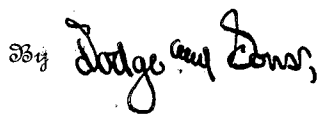


W. HESS, JR.  
WATER STAGE RECORDER.  
APPLICATION FILED JAN. 7, 1918.

4 SHEETS—SHEET 1.



Attorneys

1,285,169.

W. HESS, JR.  
WATER STAGE RECORDER.  
APPLICATION FILED JAN. 7, 1918.

Patented Nov. 19, 1918.  
4 SHEETS—SHEET 2.

*Fig. 2.*

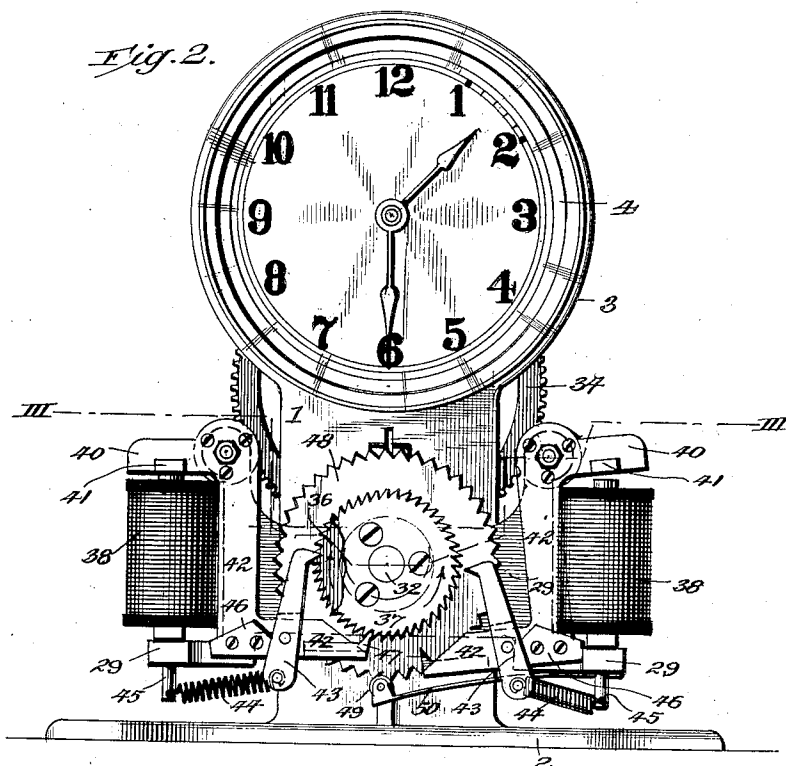
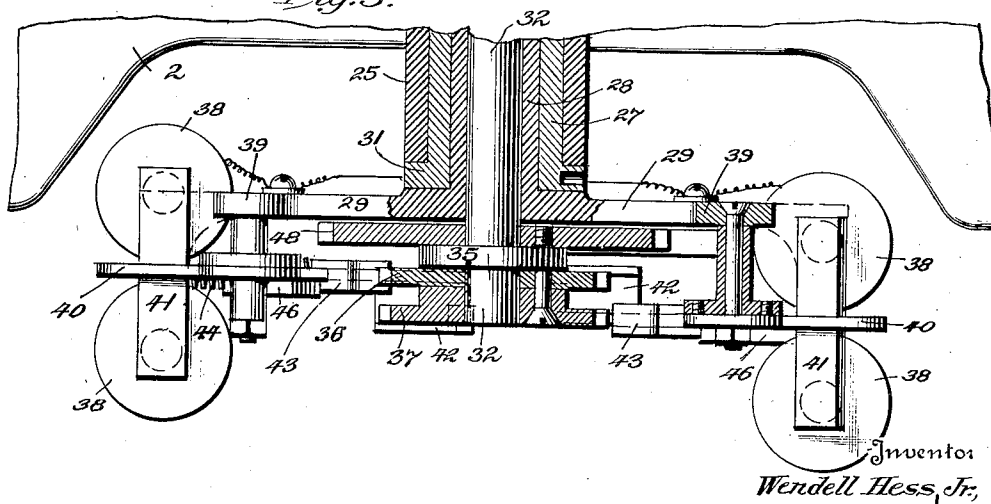


*Fig. 3.*



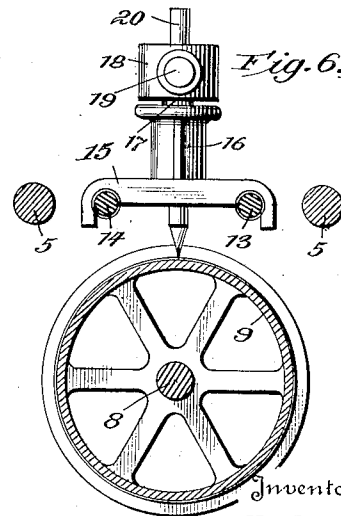
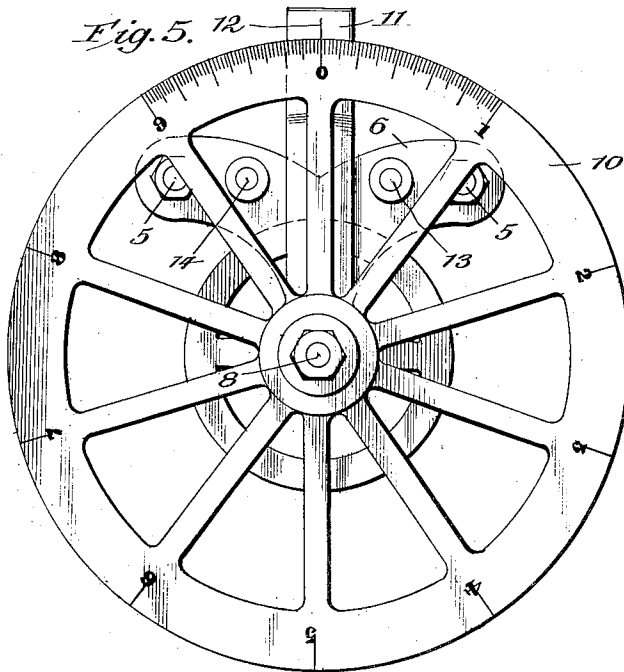
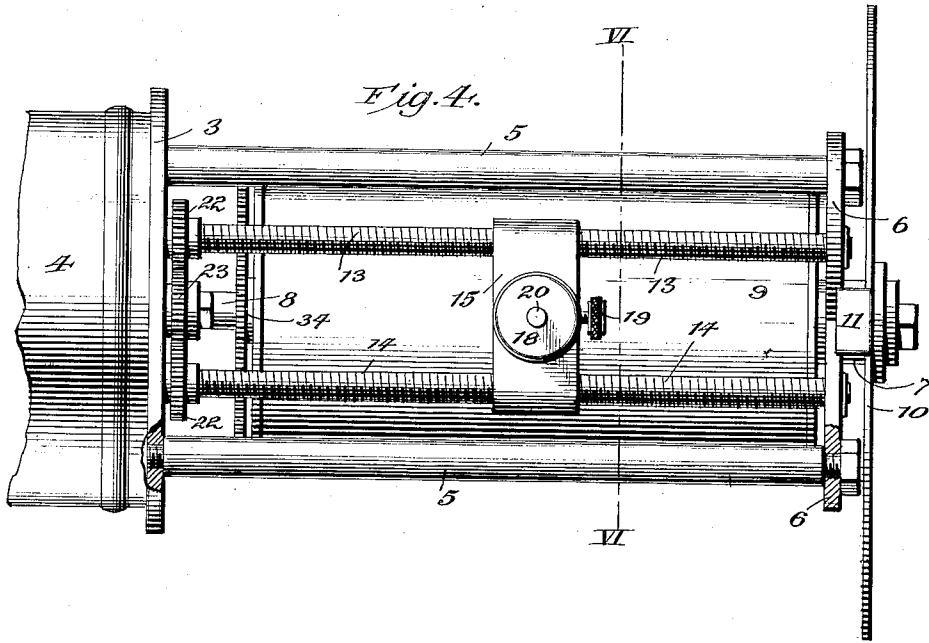
Inventor  
Wendell Hess, Jr.,

By Dodge and Sons,

Attorneys.

1,285,169.

Patented Nov. 19, 1918.  
 4 SHEETS—SHEET 3.



Inventor:  
 Wendell Hess, Jr.

By *Dodge and Sons,*

Attorneys.

1,285,169.

Patented Nov. 19, 1918.  
 4 SHEETS—SHEET 4.

Fig. 7.

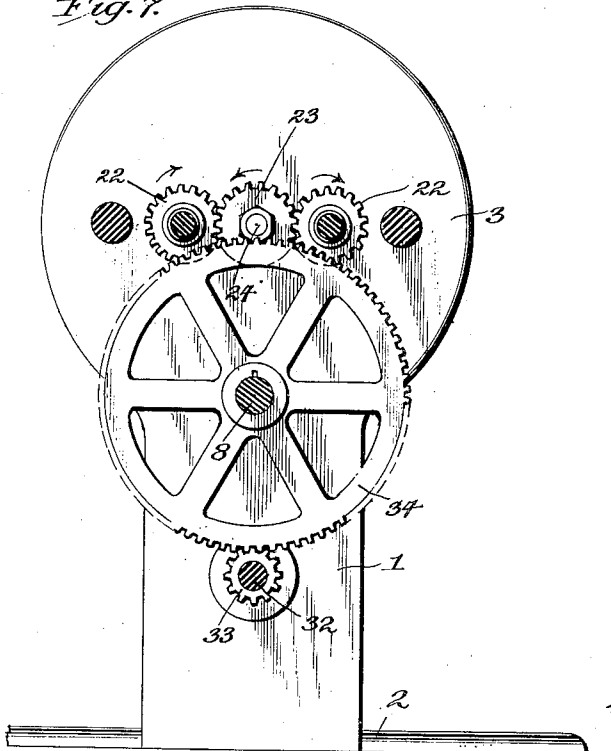


Fig. 9.

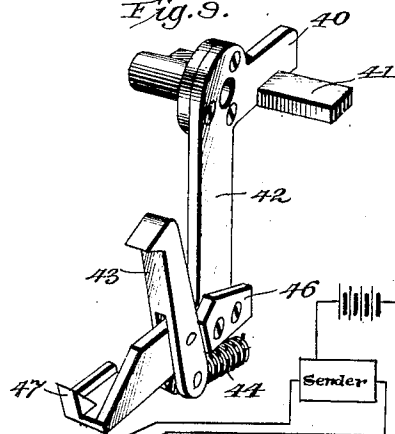
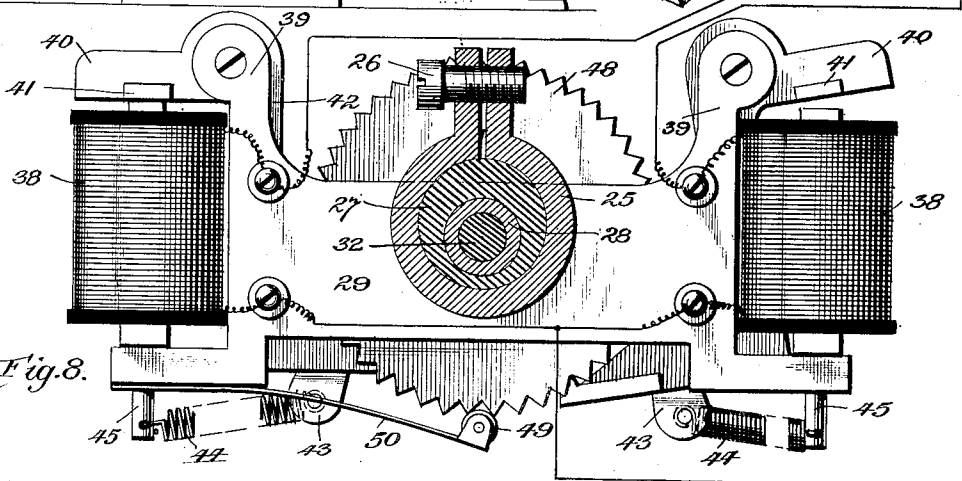


Fig. 8.



Inventor  
 Wendell Hess, Jr.,

By *Dodge and Sons,*

Attorney.

# UNITED STATES PATENT OFFICE.

WENDELL HESS, JR., OF TROY, NEW YORK, ASSIGNOR TO W. & L. E. GURLEY, OF TROY, NEW YORK, A CORPORATION OF NEW YORK.

## WATER-STAGE RECORDER.

1,285,169.

Specification of Letters Patent.

Patented Nov. 19, 1918.

Application filed January 7, 1918. Serial No. 210,685.

*To all whom it may concern:*

Be it known that I, WENDELL HESS, JR., a citizen of the United States, residing at Troy, in the county of Rensselaer and State of New York, have invented a certain new and useful Improvement in Water-Stage Recorders, of which the following is a specification.

My present invention pertains to recorders, and while the structure is designed and adapted more particularly for use as a water-stage recorder, it may be used for recording any desired data.

The main object of the invention is to produce a recorder which is at once simple and effective in construction and operation, and which by reason of its simplicity may be produced at a relatively low cost.

A further object of the invention is to provide means whereby different gear ratios may be utilized between the actuating mechanism and the record sheet carrying drum, said means being primarily one of adjustment of the actuating mechanism as a whole to the drum, whereby the coöperative relation of the various working elements of the actuating mechanism is not disturbed.

A still further object is the provision of special pawl-actuating mechanism of such character that any overthrow of the parts is precluded.

With these and other objects in view reference will be had to the annexed drawings, wherein:

Figure 1 is a longitudinal sectional elevation of the structure;

Fig. 2 a front face view, one of the ratchet wheels being broken away in part;

Fig. 3 a horizontal sectional view on the line III—III of Fig. 2, on an enlarged scale;

Fig. 4 a top plan view with the clock case broken away and the drum driving mechanism omitted;

Fig. 5 a rear face view with the driving or operating mechanism likewise omitted;

Fig. 6 a vertical sectional view on the line VI—VI of Fig. 4;

Fig. 7 a similar view on the line VII—VII of Fig. 1;

Fig. 8 a like view on the line VIII—VIII of Fig. 1, on an enlarged scale; and

Fig. 9 a perspective view of one of the

pawl-carriers, one of the pawls and one of the locking detents employed to prevent overthrow of the parts.

In the drawings, 1 denotes the main frame of the machine, provided with a foot or base 2. The upper portion or head of the plate-like frame 1 is enlarged, as at 3, Fig. 7, and has attached thereto the clock 4.

Threaded into the rear face of the head and extending horizontally therefrom are two bars or rods 5, said rods at their outer ends being connected to a frame or casting 6. Said frame at its lower portion is provided or formed with a bearing 7 through which extends the shaft 8, the opposite end of the shaft finding its bearing in the lower portion of the head 3. The record sheet carrying drum 9 is fixed to shaft 8, and rotates therewith. A graduated dial 10 is secured to the outer end of shaft 8, said dial moving adjacent an arm 11 having an index or reading mark 12 thereon, see Fig. 5.

Journalled in frame 6 and the head 3 are two threaded shafts 13, 14, said shafts overlying the drum and being in spaced relation thereto. Resting upon said shafts is a saddle or block 15, the under face of the block being provided with two threaded grooves adapted to coöperate with the threaded shafts, which latter when rotated effect a feed of the saddle along the shafts and lengthwise of the underlying drum. Said saddle is provided with an upstanding hollow post 16, see Figs. 1 and 6, through which slides the hollow stem 17 of the pencil-carrier, the stem being surmounted by a head 18 in which is mounted a set-screw 19 adapted to clamp the pencil 20 in place. A guide-pin 21 extends upwardly from post 16 and enters a socket or recess formed in the under face of the head 18. The arrangement as just described insures a proper positioning of the pencil and a proper bearing of the point thereof on the record sheet, which is secured in place upon the exterior of the drum. By clamping the pencil in the carrier and having the latter mounted to slide in the post 16, any swelling of the pencil does not affect its operation. The pin 21 prevents rotation of the carrier and consequently rotation of the pencil, insuring an even line or marking on the sheet.

Motion is imparted to shafts 13 and 14 through gears 22 mounted thereon, which latter are in mesh with and are driven by a pinion 23 fast to the clock arbor 24, Fig. 1.

5 Motion of the drum in one or the other direction, according as the water level is rising or falling, is brought about through the following mechanism:

Extending outwardly from the lower portion of the main frame 1 is a split hub 25 adapted to be contracted by a screw 26, Fig. 8. Mounted within said hub is an eccentric sleeve 27, and passing through said sleeve is a tubular extension 28 projecting rearwardly from a cross supporting frame 29, the parts being formed integrally. The rear end of the extension 28 projects beyond the rear face of the frame 1 and is exteriorly threaded, a nut 30 being mounted thereon so that the parts may be brought into close relation. The eccentric sleeve 27 (see Fig. 3) is provided with a collar 31 having openings therein for the insertion of a pin or tool to admit of rotation of the sleeve with reference to the hub 25. The tubular extension 28 forms the bearing for a shaft 32, the rear end of which is designed to support a pinion 33, which meshes with a gear 34 secured to the shaft 32 with reference to the gear 34 may be changed by shifting the eccentric sleeve 27 and pinions of different sizes may, therefore, be mounted upon the shaft 32 and brought into proper engagement with the gear 34, thus changing the degree or amplitude of movement of the drum for each step-by-step movement of the shaft 32.

The outer end of the shaft 32 is formed with a collar 35 (see Fig. 3) and secured to said collar and, therefore, movable with the shaft, are two ratchet-wheels 36 and 37, the teeth of the wheels extending in opposite directions, as best shown in Fig. 2, wherein the forward wheel 37 is partly broken away. Coöperating with each of the ratchet-wheels is an electrically-actuated pawl and overthrow-preventing device, and inasmuch as the devices are the same for each wheel the same reference numerals will be applied to similar parts.

Mounted upon the outwardly-extending end of the frame 29 is an electro-magnet 38, each magnet being in circuit with a sender located at a distant point where the water-level is being taken, one magnet being connected to the rising side of the gage and the other in circuit with the opposite side of the gage, which is actuated by the fall of the water level. Such gage may be of any approved type.

Pivoted to the frame 29, or more specifically to an upward extension 39 thereof, is a lever, one arm 40 thereof carrying an armature 41, while the downwardly-extend-

ing, L-shaped arm 42 of the lever has pivoted thereto a pawl 43. Said pawl has attached to its lower end, below the lever, one end of a coiled spring 44, the opposite end of the spring being secured to a fixed pin 45, the spring serving normally to throw the toothed end of the pawl toward the ratchet wheel 36 or 37 with which it co-operates. A block 46 carried by the lever arm 42, serves to limit the swinging movement of the pawl toward the ratchet. The lower forwardly-extending element of the arm 42 carries at its outer end a tooth 47, said tooth being offset with reference to the pawl 43, so that it coacts with one of the ratchet-wheels when said pawl coöperates with the other wheel.

The collar 35 likewise has secured to it a relatively large toothed wheel or disk 48, and a roller 49 carried at the outer end of a spring arm 50 coacts with the teeth of said wheel or disk and tends to prevent overflow of the parts.

This mechanism also operates to index the ratchet-wheels, so that when the power is not on the magnets the pawls are always in the same relation to the teeth of the ratchet-wheels, thus insuring the pawls entering the teeth and moving the wheels a predetermined fixed distance when the impulse comes over the line and to one or the other of the magnets.

In operation an impulse coming over the line, say to the magnet at the left in Fig. 1, will attract the armature 41 and rock the lever, throwing the pawl 43 into contact with the ratchet-wheel 36 and consequently moving the same the distance of one tooth. As the ratchet-wheel is rotated the tooth 47 will pass into contact with the ratchet-wheel 36, and inasmuch as said tooth is rigid, movement of the shaft through a distance greater than one tooth will be prevented; in other words, overthrow of the parts is precluded. The spring-sustained roller 49 will also assist in preventing overthrow, and likewise assist in the movement of the shaft through the distance of one tooth should the lever and pawl for any reason fail to carry the shaft the proper distance.

The present structure lends itself to the maintenance of the recorder in the office or factory of the user of the water supply and the location of the water-level determining device at a point remote from the recorder, as all that is necessary is to have such determining device close the circuit to one or the other magnet according as the level is rising or falling. Thus the water-level determining device may be located many miles distant from the recorder, and the only connections between the two are the necessary wires for transmitting the electric impulses

set up momentarily, periodically and permanently by the closing of the circuit by the level determining device.

Having thus described my invention, what I claim is:

1. In a recorder, the combination of a drum adapted to support a record sheet; a constantly-driven stylus associated in working relation with the drum; and a plurality of electrically-actuated ratchet devices arranged to rotate the drum.

2. In a recorder, the combination of a drum adapted to support a record sheet; a stylus associated therewith; means for moving the stylus longitudinally of the drum at a fixed rate of speed; opposed ratchet mechanisms for rotating the drum in one or the other direction; and electro-magnets for actuating said ratchet mechanisms.

3. In a recorder, the combination of a drum adapted to support a record sheet; a stylus associated therewith; means for moving the stylus longitudinally of the drum at a fixed rate of speed; a gear rotatable with the drum; a pinion meshing therewith; means for imparting motion in one or the other direction to said pinion; and means for bodily adjusting said last-named means toward or from the axis of the gear, whereby pinions of different sizes may be employed and the amplitude of movement of the drum consequently varied.

4. In a recorder, the combination of a drum adapted to support a record sheet; a driving gear therefor; a pinion meshing with said gear; a pair of ratchet-wheels rotatable with the pinion, the teeth of one wheel being the reverse of the other; an electrically-actuated pawl cooperating with each ratchet-wheel, a stylus bearing on the record sheet; and means for moving the stylus at a fixed rate of speed.

5. In a recorder, the combination of a drum adapted to support a record sheet; a driving gear therefor; a pinion meshing with said gear; a pair of ratchet-wheels rotatable with the pinion, the teeth of one wheel being the reverse of the other; a pair of electro-magnets; a lever pivoted adjacent each magnet; an armature carried by one end of each lever; a pawl pivotally mounted on each lever; and an overthrow-preventing tooth carried by each lever, said teeth and pawls cooperating, respectively, with the two ratchet-wheels.

6. In a recorder, the combination of a frame; a drum adapted to support a record sheet; a driving gear for the drum and axially aligned therewith; a hub extending outwardly from the frame; a sleeve mounted therein, said sleeve having an eccentrically-disposed opening extending longitudinally therethrough; a second frame or support provided with a tubular extension, said ex-

tension fitting within the opening in the sleeve; a shaft mounted in the extension; a pinion secured thereto and meshing with the gear aforesaid; and means attached to the support for rotating the shaft step-by-step in one or the other direction.

7. In a recorder, the combination of a frame; a drum supported thereby; a driving gear for the drum and axially aligned therewith; a driving shaft; a pinion carried by the shaft and meshing with the gear; a bearing for the shaft; means for securing transverse adjustment between said shaft and the gear, whereby pinions of different sizes may be employed; and electrically-actuated mechanism for rotating the shaft, step-by-step, in one or the other direction.

8. In a recorder, the combination of a frame; a drum supported thereby; a driving shaft; gearing interposed between the shaft and drum; a pair of ratchet wheels secured to the shaft, the teeth of the wheels being oppositely inclined; and an actuating device cooperating with the wheels, each device comprising an electro-magnet, a lever, an armature carried thereby, a pawl pivoted upon the lower portion of the lever, a spring serving to throw the pawl toward the oppositely-disposed ratchet-wheel, a stop for limiting such movement, and a fixed tooth likewise carried by the lower portion of the lever, said tooth coacting with the second ratchet-wheel to prevent overthrow thereof when the pawl has advanced the same the distance of one tooth.

9. In a recorder, the combination of a frame; a drum rotatably mounted therein; a graduated dial rotatable with said drum and movable past an index point or mark; a stylus; means for moving said stylus longitudinally of the drum at a fixed rate of speed and in contact with a record sheet carried by the drum; gearing for rotating said drum; and electrically-actuated mechanism for imparting a step-by-step rotation to said gearing in one or the other direction.

10. In a recorder, the combination of a drum adapted to support a record sheet; a driving gear therefor; a pinion meshing with said gear; a pair of ratchet wheels rotatable with the pinion, the teeth of one wheel being the reverse of the other; an electrically actuated pawl cooperating with each ratchet wheel; means to index the ratchet wheels with reference to the pawls; a stylus bearing on the record sheet; and means for moving the stylus at a fixed rate of speed.

11. In a recorder, the combination of a drum adapted to support a record sheet; a stylus associated therewith; means for moving the stylus longitudinally of the drum at a fixed rate of speed; a driving gear secured to the drum; a pinion meshing

with the gear; a pair of ratchet wheels rotatable with the pinion, the teeth of one wheel being the reverse of the other; an electrically actuated pawl cooperating with  
5 each ratchet wheel; a toothed disk secured to the shaft upon which the pinion is mounted; and a spring pressed member cooperating with the teeth upon said wheel, said member serving to move the wheel and consequently the shaft in one or the other direc-

tion when the pawls are in inoperative position, whereby the pawls will occupy the same relative position to the teeth of the ratchet wheels thus insuring the movement of the wheels through a predetermined fixed  
15 distance upon the actuation of their pawl.  
In testimony whereof I have signed my name to this specification.

WENDELL HESS, JR.