

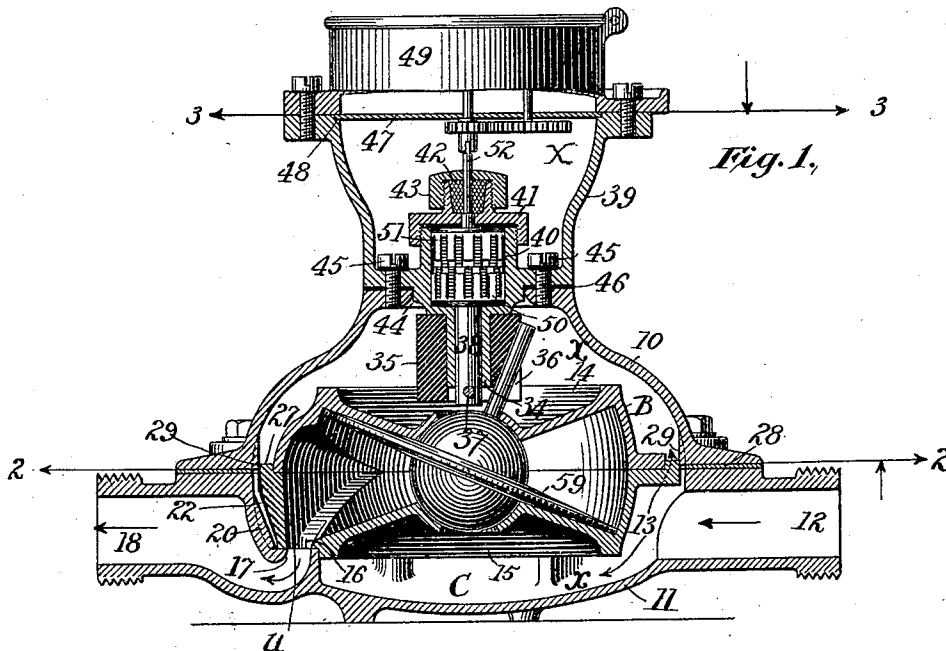
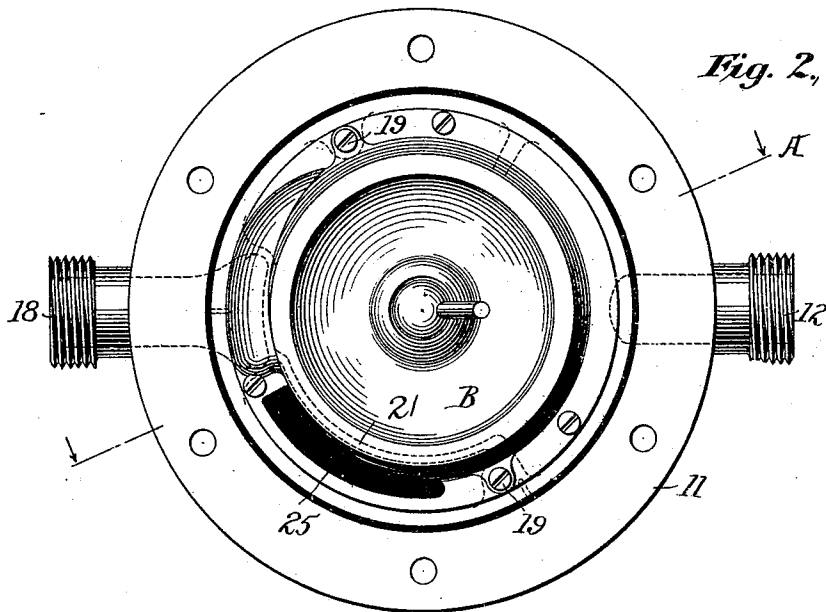
(Model.)

4 Sheets—Sheet 1.

J. THOMSON & F. LAMBERT.
DISK WATER METER.

No. 471,295.

Patented Mar. 22, 1892.



Witnesses:

Geo. G. Hinkel
Henry W. R. Lloyd.

Inventors:
John Thomson
Frank Lambert

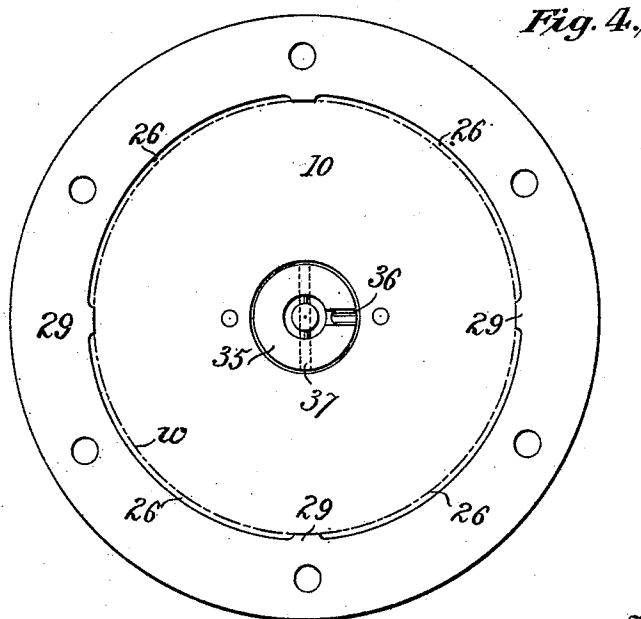
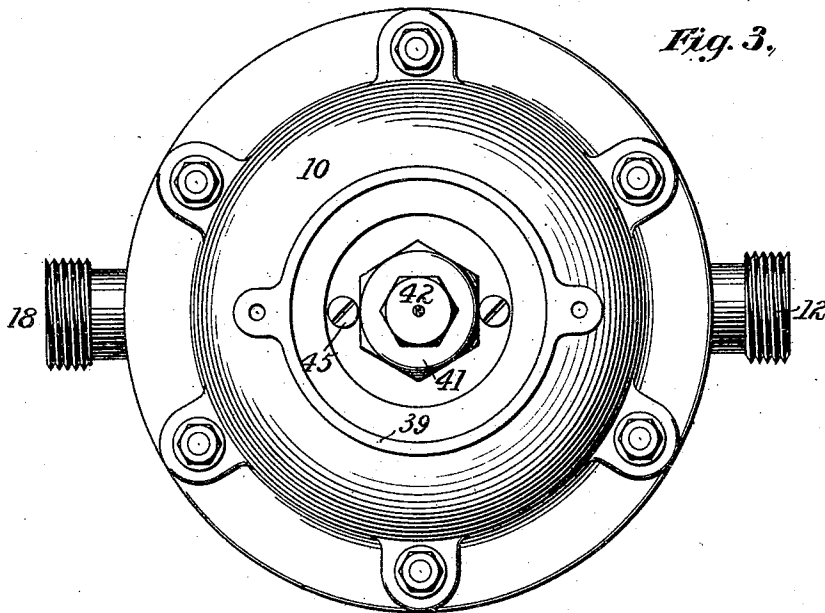
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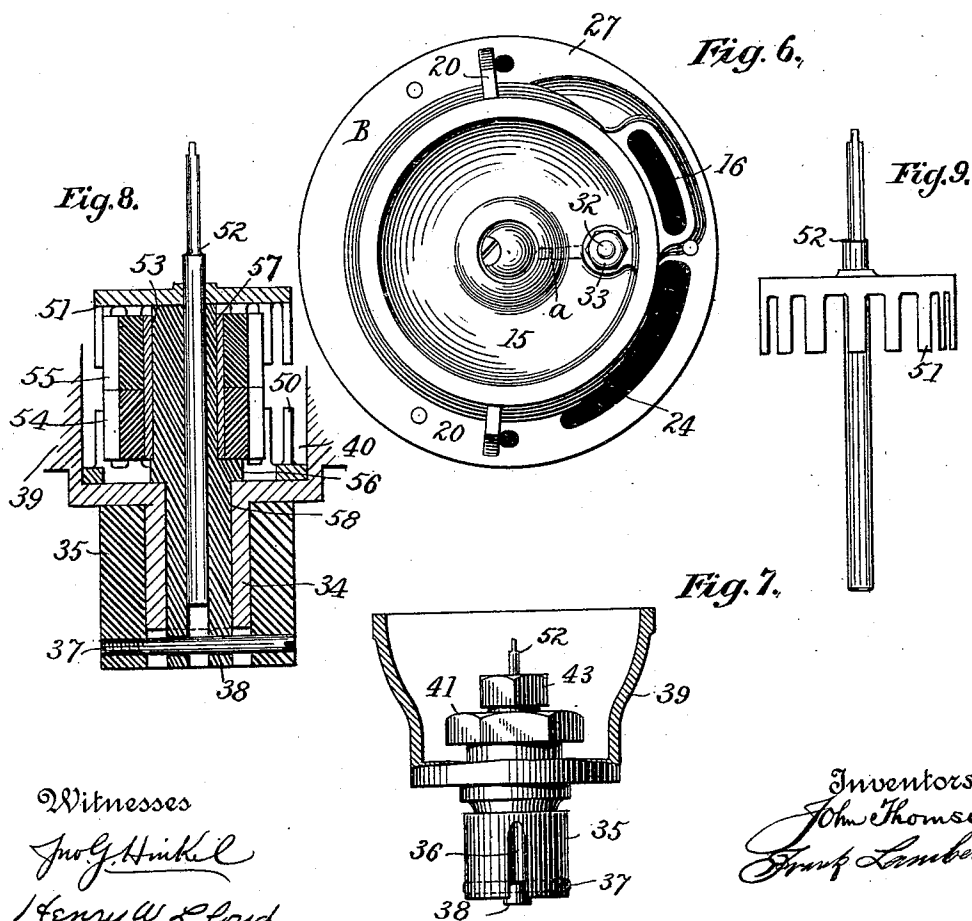
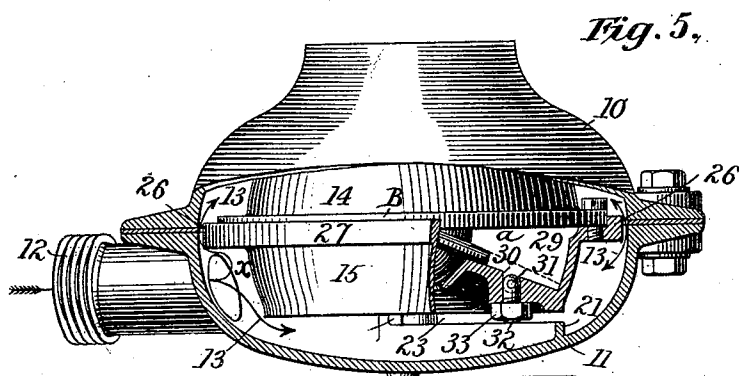
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4 Sheets—Sheet 4.

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Fig. 11.

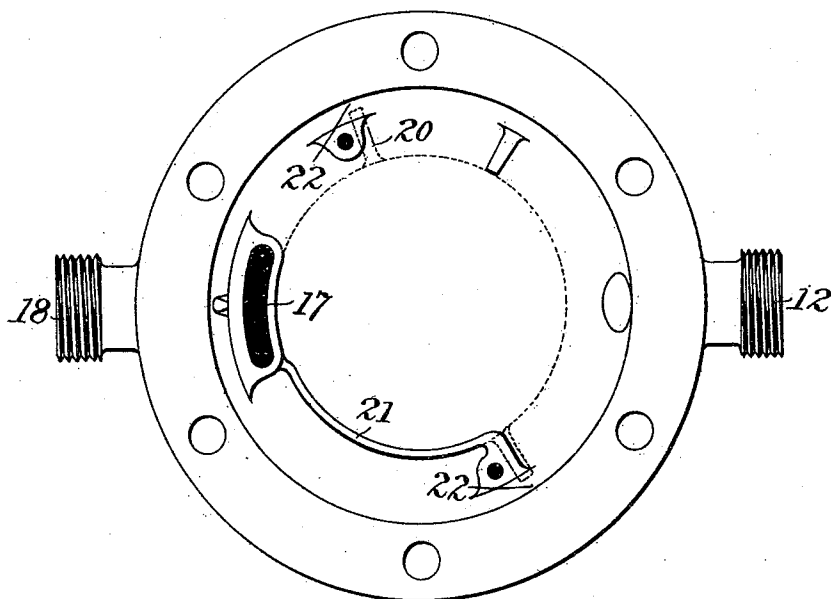
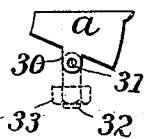


Fig. 10.



WITNESSES

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UNITED STATES PATENT OFFICE.

JOHN THOMSON AND FRANK LAMBERT, OF BROOKLYN, ASSIGNORS TO THE
THOMSON METER COMPANY, OF NEW YORK, N. Y.

DISK WATER-METER.

SPECIFICATION forming part of Letters Patent No. 471,295, dated March 22, 1892.

Application filed April 25, 1891. Serial No. 390,511. (Model.)

To all whom it may concern:

Be it known that we, JOHN THOMSON and FRANK LAMBERT, citizens of the United States, and residents of the city of Brooklyn, Kings
5 county, State of New York, have jointly invented certain Improvements in Disk Water-Meters, of which the following is a specification.

This invention relates to improvements in
10 disk water-meters—such, for instance, as illustrated in our Letters Patent No. 375,023, of December 20, 1887; and our invention consists in certain constructions fully set forth hereinafter, and illustrated in the drawings,
15 in which—

Figure 1 is a vertical center section through the inlet and outlet spuds and casing, exposing the disk and internal-gear train in side elevation. Fig. 2 is a plan view from the upper
20 side of the disk-casing and also of the lower section of the exterior casing. Fig. 3 is an exterior top plan view of the outer casing, the register-box and register removed. Fig. 4 is an interior plan view of the upper
25 section of the outer casing. Fig. 5 is a combined side elevation and section through both the outer casing and the disk-casing on line A, Fig. 2. Fig. 6 is a detached bottom plan view of the disk-casing. Fig. 7 is a detached
30 sectional detail of register-support, disk-controlling device, and internal-gear casing. Fig. 8 is an enlarged sectional detail of the differential internal-gear train, and Fig. 9 is a detail view of stuffing-box spindle and gear attached
35 thereto. Fig. 10 is a detached view of the diaphragm. Fig. 11 is a plan of the lower section of the outer casing.

The several improvements and their objects will be pointed out in the following sections:
40

First. In that form of apparatus illustrated in the aforesaid Letters Patent the disk-chamber is contained within the disk-casing, the periphery of the disk-casing forming part
45 of the outer casing of the apparatus, which construction is attended with advantages over those constructions before used; but in order to further improve the apparatus we have devised the arrangement illustrated in the drawings, in which the disk-casing B is wholly in-
50 closed by the two sections of the outer casing,

comprised of the sections 10 11, separable from each other and bolted together. It will be seen that the disk-casing in the present construction is on a seat supported and secured as by screws 19, while that illustrated
55 in the aforesaid patent is suspended from its rim; but there is one condition which is the same—namely, that the inlet-spud 12 communicates with the space surrounding the
60 disk-casing, as indicated by the arrows 13. Consequently the disk-casing is maintained in perfect balance as to pressure. The advantages of this construction are that the
65 separable sections 14 15, constituting the disk-casing, in consequence of their reduced size are more readily machined by quick processes, and, being entirely inclosed within the outer casing, are subject to but very slight strain,
70 and hence may be of the minimum weight.

Second. The second feature refers to the relative disposal of the outlet-port 16 of the disk-casing, which consists in setting it to register with a corresponding port 17, formed
75 in the lower casing, communicating with the outlet-spud 18, the port 17 extending to a flat face *u*, coinciding with a flat face of the disk-casing, as shown in Fig. 1. The object of this is to obtain a downward discharge from
80 the disk-casing, and which discharge shall also be outside of the area of action of the disk itself, to the end that any foreign substances which may have been driven or carried into the disk-chamber may be more
85 readily ejected.

Third. The third feature relates to the disposal of the disk-casing with respect to the outer casing, the arrangement being such that no foreign material of sufficient bulk to damage the mechanism can pass to the interior
90 of the disk-chamber. This is accomplished by simply providing radial ribs, as 20 20, extending from the section 15, as shown in Fig. 6 and dotted lines, Fig. 11, and a curved rib 21 on the inside of the lower section 11 of
95 the outer casing, (see Figs. 5 and 11,) so situated as to leave narrow vertical spaces, as 22, and a horizontal channel, as 23, instead of a single wide opening, as heretofore. This permits the water to flow directly to the lower
100 part 24 of the inlet-port, which is below the flange 27, while it reaches the part 25 of said

port by passing through the spaces 26, Fig. 5, which extend around the flange 27 of the disk-casing between it and the inside of the upper outer casing. The dotted line W, Fig. 4, indicates the position of the flange 27. As these sinuous slits extend around nearly the entire circumference of the chamber, the required area is readily secured by very narrow spaces, thereby retaining within the space B below the disk-casing any substance which may not properly pass to the disk-chamber. Another advantage of this arrangement is that, although the water at times will pass these narrow openings at a very high velocity, yet the impact of these jets is in the spaces outside of and away from the inlet-port. Hence the flow through the inlet-port to the disk-chamber is relatively at a much lower velocity and favorable to the proper and durable action of the disk and its ball-bearing.

Fourth. The fourth feature refers to the centering of the disk-casing and the upper outer casing with respect to each other, (involving the proper operating of the disk and gearing,) which consists in setting the disk-casing to such a depth in the lower outer casing that a portion of its vertical flange 27 will project slightly above the face of the horizontal flange 28 of the exterior casing. Then the four guiding-points 29 of the upper outer casing are turned to the diameter of the flange 27 of the disk-casing. The advantage of this is that the disk-casing does not require to be accurately centered to the lower outer casing with approximate accuracy only, as by the retaining-screws 19, so that the single operation of turning the guiding-points insures the proper water-way to the chamber above the disk-casing through the intermediate spaces 26 and brings the vertical center of the upper casing into absolute alignment with the corresponding center of the disk-casing.

Fifth. The fifth feature relates to the means for securing the diaphragm *a* to the casing of the disk-chamber, consisting of attaching to the lip 30 of the diaphragm by the pin 31, Figs. 5, 6, and 10, the threaded stud 32, adapted to project through the chamber to be secured by the nut 33. It is to be observed that the stud lies at a right angle to the horizontal plane of the disk-chamber. Therefore when the nut is tightened the diaphragm is drawn forcibly downward and is also slid outward upon the inclined surface of the chamber to its exterior spherical surface, the pivotal connection permitting parts to accommodate themselves to each other. This insures a perfectly-tight joint and durable structure, while yet permitting the ready removal of the diaphragm. Any other suitable form of device for drawing the diaphragm downward may be used.

Sixth. The sixth feature relates to the method of controlling the action of the disk, which consists in forming a journal-bearing

34, projecting inward from the exterior casing and mounting thereon a crank-block 35, having a slot 36 to engage the disk-spindle, which latter as it gyrates causes the revolution of the crank-block, thereby insuring the proper action of the disk within its chamber. The crank-block is maintained in position by the stud screw or pin 37, which passes transversely through the block to which it is secured, and also passing freely through the lower end 38 of the gear-shaft, the block thus serving to transmit the motion of the disk to the gear-train and register. Said crank-block may, however, be formed in one piece with the spindle.

Seventh. The seventh feature relates to the manner of mounting the crank-block, the gear-train, and the register, which consists in applying the crank-block, as already described, to the inwardly-projecting bearing 34, which, however, is preferably here shown as a part of the separate cup or register support 39. The gearing is contained within the chamber 40, inclosed by the cap 41, which may be in the form of a nut, in which is formed the stuffing-box 42, having the usual stuffing-box cap 43. The opening 44 through the upper outer casing 10 is to be large enough to permit the insertion of the bearing, with or without a crank-block, from the outside of the casing, the cup being secured thereto, as by means of the screws 45, and a tight joint obtained by the gasket 46. The lower plate 47 of the register is fitted to the recess 48 of the cup, being clamped between the parts 39 and 40, so that when the register-box 49 is secured to the cup the register is locked firmly to its position. The advantages of this arrangement are that the internal gearing is contained within a tight chamber X, Fig. 1, closed by the plate 47, which chamber may be filled with oil to exclude both water and grit, and that the entire device, with the parts of and connections to the register, may be attached to or removed from the outer casing without disconnecting the outer casing and without disturbing the disk-casing.

Eighth. The eighth feature refers to the arrangement of the internal-gear train, which communicates between the disk and the register. In the drawing this is shown to be a train of differential gearing arranged to obtain the utmost compactness and yet to afford the greatest possible area of wearing-surfaces with such a combination of material as to insure practical immunity from friction, thereby insuring the maximum results both in durability and sensibility. In the drawings, is the fixed external gear, secured in the chamber 40. 51 is the driven external gear, fast to the stuffing-box spindle 52. These gears, together with the spindle, are made of metal. The upper extension 51 of the gear-shaft is an eccentric upon which is mounted the internal gears 54 55. The shoulder 56 of the eccentric sustains the weight of the gearing, the shaft, the eccentric, and the crank-block.

The gears 54 55 are made separately, as they require an unequal number of teeth; but both are fixed to each other and are driven by the eccentric, as if one single gear. The gear 54 is turned as it travels in contact with the gear 50, and the motion thus imparted to the gear 55 drives the gear 51. A metal bushing 53 is forced into the internal gears, tight thereto, and the spindle extends down through nearly the entire length of the eccentric and the shaft. The crank-block, the shaft, and its eccentric and the internal gears 54 55 are made of hard rubber or other non-metallic material. The consequence of this arrangement and combination of material is that the well-known low specific gravity of rubber imposes the minimum of weight upon the shoulder 56, while the combination of hard rubber and metal with concentric bearings affords to the crank-block 35 and bearing 34 a support of ample rigidity and extent to withstand the direct thrust of the disk-spindle, leaving the pin 37 free to transact simple rotary motion to the shaft, which is guided by the bearing 58 and in turn affords and also receives guidance from the stuffing-box spindle, while the metal sleeve 53 provides the metallic and hard-rubber combination between the eccentric and the internal gears, and the same combination is found between the teeth-contact of the internal and external gearing.

Without limiting ourselves to the precise construction and arrangement of parts shown, we claim—

1. The combination, in a disk water-meter, of a main outer casing and a separate disk-casing in which the arrangement and construction are such that the disk-casing is contained within the outer casing by attachment to a flat seat therein, the inlet communicating with a free space surrounding the disk-casing, while the discharge therefrom is through a port formed jointly in the disk-casing and the aforesaid flat seat, substantially as specified.

2. In a disk water-meter, the combination, with the disk and its casing, of an outlet-port arranged to discharge downwardly and outside of the area of action of the disk, substantially as specified.

3. In a disk water-meter in which the disk and its casing are contained within a separate outer casing, the combination, with the inlet-port of the disk-casing, of a series of ribs arranged to form a series of narrow slits communicating between the inlet of the outer casing and the spaces leading to the inlet-port of the disk-casing, for the purpose set forth.

4. In a disk water-meter, the combination,

with the disk-casing, of a detachable diaphragm and a securing device constructed to draw the edge of the diaphragm against the inclined surface of the casing, whereby to cause the diaphragm to slide outwardly to insure contact thereof with the spherical wall of the casing, substantially as set forth.

5. In a disk water-meter, the combination, with the disk-casing and diaphragm, of the stud pivotally connected to the diaphragm to project through the chamber and be secured thereto by securing means, for the purpose specified.

6. The combination, with the outer casing and the disk-casing contained therein, of the cup having a closed chamber containing a system of differential gearing provided with a crank-block adapted to control and transmit the motion of the disk and with a stuffing-box and register-seat, all connected together and adapted to be attached from the outside of the casing, substantially as specified.

7. In a disk water-meter, the combination, with the disk and its casing, of the cup to which is directly connected the support for the crank-block, the eccentric and differential gearing driven thereby, the stuffing-box spindle, cap-nut, and stuffing-box, substantially as specified.

8. In a disk water-meter, the combination, in the differential-gear train, substantially such as described, of the following elements: the non-metallic crank-block mounted upon a metallic journal and freely connected, as by the pin 37, to the non-metallic gear-shaft mounted in a metallic bearing, the non-metallic internal gears secured together and having a metallic bushing to bear upon the eccentric, the metallic fixed and driven external gears meshing with the teeth of the internal gears, and the metal stuffing-box spindle fast to the drive-gear and having a bearing in the eccentric and shaft, substantially as and for the purpose set forth.

9. In a water-meter, the combination, with the cup, gear-chamber, differential gearing, and spindle, of the inclosing cap containing the stuffing-box and stuffing-box nut, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN THOMSON.
FRANK LAMBERT.

Witnesses:

EDWD. K. ANDERTON,
F. L. FREEMAN.