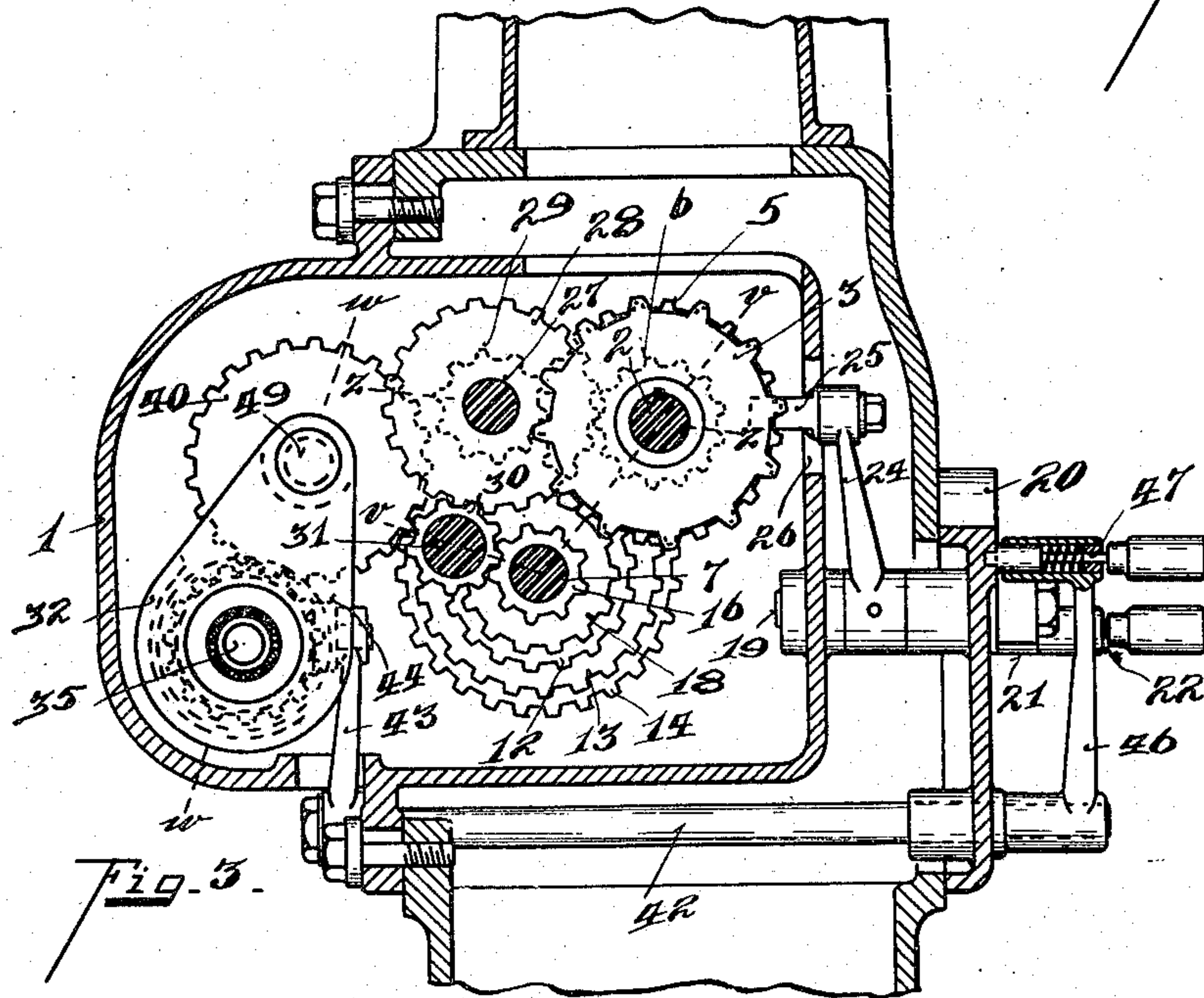
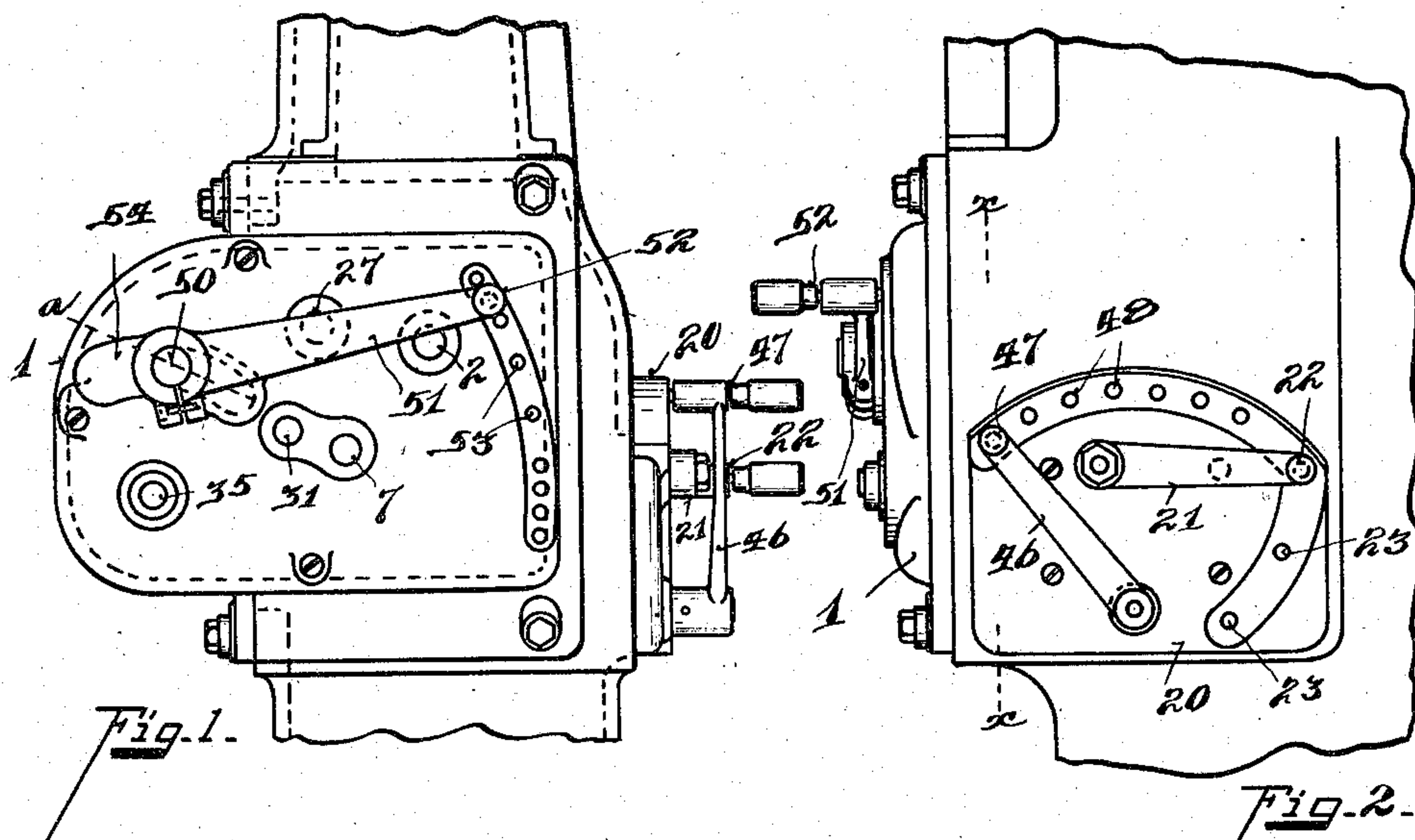


No. 840,671.

PATENTED JAN. 8, 1907.

L. THIEL.
VARIABLE SPEED MECHANISM.
APPLICATION FILED JULY 17, 1906.

2 SHEETS—SHEET 1.



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Witnesses

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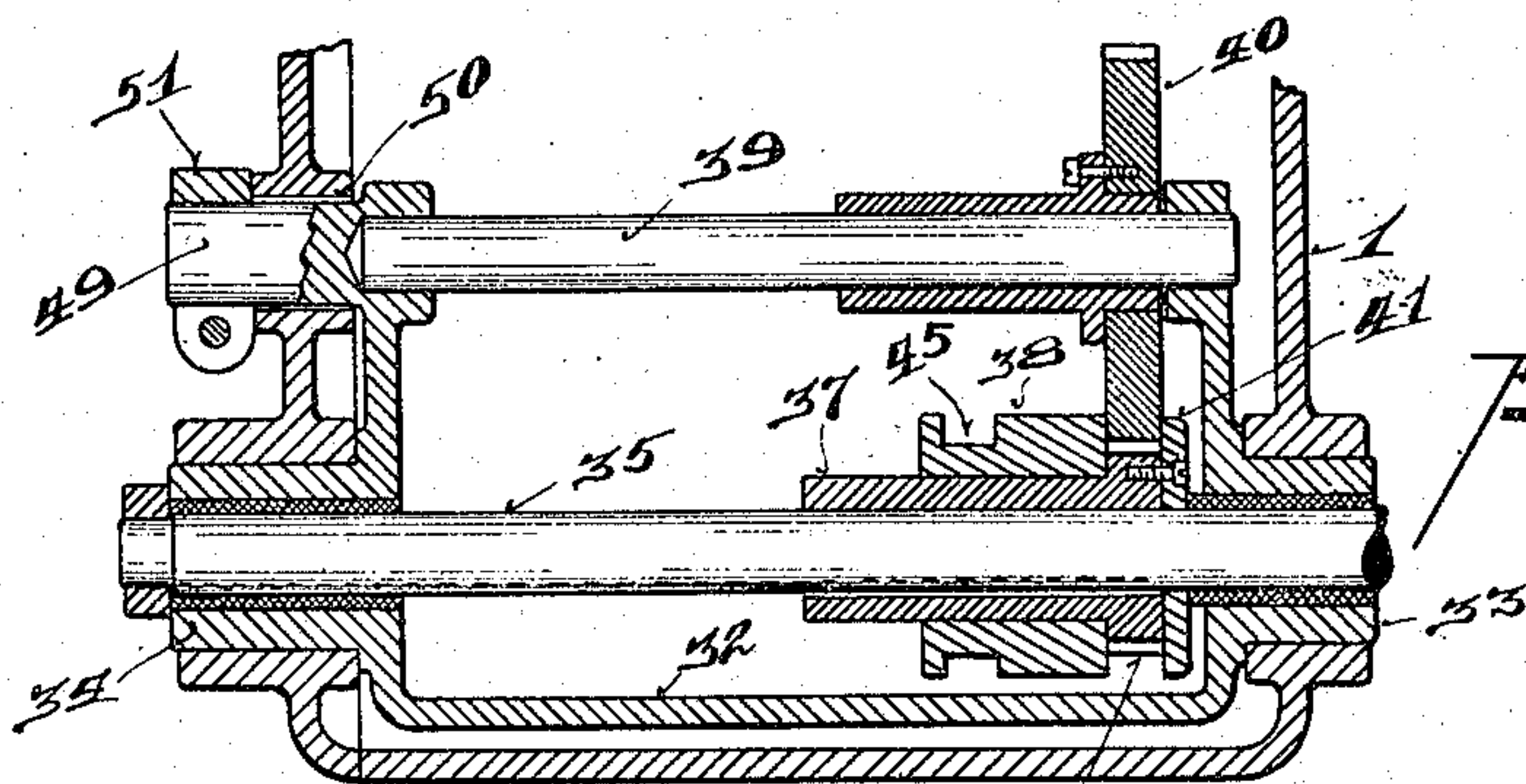


Fig. 4.

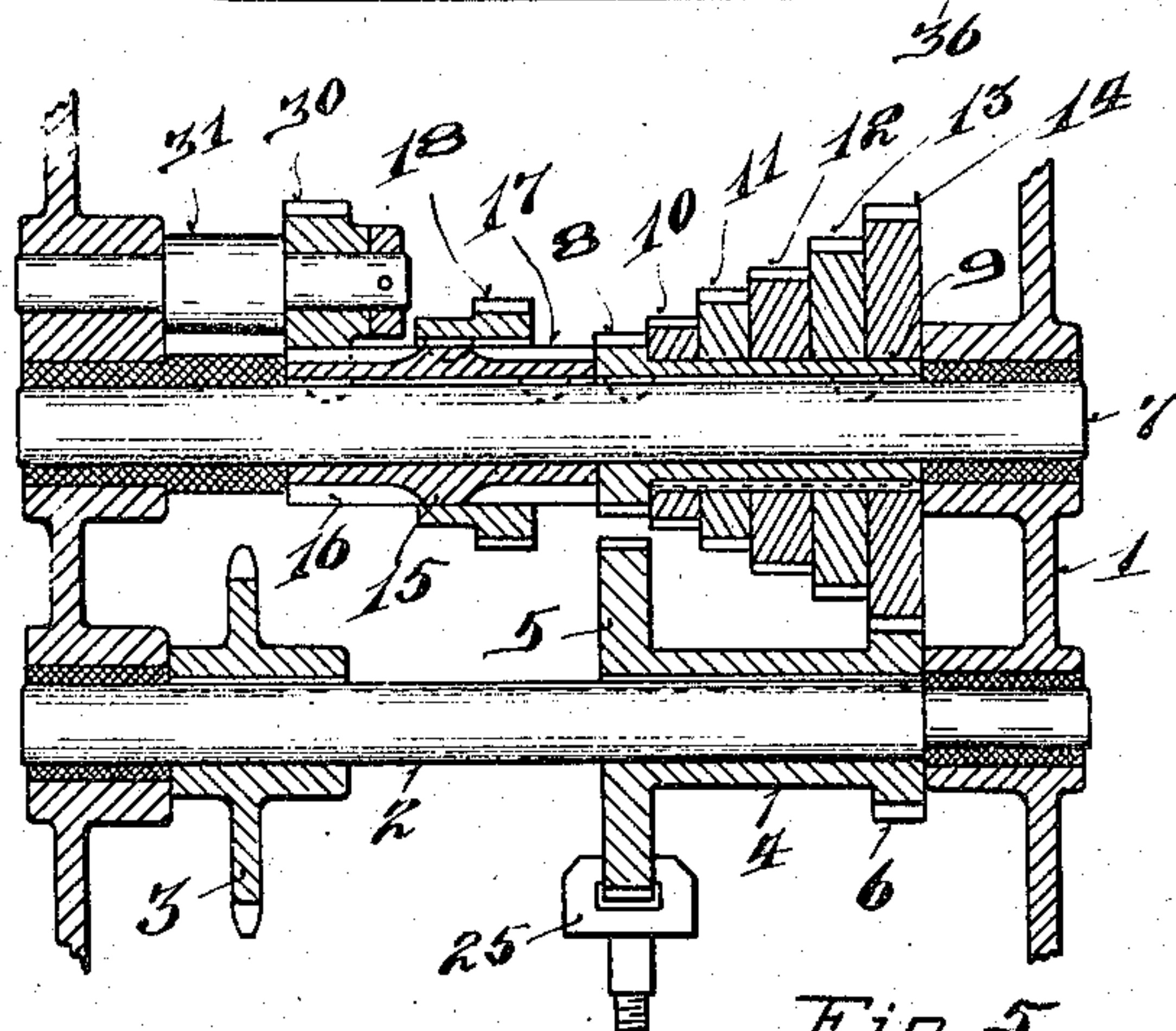


Fig. 5.

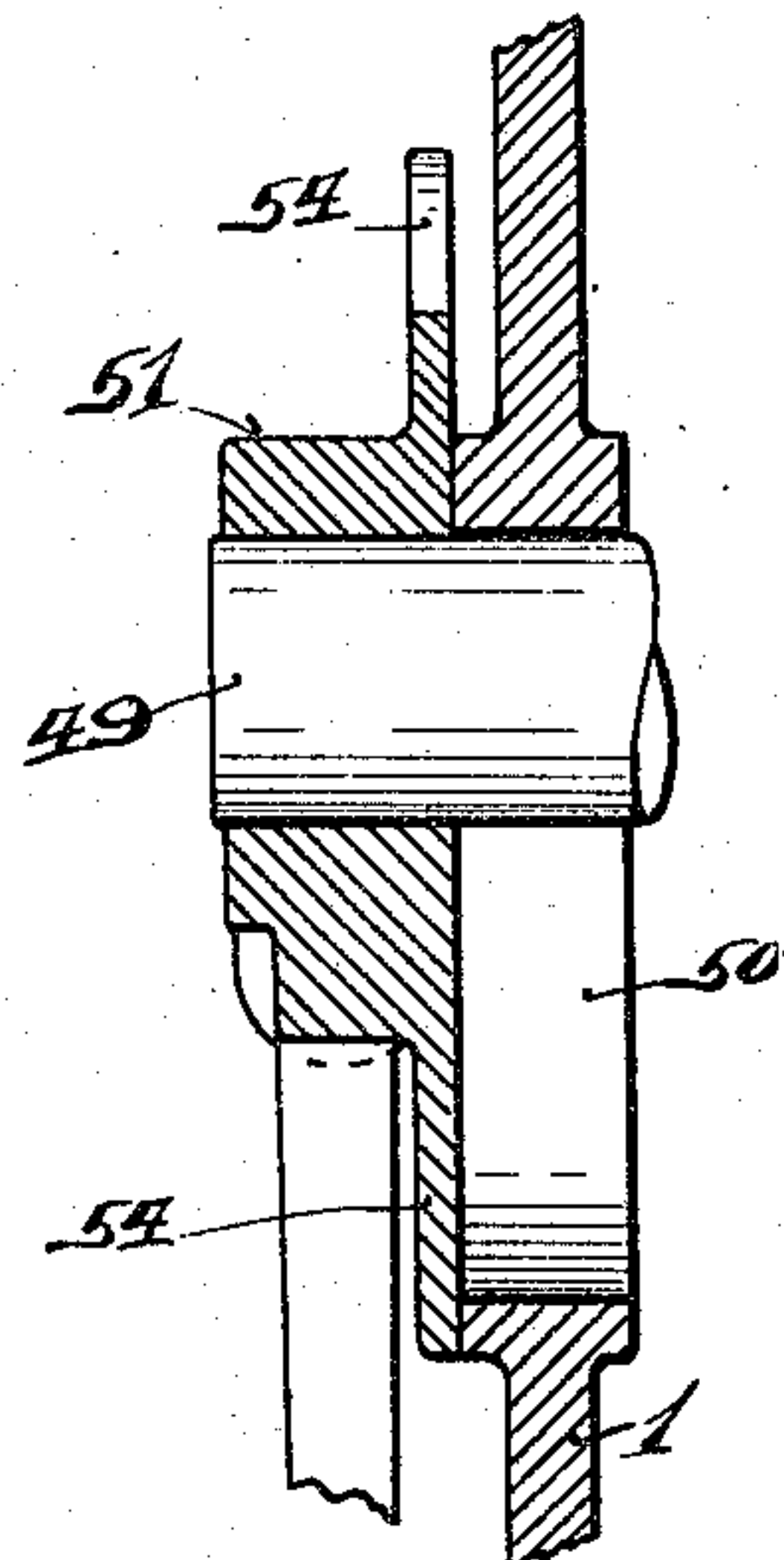


Fig. 7.

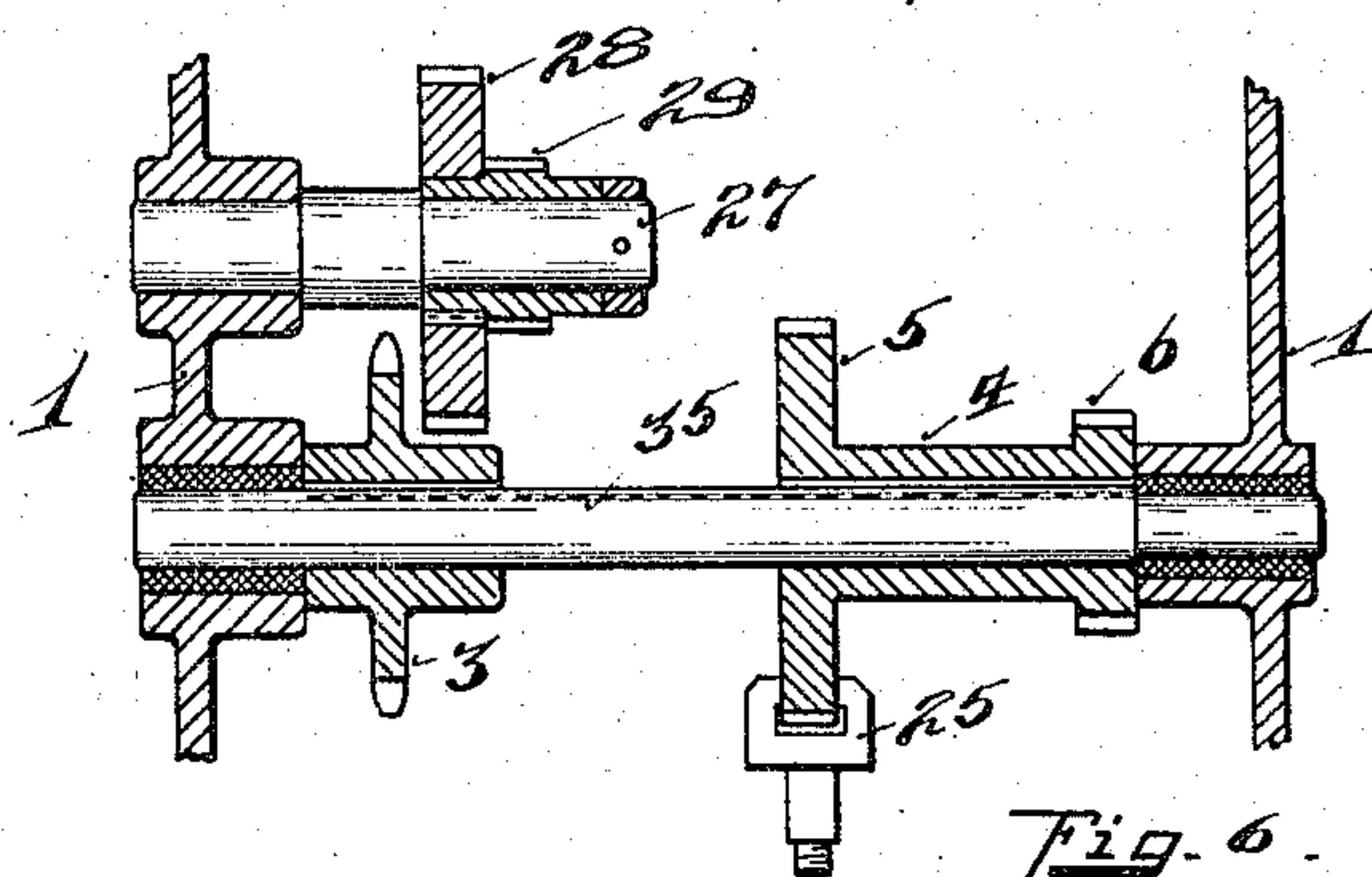


Fig. 6.

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UNITED STATES PATENT OFFICE.

LOUIS THIEL, OF CINCINNATI, OHIO, ASSIGNOR TO THE CINCINNATI MILLING MACHINE COMPANY, OF CINCINNATI, OHIO, A CORPORATION.

VARIABLE-SPEED MECHANISM.

No. 840,671.

Specification of Letters Patent.

Patented Jan. 8, 1907.

Application filed July 17, 1906. Serial No. 326,612.

To all whom it may concern:

Be it known that I, LOUIS THIEL, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Variable-Speed Mechanism, of which the following is a specification.

My invention relates to variable-speed mechanism used in connection with machine-tools.

The principal object of my invention relates to the shifting of tumbler mechanism for accomplishing changes of speed from a driving to a driven shaft.

The features of the invention will be more fully set forth in the description of the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a front elevation of my improved speed-box as applied to a milling-machine. Fig. 2 is a side elevation thereof. Fig. 3 is an enlarged section on line *x x*, Fig. 2. Fig. 4 is a section on line *w w*, Fig. 3. Fig. 5 is a section on line *v v*, Fig. 3. Fig. 6 is a section on line *z z*, Fig. 3. Fig. 7 is an enlarged section on line *a*, Fig. 1. Fig. 8 illustrates the general organization of the shafts and gearing.

1 represents a box inclosing the parts, to be hereinafter described.

2 represents the driving-shaft, suitably journaled in bearings in the box, having thereon a driving-wheel 3. (See also Fig. 5.) This wheel 3 is shown as a sprocket-wheel and is driven by a sprocket-chain (not shown) from the main drive of the machine. On shaft 2 is mounted a sleeve 4, adapted to turn with and slide on shaft 2, said sleeve being provided with two gears 5 6 of different diameter.

7 represents a second shaft journaled in the box, and which for convenience I will call a "cone-shaft." On shaft 7 is fixed a gear-wheel 8, having an elongated sleeve 9, upon which sleeve are fixed the successive gear-wheels of the cone 10 11 12 13 14, respectively.

15 represents a sleeve fixed to shaft 7, having the gear-teeth 16 and 17 cut on each end thereof, and 18 represents a gear-wheel fixed to the sleeve 15.

The sleeve 4 may be slid so as to engage the gear-wheel 6 with the cone gear-wheel 14 for one rate of drive and also adapted to be

slid to intermesh the gear-wheel 5 with the gear-wheel 18 for another change of speed to the cone. To slide sleeve 4, I journal a stud shaft 19 in bearings formed in the casing or box 1 and in bearings formed in an index-plate 20, fixed to the body of the machine, within which the box or casing 1 is secured. Shaft 19 is provided with a crank-handle 21, having detent mechanism 22 to engage segmentally-arranged orifices 23 in the plate 20. On the inner end of shaft 19 an arm is fixed having a fork 25 swiveled in its free end.

The box 1 is provided with an opening 26, through which the fork 25 projects, the inner end of the fork straddling the gear-wheel 5, so as to shift the sleeve 4 with its contained gears to different positions.

In order to utilize the shifting of sleeve 4 to give another change of speed to the cone of shaft 7, I provide a stud-shaft 27, upon which are fixed two gear-wheels of different diameter 28 29, respectively, adapted to rotate together. Gear-wheel 28 intermeshes with a pinion 30 on a stud-shaft 31, and pinion 30 intermeshing with the gear-wheel 16 on the cone-shaft 7. Therefore if sleeve 4 be shifted still farther to the left, so as to disengage gear-wheel 5 from the gear-wheel 18, gear-wheel 5 can be intermeshed with gear-wheel 29 and a third change of speed imparted from shaft 2 to the cone-shaft 7.

32 represents a tumbler-frame provided with sleeve projections 33 34 at each end, projecting through and journaling in the box.

35 represents a driven shaft journaled within the sleeve projections 33 34 of the tumbler-frame 32.

36 represents a pinion slidably mounted upon shaft 35, adapted to rotate the same, said pinion being provided with a sleeve 37, upon which a shifting sleeve 38 is fixed.

39 represents a tumbler-shaft fixed to the limbs of the tumbler-frame 32, upon which is loosely mounted the gear-wheel 40, intermeshing with the pinion 36.

41 represents a plate fixed to the pinion 36, forming means whereby when the pinion 36 is shifted to the right or left it, together with the shoulder formed by the sleeve 38, will carry gear 40 with pinion 36.

Mechanism for sliding the tumbler-gears 36 and 40 consist of the following instrumentalities: 42 represents a rock-shaft journaled in the bottom of the box and index-plate,

having an arm 43 fixed to one end thereof, said arm 43 being provided with a plate 44, (see dotted lines, Fig. 3,) swiveled in the free end of the arm 43 and engaging into the 5 groove 45 of the sleeve 38. Upon the opposite end of the shaft 42 a crank-handle 46 is provided, having detent mechanism 47 engaging with the segmentally-arranged orifice 48 of the index-plate 20. The orifices 48 10 represent different lateral positions of adjustment of the tumbler-gears relative to the steps of the cone.

The mechanism for rocking the tumbler mechanism for intermeshing gear-wheels 40 15 with any one of the gears of the cone consists of the following instrumentalities: 49 represents a boss projecting from one limb of the tumbler-frame 32 through a curved slot 50 in the side of the box. 51 represents a handle 20 fixed to said boss 49, the free end being provided with detent mechanism 52, adapted to engage with the segmentally-arranged orifices 53 on the end portion of the box 1, the position of these orifices 53 representing different 25 vertical steps into which the tumbler-gear 40 can be brought for engaging the same with one of the cone of gears. 54 represents a flange projecting from the lever, forming means for serving as a cover to the slot 50 at 30 all times, thereby preventing dust from getting into the casing, also preventing chip-pings or drillings from getting into the same. Thus it will be seen that by the manipulation of the lever 51 the tumbler-frame is rocked, 35 carrying with it the tumbler-shaft 39, with its gear 40, the projecting sleeves 33 34 of the tumbler-frame serving as a fulcrum therefor.

From the foregoing description it will be understood that by manipulating lever 21

three different rates of drive may be impart- 40 ed to the cone-shaft 7. By manipulating the lever 46 the tumbler-gears 36 40 can be adjusted laterally upon the driven shaft 35 and tumbler-shaft 39, respectively, to bring 45 the tumbler-gear 40 opposite any selected gear-wheel of the cone, and by manipulation of the lever 51 the tumbler mechanism can be rocked to bring the tumbler-gear 40 into en- 50 gagement with such selected gear-wheel of the cone.

Having described my invention, I claim—

In a variable-speed device, a box, a cone-shaft, different-diameter gear-wheels thereon, a rocking tumbler-frame having end hubs 55 journaled in the casing, a second shaft journaled in said hubs, a tumbling-shaft supported by the swinging ends of the frame, intermeshing gear-wheels on said second shaft and tumbling-shaft adapted to slide thereon in unison, a rock-shaft projecting through 60 the casing and having connections for adjustably sliding said intermeshing gear-wheels on said shafts, one of the limbs of the tumbling-frame lying adjacent to the end wall of the box and being provided with a 65 boss projecting through a segmental slot in said adjacent side of the box, and a handle attached to said boss on the outside of the box, and being provided with detent mechanism adapted to engage with a series of seg- 70 mental orifices on the outside of the box, substantially as described.

In testimony whereof I have hereunto set my hand.

LOUIS THIEL.

Witnesses:

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LEO O'DONNELL.