

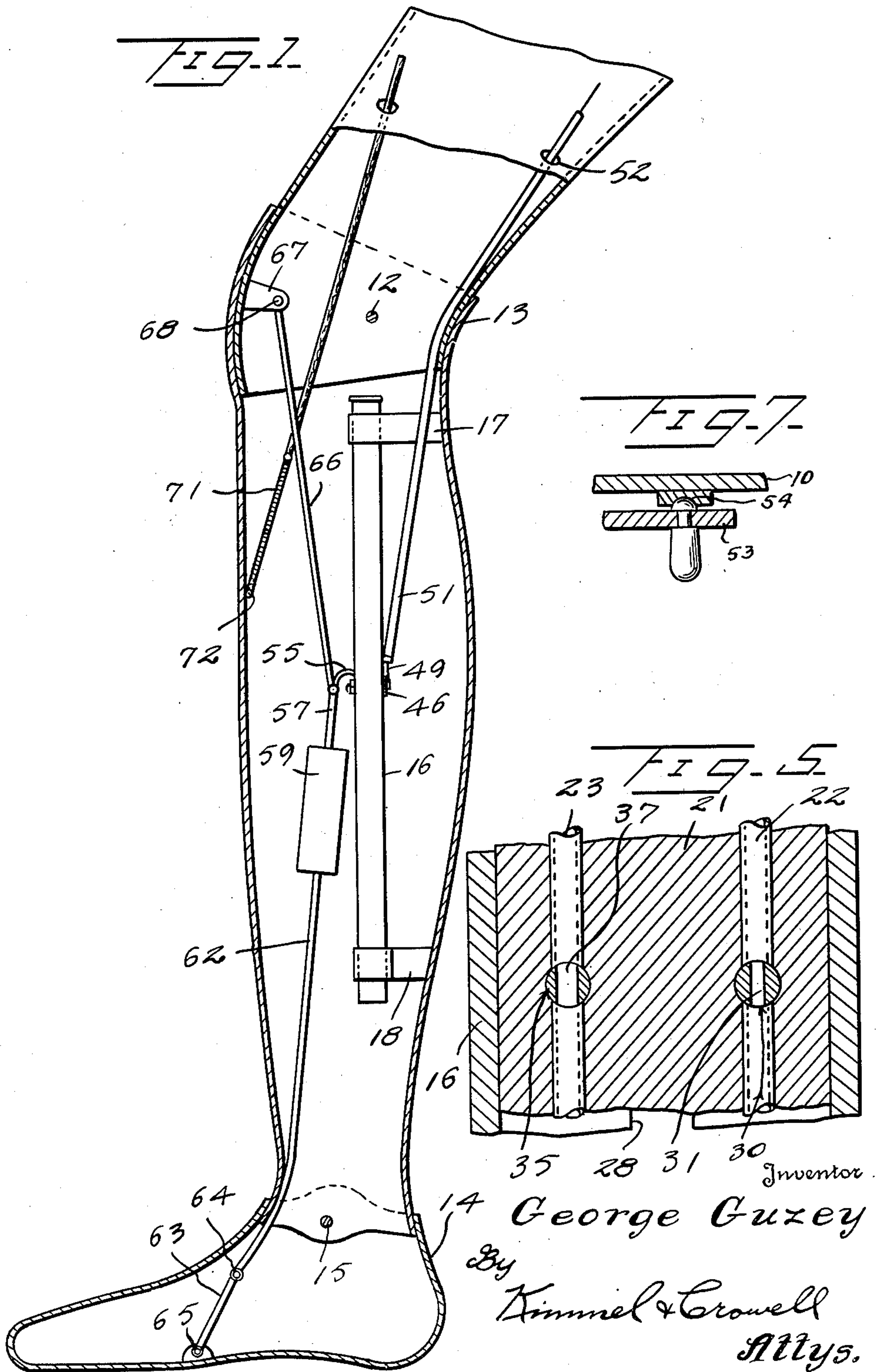
March 6, 1951

G. GUZEY  
ARTIFICIAL LEG

2,543,908

Filed Sept. 24, 1946

3 Sheets-Sheet 1



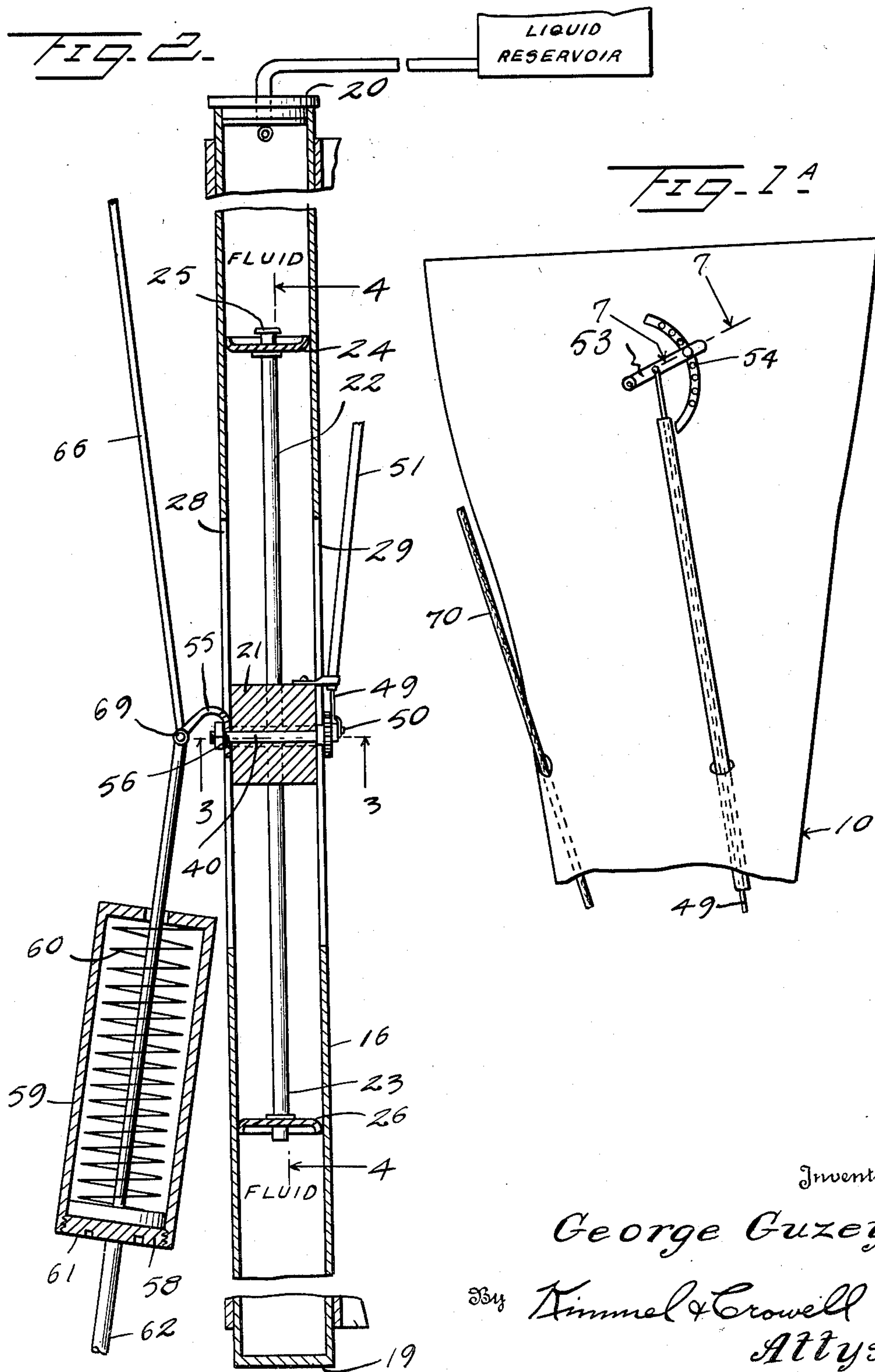
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3 Sheets-Sheet 2



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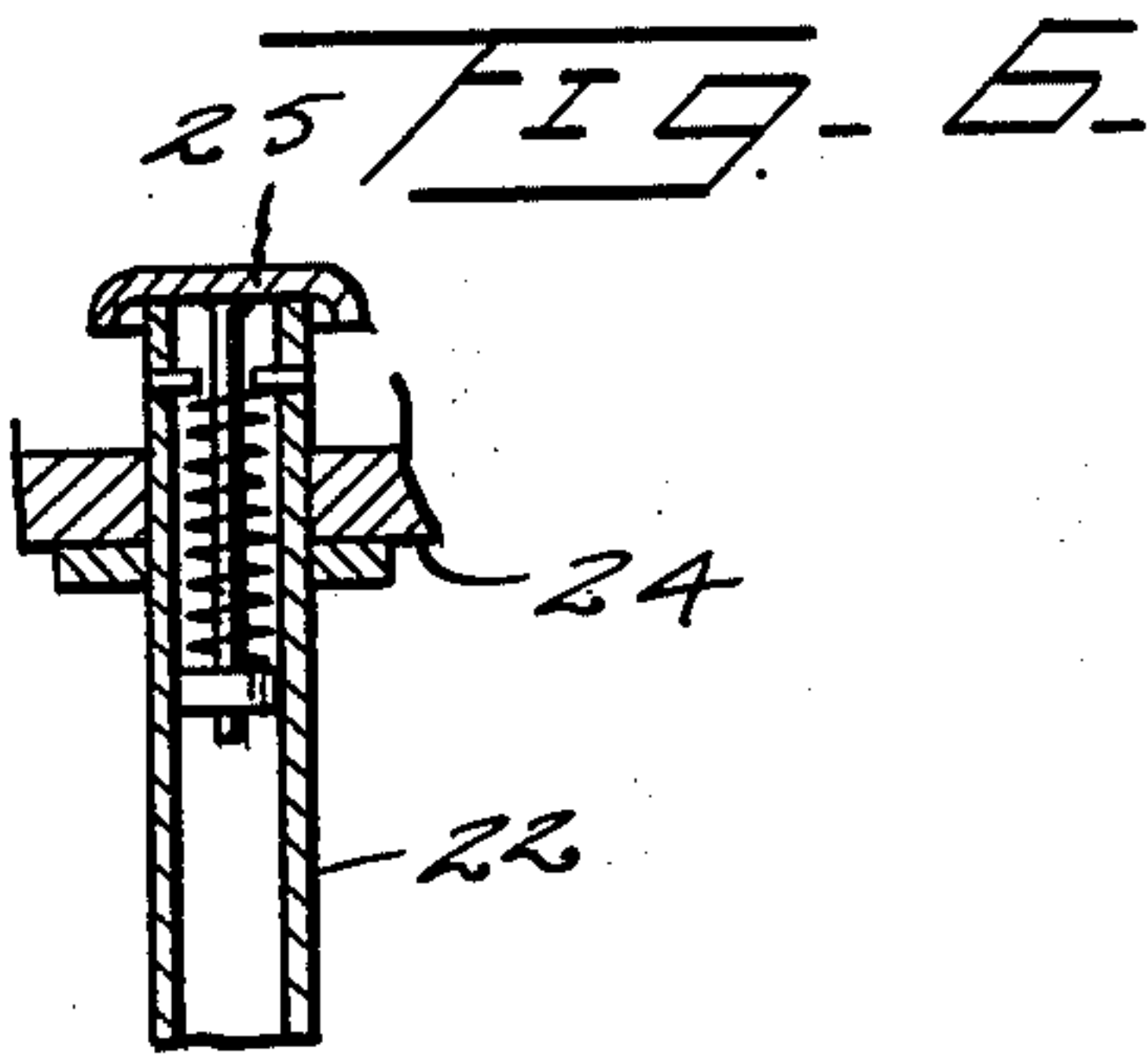
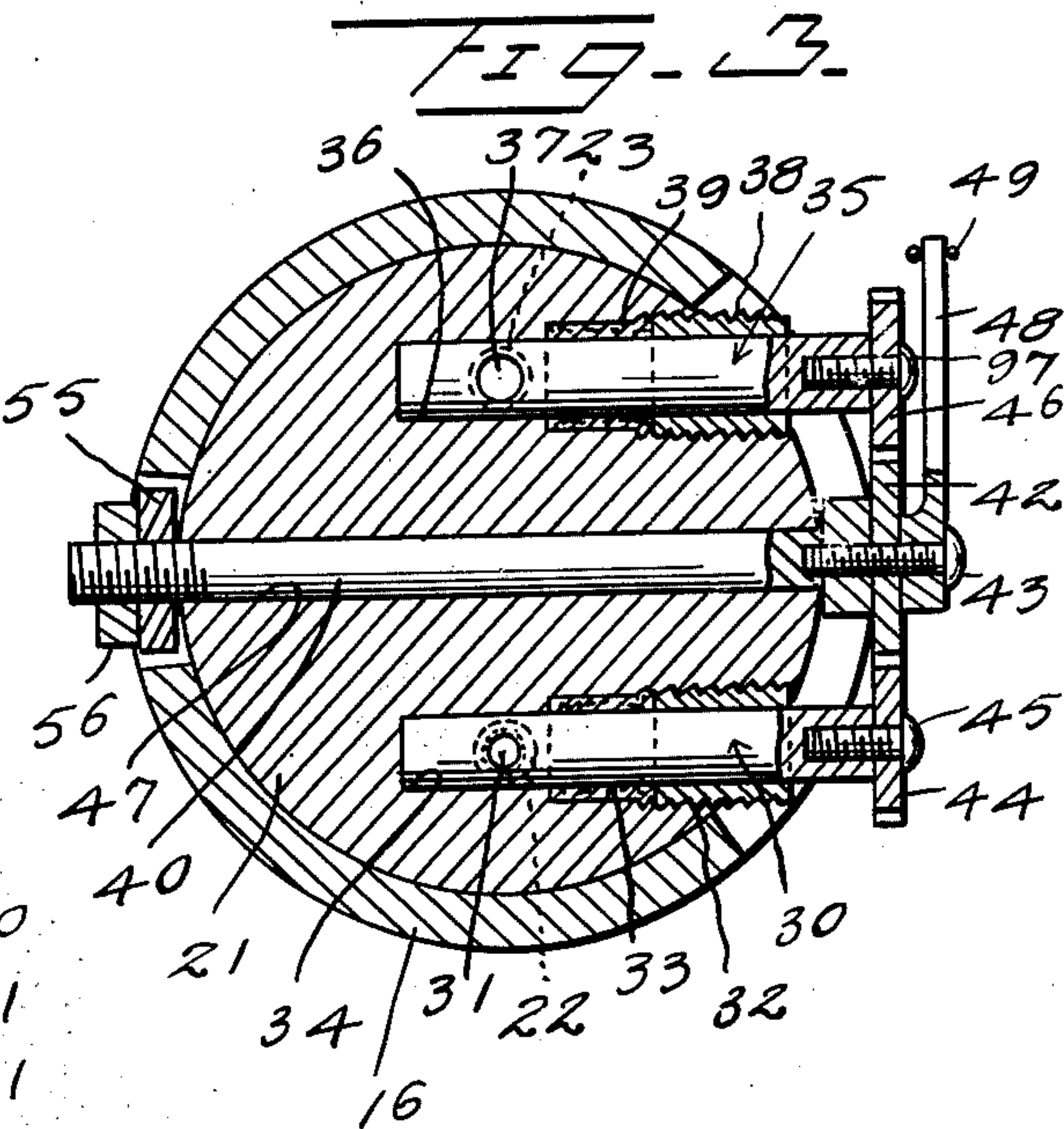
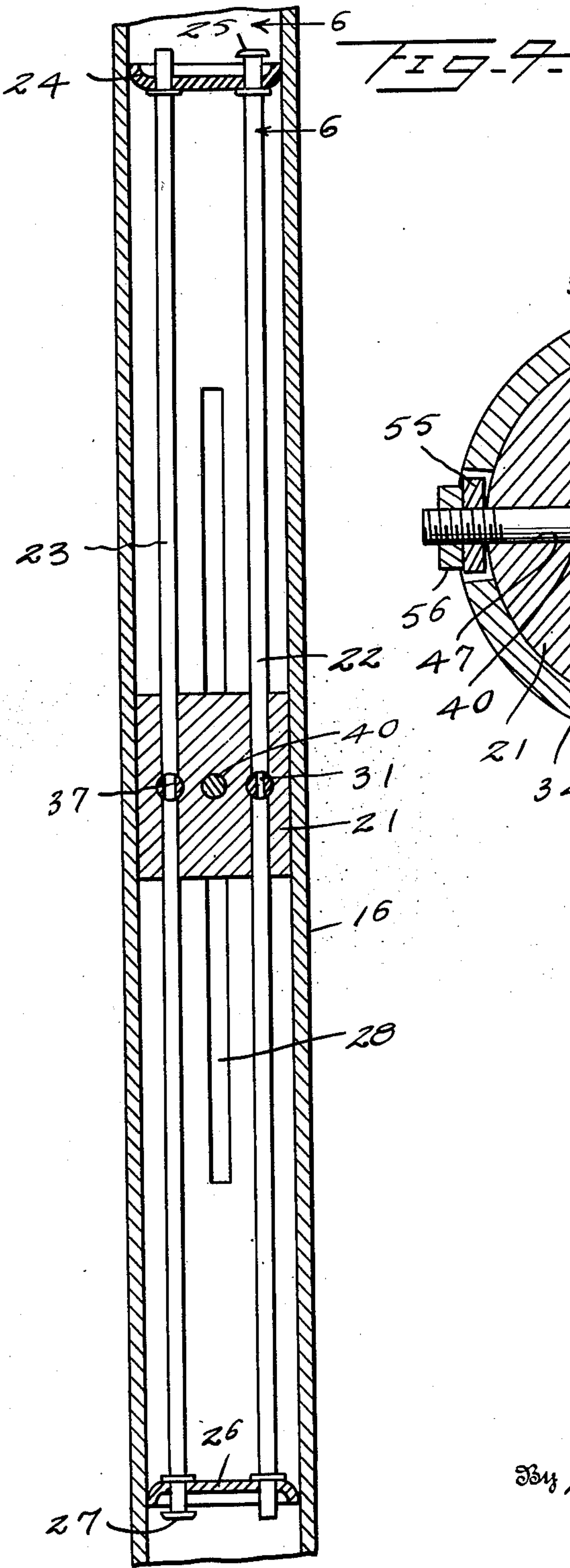
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## UNITED STATES PATENT OFFICE

2,543,908

## ARTIFICIAL LEG

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Application September 24, 1946, Serial No. 698,986

4 Claims. (Cl. 3—2)

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This invention relates to artificial legs.

An object of this invention is to provide an improved artificial leg whereby the wearer can readily regulate the swinging movement of the leg members so that these members can either swing relatively slow or can swing relatively fast.

Another object of this invention is to provide an artificial leg embodying fluid check means for checking the movement of the limbs.

A further object of this invention is to provide an artificial leg wherein the rocking of the foot member will effect a bending of the calf portion relative to the upper thigh portion.

A further object of this invention is to provide an artificial leg construction wherein the movements of the limbs will simulate the natural movements of a natural leg.

A further object of this invention is to provide an artificial leg of this kind which is of simple construction and can be made of relatively light weight material.

With the above and other objects in view my invention consists in the arrangement, combination and details of construction disclosed in the drawings and specification, and then more particularly pointed out in the appended claims.

In the drawings,

Figures 1 and 1a show in side elevation, partly broken away and in vertical section, an artificial leg constructed according to an embodiment of this invention.

Figure 2 is a vertical sectional view of the fluid retarding means within the leg.

Figure 3 is a sectional view taken on the line 3—3 of Figure 2

Figure 4 is a fragmentary sectional view taken on the line 4—4 of Figure 2.

Figure 5 is an enlarged fragmentary vertical section of the slide within the fluid cylinder.

Figure 6 is a fragmentary sectional view of one of the check valves.

Figure 7 is an enlarged sectional view taken substantially along the line 7—7 of Figure 1a.

Referring to the drawing, the numeral 10 designates the upper or thigh portion of the leg within which the stump is adapted to be positioned. The calf or lower leg member generally designated as 11 is hingedly secured to the thigh portion 10 by means of a pivot 12. The lower portion of the thigh member 10 is adapted to telescope into the upper reversely curved portion 13 of the calf member or lower leg 11, as shown in Figure 1.

A foot member 14 is swingably secured as indicated at 15 to the lower end of the calf member 11 and telescopes over the lower end of the calf member 11. An elongated cylinder 16 is secured within the calf member 11, being disposed in substantially vertical position and supported in such position by means of upper and lower bracket members 17 and 18. The cylinder

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16 has a closed lower end 19 and a screw cap 20 is mounted in the upper end of the cylinder 16. A plug or slide member 21 is slidably mounted in the cylinder 16 and a pair of elongated tubes 22 and 23 are extended vertically through the slide member 21, being disposed in spaced parallel relation.

The tube 22 has fixed on the upper end thereof a piston or washer 24 and a spring-pressed check valve 25 is carried by the upper end of the tube 22 and is adapted to normally close the upper end of the tube. The lower end of the tube 22 is open into the lower portion of the cylinder 16. The tube 23 is reversely disposed with respect to the tube 22, having a piston 26 at its lower end and a spring-pressed check valve 27 normally closes the lower end of the tube 23. The upper end of the tube 23 is open into the upper portion of the cylinder 16.

The cylinder 16 is formed with a pair of diametrically disposed elongated slots or openings 28 and 29, the purpose for which will be hereinafter described. A valve plug 30 is extended into the slide member 21 and intersects the tube 22 within the slide member 21. The plug 30 is formed with a relatively small fluid passage 31 which may be moved into or out of registry with the tube 22. The plug 30 extends through a threaded sleeve 32 which is threaded into the slide member 21, and a sealing means 33 is adapted to be compressed by threading of the sleeve 32 so as to seal the plug 30 in the bore or plug opening 34 which is formed in the slide member 21.

A second valve plug 35 is disposed in a plug opening 36 formed in the slide member 21 and intersects the tube 32 in the slide member 21. The plug 35 is formed with a relatively large port or opening 37 which will be selectively moved into registry or out of registry with respect to the tube 23. A threaded sleeve 38 is disposed about the plug 35 and a sealing packing 39 is adapted to be compressed by the sleeve 38 for sealing the plug 35 in the opening 36. A shaft 40 is journaled in an opening 41 extending diametrically through the slide member 21 and extends at one end into the slot or elongated opening 29.

A spur gear 42 is fixed on the end of the shaft 40, projecting into the opening 29 by means of a fastening member 43. Valve plug 30 has a gear 44 fixed thereto by fastening means 45 which meshes with the gear 42, the latter being a valve regulating gear, and valve plug 35 has a spur gear 46 fixed thereto by fastening means 47, which also meshes with gear 42.

A lever or valve regulating arm 48 is secured to the shaft 40 and the lever 48 has secured to the outer end thereof one end of a Bowden wire 49, by fastening means 50. The Bowden wire 49 extends through a flexible tube 51 which is dis-



posed interiorly of the calf member 11, and as shown in Figure 1, is extended through an opening 52 in the thigh member 10 so that the stump of the leg will not contact the valve regulating means.

The upper end of the Bowden wire 49 is secured to an adjusting lever 53 and preferably the lever 53 is adapted to ride over notches or detents 54 formed in the upper portion of the thigh member 10 so that the regulating lever 53 will be normally maintained in its adjusted position.

In order to provide a means whereby the slide member 21 and the pistons 24 and 26 may be moved lengthwise of the cylinder 16 when the foot member 14 is rocked relative to the calf member 11, I have provided a curved arm 55 which is fixed to the shaft 40 oppositely from the gear 42, being secured thereto by a nut 56. The arm 55 has secured thereto an elongated rod 57 which is formed at its lower end with a head 58. The head 58 is slidable in a cylinder 59 and a spring 60 is disposed in the cylinder 59 and constantly urges the head 58 downwardly to engage the lower end 61 of the cylinder 59.

An elongated rod 62 is secured to the lower end 61 of the cylinder 59 and extends downwardly into the foot member 14 and is connected at its lower end to a link 63 by means of a pivot joint 64. The link 63 is rockably mounted as at 65, on the bottom of the foot member 14. The arm 55 also has secured thereto an upwardly extending rod 66 which is pivotally secured to a bracket or inwardly projecting mounting 67 which is carried by the lower portion of the thigh member 10 in the region of the knee portion of this thigh member.

The pivot 68 which connects the rod 66 with the mounting 67 is offset forwardly from the pivot 69 of rod 66 on the arm 55 so that upward pressure on rod 62, causing slide 21 and arm 55 to move upwardly will cause upward pressure to be exerted on rod 66 as this pressure will effect a swinging of the calf member 11 relative to the thigh 10. The calf member 11 is adapted to be returned to normal straight position by means of an elongated flexible member 70 which is extended upwardly through the thigh member 10 and is adapted to be connected to a belt or the like which is worn by the wearer. The lower end of the flexible member 70 is connected to an elastic strap 71 which is secured as at 72 to the forward portion of the calf member 11.

In the use of this invention, the opposite end portions of the cylinder 16 are adapted to be filled with a fluid and the regulating valves 30 and 35 are adjusted to the desired degree by means of the adjusting lever 53.

In the drawings, the ports 31 and 37 are both shown in open position, to provide for a faster down stroke of the pistons for faster walking or bending the thigh member when assuming a seated position.

I do not mean to confine myself to the exact details of construction herein disclosed, but claim all variations falling within the purview of the appended claims.

What I claim is:

1. An artificial leg comprising an upper thigh member, a calf member, a foot member, means hingedly connecting said members together, link means connecting said foot member with said thigh members, and fluid means in said calf member connected to said link means whereby rocking of said foot member will effect rocking of said calf member, said fluid means including an elongated

cylinder formed with a pair of elongated slots, a slide in said cylinder, a pair of tubes extending through said slide, oppositely disposed pistons carried by said tubes, oppositely closing check valves carried by said tubes, means connecting said slide to said link means, and valve means carried by said slide for regulating the passage of fluid through said tubes.

2. An artificial leg comprising an upper thigh member, a calf member, a foot member, means hingedly connecting said members together, link means connecting said foot member with said thigh members, and fluid means in said calf member connected to said link means whereby rocking of said foot member will effect rocking of said calf member, said fluid means including an elongated cylinder formed with a pair of elongated slots, a slide in said cylinder, a pair of tubes extending through said slide, oppositely disposed pistons carried by said tubes, oppositely closing check valves carried by said tubes, means connecting said slide to said link means, valve means carried by said slide, and adjusting means for said valve means.

3. An artificial leg comprising an upper thigh member, a calf member, a foot member, means hingedly connecting said members together, link means connecting said foot member with said thigh members, and fluid means in said calf member connected to said link means whereby rocking of said foot member will effect rocking of said calf member, said fluid means including an elongated cylinder formed with a pair of elongated slots, a slide in said cylinder, a pair of tubes extending through said slide, oppositely disposed pistons carried by said tubes, oppositely closing check valves carried by said tubes, means connecting said slide to said link means, valve means carried by said slide, gear means for adjusting said valve means, and means for adjusting said gear means.

4. An artificial leg comprising an upper thigh member, a calf member, a foot member, means hingedly connecting said members together, link means connecting said foot member with said thigh members, and fluid means in said calf member connected to said link means whereby rocking of said foot member will effect rocking of said calf member, said fluid means including an elongated cylinder formed with a pair of elongated slots, a slide in said cylinder, a pair of tubes extending through said slide, oppositely disposed pistons carried by said tubes, oppositely closing check valves carried by said tubes, means connecting said slide to said link means, valve means for said tubes carried by said slide, gear means for actuating said valve means, and means carried by said thigh member connected to said gear means for adjusting said gear means and hence said valve means.

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