No. 642,765. Patented Feb. 6, 1900.

J. THOMSON.

COMPOUND GEAR TRAIN FOR WATER METERS.

(Application filed Sept. 15, 1899.)

(No Model.)

Fig. 1.

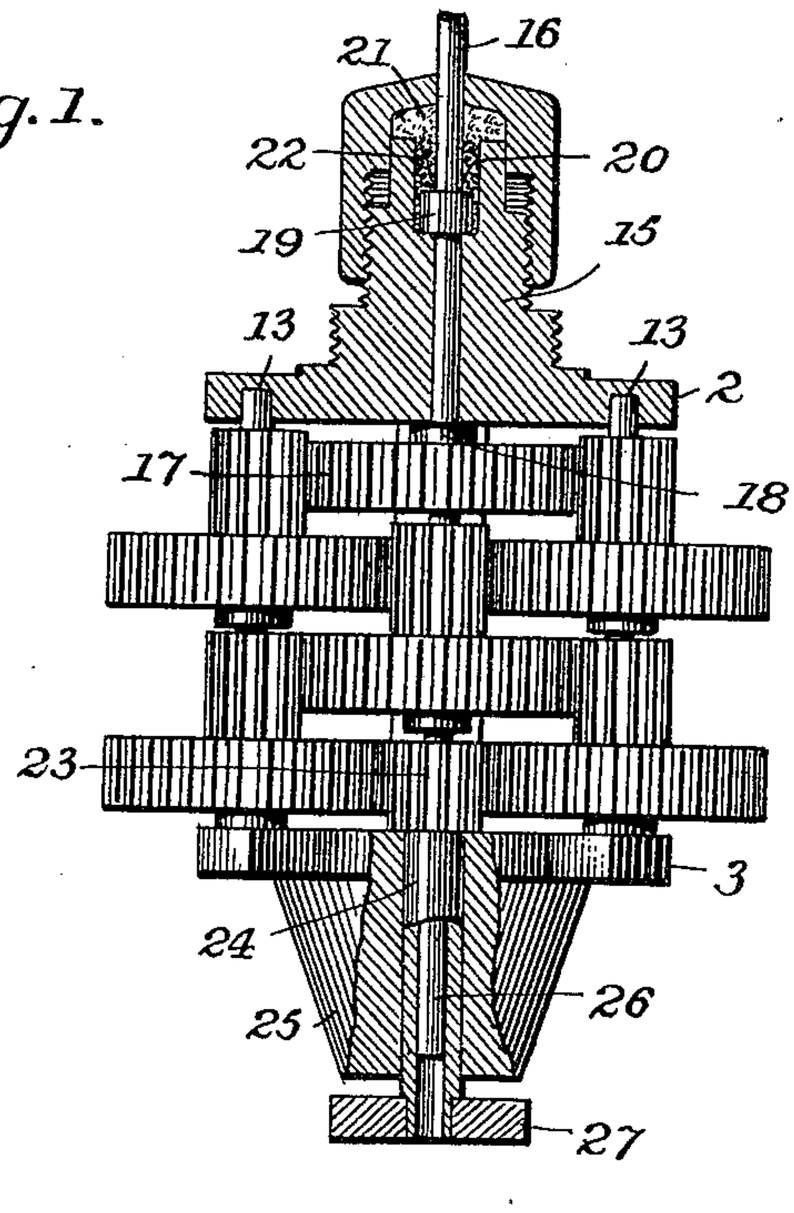
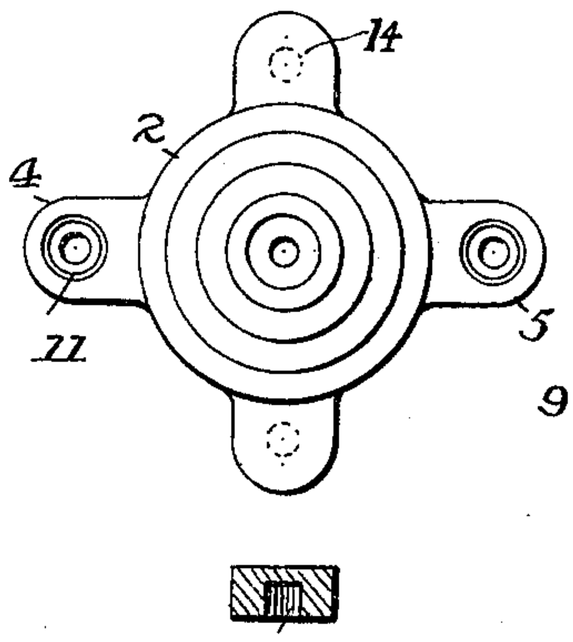


Fig. 2.

Fig. 3.



14 Fig. 3.a

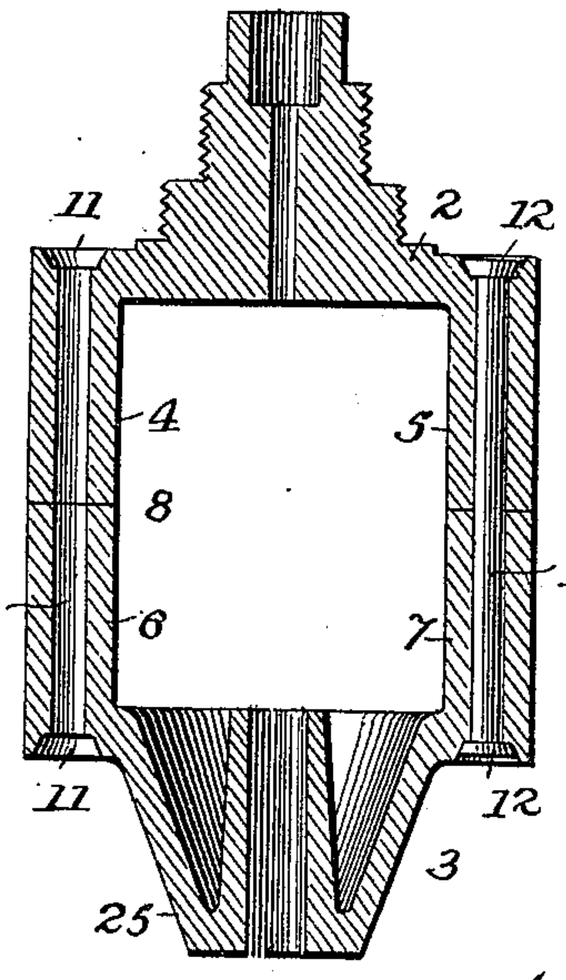
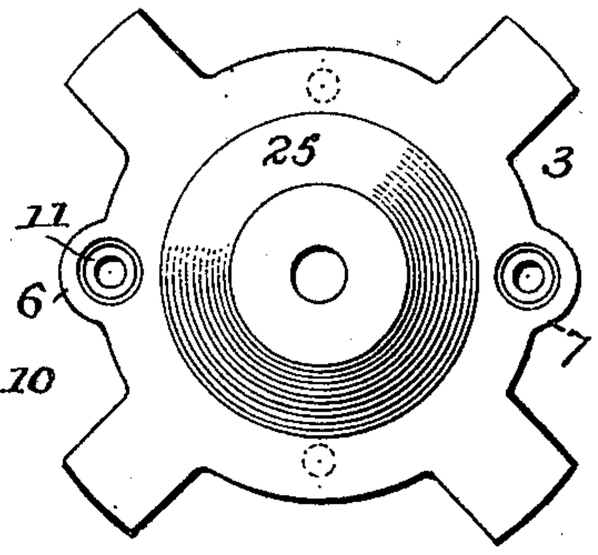


Fig. 4.



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UNITED STATES PATENT OFFICE.

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COMPOUND GEAR-TRAIN FOR WATER-METERS.

SPECIFICATION forming part of Letters Patent No. 642,765, dated February 6, 1900.

Application filed September 15, 1899. Serial No. 730,627. (No model.)

To all whom it may concern:

Be it known that I, JOHN THOMSON, a citizen of the United States, residing at New York, (Brooklyn,) in the county of Kings and State of New York, have invented certain new and useful Improvements in the Construction of Compound Gear-Trains for Water-Meters, of which the following is a specification.

My invention relates to speed-changing spur-gear trains; and it has for its object to provide an improved construction and arrangement of parts tending to produce accuracy in operation and durability of use of such devices; and to these ends it consists in the features of construction and arrangement of parts, substantially as hereinafter more particularly set forth.

In the accompanying drawings, Figure 1 is an elevation, partly in section, of a train having my improvements embodied therein. Fig. 2 is a vertical section at right angles to the section in Fig 1, showing the construction of the gear-plates and bearings. Fig. 3 is a plan view of the upper gear-plate. Fig. 3^a is a transverse section of a portion of Fig. 3, showing the blind bearings; and Fig. 4 is a plan view of the lower gear-plate.

My improvements may be embodied in various forms and styles of spur-gear trains; but for the purposes of illustration I have shown them in connection with a train such as is illustrated and claimed in my Patent No. 535,643, of March 12, 1895.

It is not deemed necessary to describe with particularity the various gears shown, as they form no part of my present invention and as their construction and operation are well understood by those skilled in the art, it being sufficient to state that there is a driven member and a driving member contained in the central series of the gears and there is a double series of pinions and gears meshing with the central series and being disposed in approximately the same vertical plane and serving to change the speed between the driven and driving members and avoid to a greater or less extent the objections of side thrust.

It is well known that it is exceedingly desirable to produce a structure in which there will be the least amount of friction and in which there will be a uniform amount of friction whatever may be its amount and in which there will be the least disturbance of the proper relations of the gears due to wear, all these features tending to efficient operation and durability of use, as any variation or disturbance of the relations of the parts tends to inaccuracy of operation, which in the present state of the art is a fatal objection, especially when such gear-trains are used in connection with water-meters.

Heretofore the upper gear-plate 2 and the lower gear-plate 3 have been secured together by separate pillars extending from one to the other; but they are liable to distortion to a greater or less extent, and in order to overcome these objections I provide each plate with pillars which are formed integral with the plates, and preferably these pillars are of a length so that they are separated about the medium line between the plates when they are in operative position. Thus, as shown in the drawings, the pillars 4 and 5 are formed integral with the upper gear-plate 2 and the pillars 6 and 7 are formed integral with the lower gear-plate 3, and these are shown as being of substantially equal length and abutting each other about the medium line 8 between the plates. These pillars are provided with central cylindrical bores 9, into which are inserted rods 10, these being formed so as to fit tightly in the bores and preserve the pillars of the two gear-plates in proper alinement. To lock the gear-plates together, the bores in the pillars preferably terminate in shallow countersunk openings 11, and the length of the rods 10 are preferably less than the distance between the outer surfaces of the gear-plates, and the ends of the rods can thus be riveted or upset into the countersunk spaces, as indicated at 12, thus securely tying the gear-plates together and leaving their outer surfaces free from projections. It will readily be seen that by this construction, the pillars having been made integral with the plates and the rods fitting tightly in the central bores and being secured in position, the plates are held in accurate adjustment and alinement and the gears when once adjusted are free from strain or undue friction caused by distortion or change in the relations of the gear-plates. The outer series of gears and pinions are mounted to rotate freely upon cylindrical

pins or rods 13, supported in the gear-plates 2 and 3. It has been found desirable that these pins or rods should be loosely mounted in the plates, so that they are free to intermittently revolve under the influence of the gears freely mounted thereon, and in order to accomplish this I provide the gear-plates 2 or 3 with sockets or blind bearings 14, into which the ends of the rods or pins 13 are fitted and which hold them against endwise and sidewise thrust. In this construction no shoulders are required on the rods or pins, and they being free they intermittently revolve with a speed differential to that of the gear-plate mounted thereon, and thereby they present their entire surface to resist the side thrust and produce a uniform wear not only on the rods or pins, but on the gear mounted thereon, and the consequence is that there is a material increase in the durability as well as the accuracy of the operation of the gear-train.

Heretofore it has been the practice to depend upon the friction in the stuffing-box 15 to sustain the stuffing-box or driving-spindle 16 and its attached driving-gear 17; but it frequently occurs that the spindle and its attached parts are pressed downward to the extent of the lost motion provided, which may result in interfering with the working members of the gear-train. If when the train is used in a water-meter the internal water-pressure against the end of the spindle and its attached driving-gear is greater than the friction of the packing material in the stuffing-box, the spindle may be restored to its proper position; but this is an uncertain quantity and does not conduce to accuracy of operation. To avoid these objections, I provide the driving-spindle 16 with a shoulder 18 below the upper gear-plate 2, and I further provide the spindle with a collar 19, which is pressed tightly upon the spindle and is adapted to rest in the bottom of the bore in the stuffing-box chamber 20. In this wise the end thrust of the spindle is taken either by the collar 19 from above or the shoulder 18 from below and the position of the driving-spindle is fixed. Furthermore, I form the stuffing-box chamber 20 of such a depth and size that friction on the side of the collar is avoided and the packing material 21 around the spindle is prevented from impinging on the collar. Furthermore, I preferably supply the chamber with some lubricating material 22—such, for instance, as graphite or the like—which may fill the chamber around the spindle or collar, providing a suitable lubricant and an automatic packing for the spindle, as any dynamic movement of the fluid upward will induce the free material to flow with it.

Another difficulty arises in the manner of connecting the driving-pinion 23 with the gear-plates so that a satisfactory action will occur. In the present case the driving-pinion 23 is formed integral with its spindle 24, and this fits accurately in the end bearings 25, projecting downwardly from the gear-plate 3. This spindle is provided with some driving means, as the arm 27, which is secured to the end thereof in any desired way. The spindle is provided with a central bore, forming an axial bearing for the lower and extended ends 26 of the stuffing-box or driving-spindle 16. In this way not only is there an extended bearing-surface provided for both the driven pinion and for the stuffing-box or driving-pinion, but they are so arranged that they tend to preserve the proper alinement and avoid friction and wear.

It will be seen that all these improvements conduce to the same general purposes and objects of the invention in that they tend to avoid undue friction, produce uniform wear of the parts, and the least wear possible, tending to durability of use and accuracy of construction.

What I claim is—

1. In a spur-gear train, two gear-plates supporting the train, the adjacent faces of the plates being provided with integral pillars extending longitudinally beyond the plates to the medium line between the plates with their ends abutting, said pillars having central bores, and rods tightly fitting the bores of the opposing pillars, substantially as described.

2. In a spur-gear train, two gear-plates supporting the train, the adjacent faces of the plates being provided with integral pillars extending longitudinally beyond the plates to the medium line between the plates with their ends abutting, said pillars having central bores, rods tightly fitting the bores of the opposing pillars the plates also being provided on their adjacent faces with blind bearings, and rods loosely mounted in said blind bearings, substantially as described.

3. In a spur-gear train, the combination with the gear-plates and a stuffing-box supported thereon having a stuffing-box chamber in its end, of a stuffing-box spindle mounted therein and provided with a shoulder bearing on the under side of the gear-plate, and a collar having a bearing in the stuffing-box chamber, substantially as described.

4. In a spur-gear train of a water-meter, the combination with the gear-plates the stuffing-box and the driving-pinion having formed integral therewith a hollow spindle and provided with a driving-arm, of a driven spindle having a bearing in said driving-spindle, the upper end of the driven spindle passing through the stuffing-box, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN THOMSON.

Witnesses:
W. G. ZICK,
J. MCKINNON.