which—Figure 1 is an end view; Fig. 2 is a plan view, partly broken away, and with parts omitted; Fig. 3 is a front elevation, partly broken away, and with parts omitted; Fig. 4 is a perspective view of a detail of construction; and Fig. 5 is a view of a modification.

The reference character *a* denotes a base, from which rise standards *b* whose upper ends are united by the transverse bars *c*, while *d* designates risers at the sides of the machine for the provision of bearings for certain parts.

The reference *e* denotes a drum which extends across the machine, and which is driven in any suitable way, as by an electric, or mechanical, motor, or otherwise, as may be convenient. This drum *e* constitutes the main driver of the transmitter, and it may transmit its power by friction or by means of teeth thereon.

The reference *h* marks a gear, shown as a star gear, which has the same axis of motion as the bent lever *g*, and *f* marks another gear which is mounted on an arm of the bent lever *g* and which drives the gear *h*, by friction or otherwise, but which is shown as being a star gear also and as meshing with the gear *h*. The gear *f* is normally out of contact with

the driver *e* (the driver *e* is also shown as a star wheel or gear), but when it is thrown into mesh with the driver, it and the gear *h* are rotated as long as the gear *f* remains in mesh or contact with the driver *e*, as will be understood. Fast to and rotating with the gear *h* is a wheel *i*, hereinafter called the "cam-wheel," which is provided with projections *k*, preferably on its periphery but which may be on its side, which, by their length and disposition, represent a character in the so-called "dot and dash" code, otherwise called the "Morse" or the "Continental code." Fast to said gear *h* and cam-wheel *i* is a disk *l* which is provided with one or more pins or projections *m*, for a purpose presently to appear. The lever *g* may be connected directly to a key-lever, as a lever *n*, or it may bear a key itself, but for reasons connected with lightness of touch, it is preferred to pivot on the lever *g* a sub-lever *o*, and to connect the two levers by a spring, as the spiral spring *p*, which holds the sub-lever *o* against a stop *q* on the lever *g*, and then to connect the sub-lever with the key lever *n* by any suitable form of connection, such as the wire *r* having a loop surrounding the key-lever and allowing the key-lever to rise, after being depressed, before the sub-lever and the lever *g* return to their normal positions, under the influence of a spring, as *s*. The key-levers *n* are fulcrumed at the rear of the machine, as on a rod *t*, and it is remarked that these levers may be separated by the teeth of a comb formed by slitting the rear bar of the frame or base, or by small washers, as may be desired. Any suitable form of spring may be used to return the key-levers to their normal positions.

The sub-lever *o* is connected to one member *u* of a toggle by a slot and pin, the slot being in the member *u* and the pin *v* passing through said slot and entering the sub-lever. The other member *w* of the toggle is pivotally connected with a part of the frame, as with a rod *x* on which are the spacing washers *y*; or these members may be mounted on the rod *x* with comb-teeth as spacers between them. Pivotaly connected with the toggle is a thrust rod *z* which is of a length such that, in its normal position (that shown in Fig. 1), its free end rises above the path of the projection *m* before-mentioned, there being an arm or stop 2 on the member *u* to



limit the downward motion of said thrust rod *z*.

Across the front of the machine extends a rod or bar 3 from which extend springs 4 and 5, connected, respectively, with the sub-lever *o* and the toggle-member *w*, but these springs 4 and 5 are so tensioned that spring 4 returns the parts to the positions shown in Fig. 1 in spite of the spring 5. Suitable sound-deadening stops 6 may be used above and beneath the sub-lever *o* to limit the motion of that lever.

Thus far, the mechanism for one character in the dot and dash code has been described, and it will be readily understood that, aside from the fixed frame, the driver *e*, and certain rods and stops which are common to duplicated parts, the described mechanisms are duplicated for each and every character used in the machine, except that the projections on the cam-wheels *i* vary according to the character they are to represent, and that some cam-wheels may carry one, two or more duplications of the projections or cams *k*, according to the character they represent and that there are as many pins *m* on the disk fixed to the cam-wheel as there are representations of the character for which that cam-wheel stands.

Overlying the cam-wheels *i* is a universal bar 7 which is pivoted at 8 to the main frame of the machine, and which bar is adapted to be raised and lowered by the cams *k*, a suitable returning spring 9 being employed, if necessary. A block of insulation 10 is attached by screws 11 to the bar 7 or to some part of it, and a spring 13 is attached to the block 10 by one or more screws 12 so as to be electrically insulated from the bar 7 and the rest of the machine. Above the spring 12 is a bar or arm 14 of the main frame of the machine, which arm, however, is insulated from the main frame by a block of insulation 15. Near its end, the spring 12 carries a contact-point 16, and right above the point 16, the arm 14 carries an adjustable screw contact-point 17, there being the usual locking screw 18. The terminals of the telegraph line connect with the screws 13 and 17. The distance between the contact-points 16 17 may be adjusted as in an ordinary relay or key.

In the operation of the machine, the desired key is depressed as in a typewriting machine (the key-board is preferably arranged as in standard typewriters, with the letters of the alphabet, the digits, and such other characters as may be desired) and pulls down its corresponding sub-lever *o* and lever *f*, and moving the corresponding gear *h* into contact or mesh with the driver *e*, whereupon the corresponding cam-wheel *i* begins to rotate and lift and release the universal bar 7, thus closing and opening the circuit by means of the point 16 17. At the same

time, on the depression of the key, the corresponding toggle *u w* is drawn out by the corresponding sub-lever *o* into line, (a stop-bar 25 extends across the machine to prevent the toggles from being moved too far by the springs 5) and thereupon the corresponding spring 5 throws the said toggle beyond the line of centers thereof and so moves the thrust bar *z* thereof over into the path of the pins *m* that are connected with the cam-wheel being operated, but doing so late enough to miss that pin which previously pushed back said thrust rod and toggle. The next pin *m* strikes the end of the rod *z* and pushes the toggle beyond its line of centers against the resistance of the spring 5, whereupon the stronger spring 4 acts to return the sub-lever and toggle to their normal positions, and so disengages the gear *f* from the driver *e*, and the cam-wheel *i* comes to rest, with the universal bar 7 in a depression or kerf thereof, thus opening the circuit at the contact-points 16 17, as in a key.

The operation is precisely the same in the case of all keys, except that the distance through which the cam-wheel rotates may vary, for some letters are shorter than others and there may be more of them on the corresponding cam-wheel; for instance, there may be five or six cams, each representing the single "dot" that stands for "e," on the "E" cam-wheel, and there would be an equal number of pins *m* for operating the toggle-means, or there may be but one character represented on a cam-wheel, in which case, there is but one pin *m* corresponding thereto. The driver *e* operates all the gears *f* shown, but it would be no departure from the invention if more than one driver were used in one and the same machine. Also, the contact-points 16 17 shown are opened and closed by all the mechanisms shown, but it would be no departure from the invention and the claims herein if more than one pair of such contact points were provided and certain of the cam-wheels operated one such pair and certain other of the cam-wheels operated another such pair. Again, the cam-wheels shown act directly upon the universal bar 7, but it is within the scope of this invention and of certain of the claims for the cam-wheels to actuate the universal bar 21 through the medium of lifters or pivoted bars 7<sup>x</sup>, one for each cam-wheel, which are movable independently one of another. The bar 21 is carried by arms 20, and there is a separate arm 7<sup>x</sup> for each cam-wheel, said arms 7<sup>x</sup> being lifted by the cams *k*. The slots 18 in the arms 7<sup>x</sup> slip over a rod 19, whereby any arm may be removed at any time without disturbing any other arm.

Many other modifications may be made and equivalents be used without departing from the spirit of this invention.

The gears *h*, disks *l*, and cam-wheels *i* are



loosely mounted on a shaft 22, which shaft has a longitudinal groove 23 therein, and which shaft is fixed in the framework against motion. Washers 24, provided with tongues entering said groove 23, are placed between the levers *g* and the adjacent cam-wheels *i* so that wrong cam-wheels will not be actuated (as well as the proper ones) by the levers *g* through frictional contact.

10 What I claim as new and desire to secure by Letters Patent of the United States is—

1. In a transmitter, the combination with the movable member of a circuit-closer, of a cam-wheel for operating the said member, a toothed gear to which said cam-wheel is connected, an arm pivoted on the axis of said gear, a tooth gear mounted on said arm and meshing with the first-named gear, a tooth driver from which the second-named gear is normally disengaged, means for swinging said arm to engage said second-named gear with said driver, means for locking said arm with said gear and driver in mesh with each other, and means for throwing off said locking means when the cam-wheel reaches a given position.

2. In a transmitter, the combination with the movable member of a circuit-closer, of a cam-wheel for operating said member, a tooth gear to which said cam-wheel is connected, an arm pivoted on the same axis as said gear, a tooth gear mounted on said arm and meshing with the first-named gear, a toothed driver from which the second-named gear is normally disengaged, key-actuated means for swinging said arm to engage said second-named gear with said driver, a toggle for locking said arm with said gear and said driver in mesh with each other, a thrust-arm connected with said toggle, and a pin or projection rotating with said cam-wheel and co-acting with said thrust-arm to move said toggle from its locking position.

3. In a transmitter, the combination with the movable member of a circuit-closer, of a cam-wheel for operating said member, a toothed gear with which said cam-wheel is connected, a bent lever fulcrumed on the axis of said gear, a gear mounted on said lever and meshing with the first-named gear, a toothed driver from which the second-named gear is normally disengaged, a sub-lever pivoted on the bent lever and held against a stop on the bent lever by a spring, a key-lever connected with said sub-lever, a toggle having one member pivoted on the fixed frame and the other member pivotally connected with said sub-lever, a thrust-arm pivotally connected with said toggle, and a pin or projection connected with the cam-wheel and acting on said thrust-arm to throw said toggle beyond its line of centers.

4. In a telegraph transmitter, the combination with a pair of percussive contact-points, of a rotatable cam- or telegraph-

wheel for actuating one of said points, a rotary driver having its axis of motion outside of said cam-wheel, and key-operated mechanism for connecting and disconnecting said cam-wheel to and from said driver.

5. In a transmitter, the combination with two percussive contact-points, of a plurality of cam-wheels for moving one of said points, a driver whose axis of motion is external to said cam-wheels, and a plurality of mechanisms (one for each cam-wheel) for connecting and disconnecting said cam-wheels with and from said driver independently of one another.

6. In a transmitter, the combination with two percussive contact-points, of a plurality of cam-wheels for moving one of said points, a driver whose axis of motion is external to said cam-wheels, a plurality of key-actuated mechanisms (one for each cam-wheel) for connecting said cam-wheels independently with said driver, means for locking said mechanisms in gear with said driver, and means for releasing said mechanisms after the cam-wheels have moved predetermined distances.

7. In a telegraph-transmitter, the combination with a telegraph wheel having a fixed axis of motion, a driver external to said wheel, a lever fulcrumed on the axis of said wheel and carrying a tooth gear, a gear on said wheel meshing with said tooth gear, a sublever fulcrumed on said lever, a stop for limiting the relative motion of said levers in one direction, and a spring for connecting said levers and holding said sub-lever and stop in contact with each other.

8. In a telegraph-transmitter, the combination with a telegraph-wheel, of lever-actuated mechanism for connecting said wheel with a driver, said driver, a sub-lever pivotally connected with said lever, a stop for limiting the relative motion of said levers, a spring for holding stop and lever together in contact with each other, and a toggle-mechanism connecting said sub-lever with the framework of the machine and locking said lever-actuated mechanism in operative position.

9. In a telegraph-transmitter, the combination with a telegraph-wheel, a driver, and lever-actuated mechanism for connecting said wheel with said driver, of a sub-lever pivoted on said lever and spring-held against a stop thereon, a toggle-mechanism for holding said lever-actuated mechanism in working position, and means for throwing off said toggle-mechanism when said wheel has rotated a given distance.

10. In a telegraph transmitter, the combination with two percussive contact-points, of a plurality of progressively rotating telegraph- or cam-wheels, a universal bar operated by said wheels and operating said contact-points, a star-gear driver, and a plurality of star-gears for each of said wheels nor-



mally disengaged from said driver for connecting and disconnecting said wheels to and from said driver.

11. In a telegraph transmitter, the combination with a pair of percussive contact-points, of a plurality of rotary telegraph- or cam-wheels, a universal bar operated by said wheels and operating said points, a star-gear driver, a plurality of star-gears for each of said wheels normally disengaged from said driver for connecting and disconnecting said wheels to and from said driver, means for locking said star gears in mesh with said driver, and appliances for releasing said gear from said driver after the said wheels have rotated predetermined distances.

12. In a telegraph transmitter, the combination with a pair of percussive contact-points, of a plurality of rotary cam- or telegraph-wheels, a universal bar operated by said wheels and operating said contact-points, an arm for each telegraph-wheel pivoted on the axis of motion thereof, a star-gear pivoted on each arm and connected with its wheel to drive the same, and a star-gear driver from which said star-gears are normally disengaged.

13. In a telegraph transmitter, the combination with a pair of percussive contact-points, of a plurality of rotary cam- or telegraph-wheels, a universal bar operated by said wheels and operating said contact-points, an arm for each wheel pivoted on the axis of motion thereof, a star-gear pivoted on each arm and connected with its wheel to rotate it, a star-gear driver from which said star-gears are normally disengaged, means for locking said star-gears in mesh with said driver, and appliances for releasing said star-gears from said driver after said wheels have rotated predetermined distances.

14. In a telegraph transmitter, the combination with a pair of percussive contact-points, of a rotary wheel provided with projections duplicating a "dot and dash" character,

a star-gear driver, a star-gear movable into and out of mesh with said driver and connected with said rotary wheel to rotate the same.

15. In a telegraph transmitter, the combination with a pair of percussive contact-points, of a rotary wheel provided with projections duplicating a "dot and dash" character, a star-gear driver, a star-gear movable into and out of mesh with said driver and connected with said wheel to rotate it, means for locking said star-gear in mesh with said driver, and appliances for releasing said star-gear from said driver after the transmission of one of said duplicated character.

16. In a telegraph transmitter, the combination of a pair of percussive contact-points, with a plurality of rotary telegraph-wheels each provided with projections duplicating a particular character of the "dot and dash" code, a star-gear driver, a star-gear for each telegraph-wheel and movable into and out of mesh with said driver and connected with its wheel to rotate it, toggle-mechanisms for locking said star-gears in mesh with said driver, and means for throwing off said toggle-mechanisms to release said star-gears from said driver.

17. In a telegraph transmitter, the combination of a driven shaft, a power transmitting clutch gear thereon, a coupling device driven thereby, a fixed shaft, a character wheel mounted idly thereon, a lever, and means operated by said lever for engaging said coupling device with said wheel during the transmission of each individual character on said wheel.

Signed at New York in the county of New York and State of New York this 4th day of January, A. D. 1906.

SAMUEL W. ROTHERMEL.

Witnesses:

A. WHITE,

R. W. BARKLEY.