

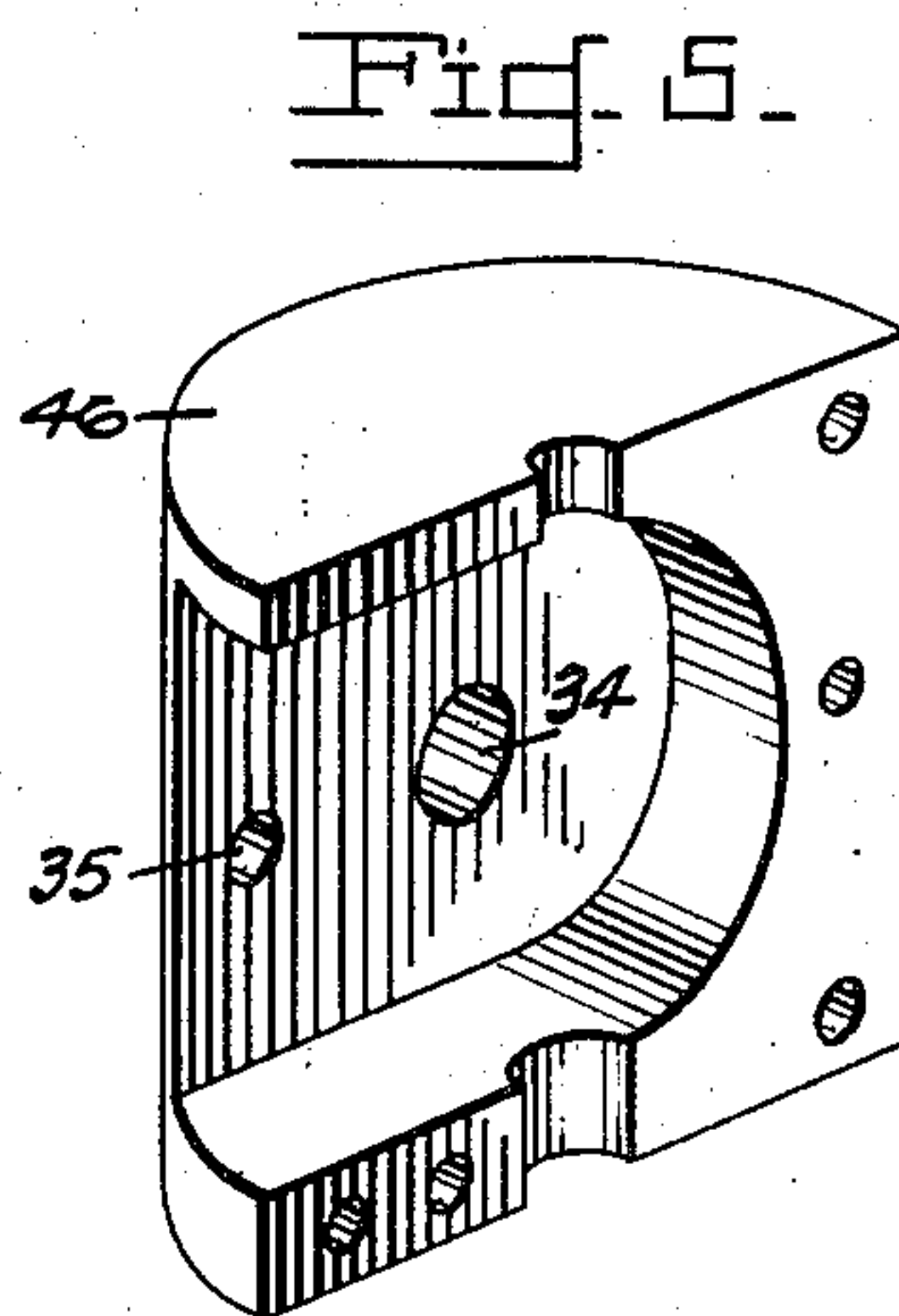
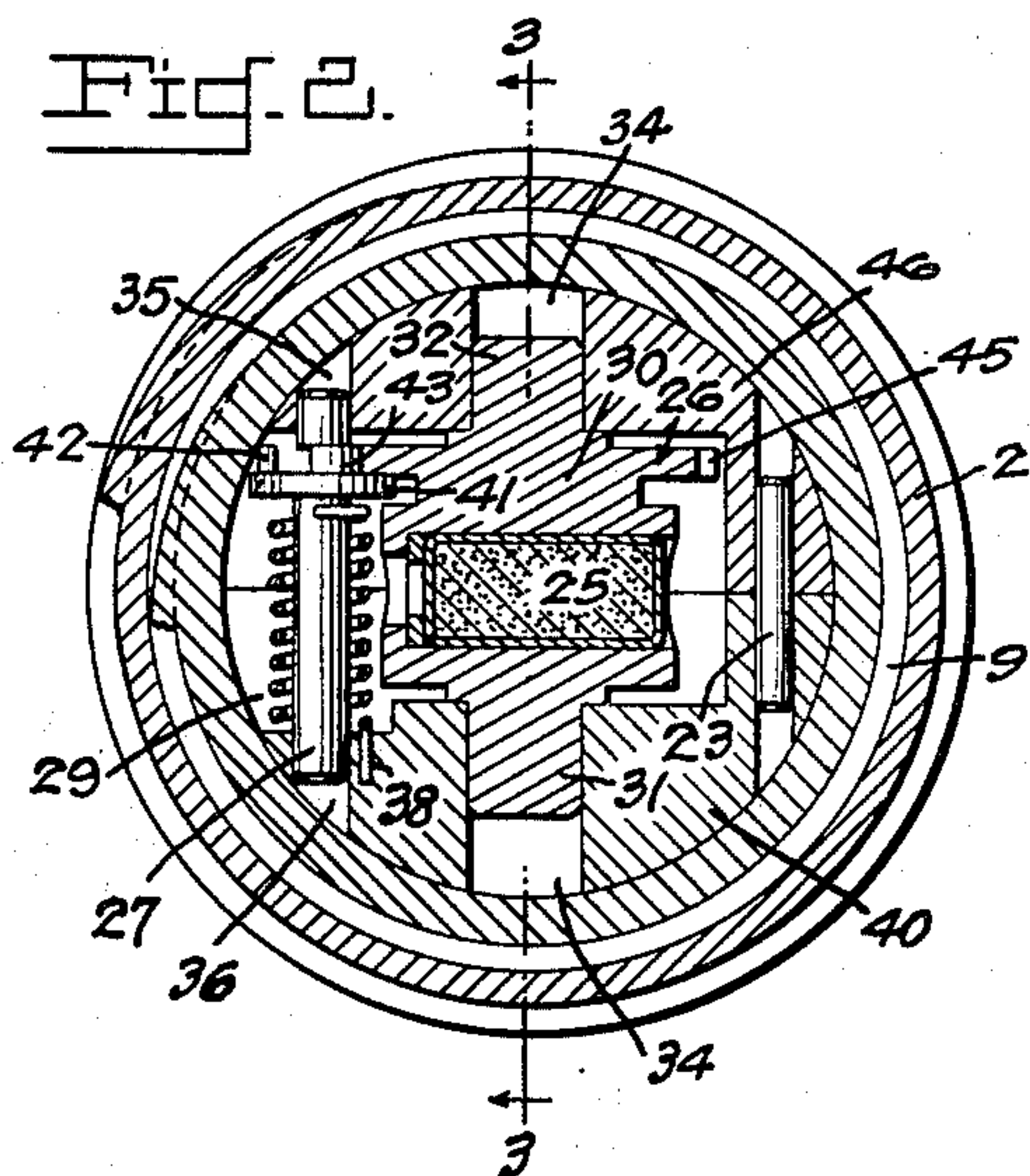
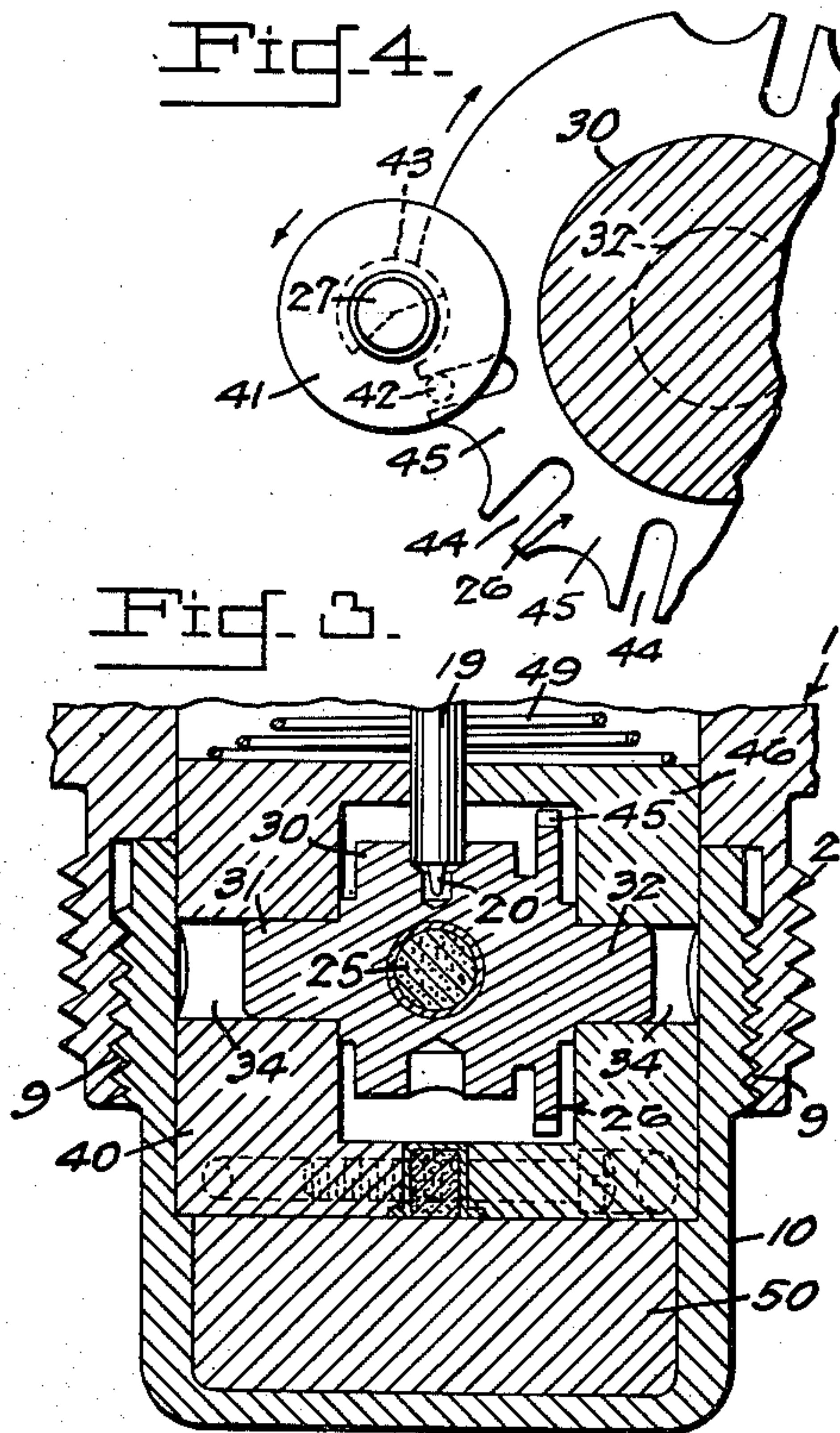
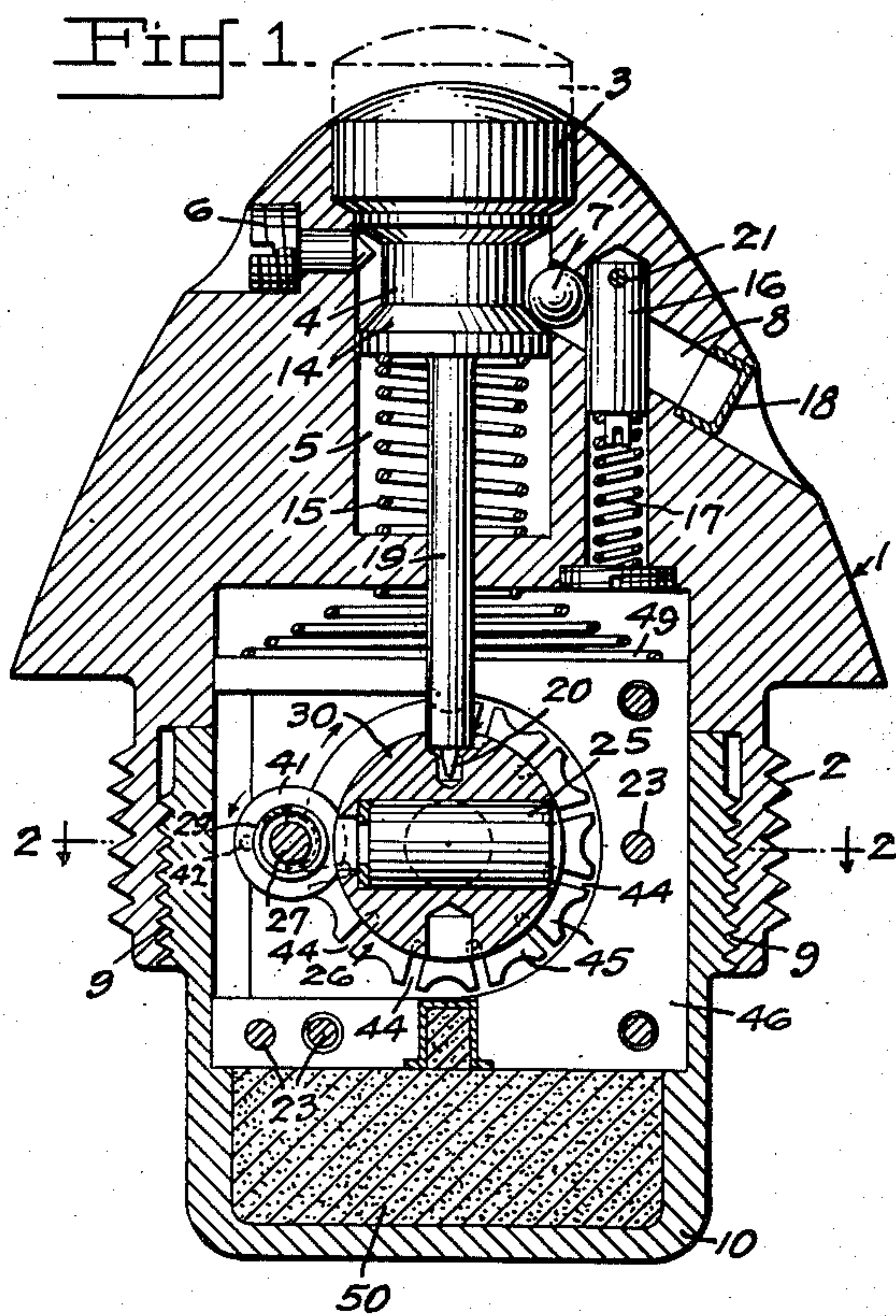
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MORTAR FUSE

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2,709,962

MORTAR FUSE

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5 Claims. (Cl. 102—78)

This invention relates to an improved delay arming device for use with projectile fuses of the non rotating type, such as mortar fuses, and which functions to retain a fuse with which it is associated in a disarmed or safe condition until the projectile has traveled a predetermined distance in its flight.

More particularly the present invention relates to a safety attachment to provide additional safety means for delaying the arming of a fuse to insure a minimum travel of the projectile prior to the arming of the fuse which is sufficient so that the projectile will be beyond a zone where the gun crew could be endangered by the detonation of the projectile when the device permits arming.

An object of our invention is to provide a device of the aforescribed character capable of being readily applied to various types of projectiles without modification thereof.

A further object of our invention is to provide a fuse that is an improvement on the fuses now in use.

A more specific object of our invention is to provide a mechanism that will positively delay the arming of the fuse for a time that will allow the projectile to become stable thereby eliminating the possibility of a premature burst.

Other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings which illustrate a preferred embodiment thereof and wherein:

Figure 1 is a longitudinal sectional view of the device of our invention.

Figure 2 is a cross sectional view taken on line 2—2 of Figure 1 and looking in the direction of the arrows.

Figure 3 is a fragmentary longitudinal section taken on lines 3—3 of Figure 2 and looking in the direction of the arrows.

Figure 4 is an enlarged fragmentary view of a detail of our mechanism illustrating the escapement at the start of a cycle.

Figure 5 is an isometric view of a supporting shoe that forms part of our invention.

Referring now more particularly to the drawings wherein like reference characters designate like or corresponding parts throughout the several views, 1 designates generally the fuse body reduced at its rear end as indicated at 2 for threading into a shell as usual and inwardly threaded as at 9 to receive a booster cup 10. A cavity is cut away at the forward part of the body and is adapted to receive a piston 3 slidable therein. The normal safe position of the piston is illustrated in solid lines and the armed position is shown in the dotted lines, as will presently be explained. The piston is cut away to form a race 4 which cooperates with a pin 6 fixed in the body 1 to limit the longitudinal movement thereof. A ball 7 is contained within a passage 8 formed in the body at an acute angle to the axis of cavity 5 and normally is squeezed between the upper wall of the passage and the lower rim 14 of the piston by the urging of spring 15 substantially as shown. A detent plug 16 having a hole 21 to receive a safety wire is longitudinally slidable in a passageway

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and is normally biased forward by spring 17 for a purpose that will later appear. A cup 18 is fitted into passage 8 to seal off the outer end thereof.

Piston 3 is shaped to form a long firing pin 19 depending in the longitudinal axis of the fuse body and terminating in a point 20. The pin extends from the piston cavity into a closed volume formed by the lower cut away portion of fuse body 1 and the interior of booster cup 10 and is received in a bore cut into cylindrical rotor 30. As is best seen in Figure 3 the rotor has formed integral therewith a segment wheel 26 which has fingers 45 radiating therefrom for substantially 270 degrees of its periphery. The fingers are shaped to have arcuate faces on the outer ends thereof and slots 44 are formed therebetween for a purpose that will presently appear.

The cylindrical rotor 30 carries a primer 25 in a bore which is normally disposed at substantially a right angle to the longitudinal axis of firing pin 19; arbors 31 and 32 extend axially from the rotor and are received in bearing holes 34. Shaft 27 is disposed parallel to the axis of arbors 31—32 and is supported for rotation in bearing holes 35 and 36. At one end of the shaft is a pallet consisting of a disc 41 carrying thereon a pin 42 for cooperation with slots 44 of the segment wheel and an arcuate raised section 43 for cooperation with the ends of fingers 45 of the wheel. A helical spring 29, embracing the shaft 27 has one end 38 thereof bent parallel to the axis of the helix and seated in an opening in shoe 40 to act as an anchor point, the other end of the helical spring is bent back upon itself and pierces the shaft 27 at substantially a right angle to the axis of the helix.

Two shoes 40 and 46 shaped in substantially hemicylindrical form as can be seen in Figure 5 are held in face engaging relation by pins 23 forming a casing for the driving assembly. The casing thus formed is free to move in the longitudinal axis of the fuse body 1, but is normally held against the booster charge 50 by the urging of inertia spring 49.

Operation

The operation of our novel fuse device is as follows: during assembly of the mechanism the helical spring 29 is so wound so that the energy stored therein tends to rotate the pallet against the segment wheel. When the safety wire 21 is removed and the projectile is fired the force of set back urges detent plug 16 against spring 17 so that it clears passage 8; then ball 7 will move down the passage and come to rest in cup 18. Spring 15 forces against piston 3 moving it substantially to the position shown in the dotted lines and pin 20 is removed from its depression in rotor 30. Since the rotor is no longer held against movement by pin 20 the spring 29 is free to rotate shaft 27; pin 42 turns and enters the adjacent slot 44 of the segment wheel. As the shaft further rotates pin 42 urges the wheel in a clockwise direction as seen in Figure 1 and removes from the slot; at the same time raised section 43 engages the adjacent arcuate finger 45 and the wheel is locked until the pin has made a complete revolution to enter the next slot. It can be seen that the wheel continues to turn at a rate that is a function of the spacing of the cooperating elements. By a simple mechanical expedient, such as varying the number of fingers, the length of time required to arm the projectile can be accurately regulated. It will be noted that the segment wheel driven through 270 degrees so that when the wheel stops the primer 25 is aligned with the point 20 of firing pin 19. If the projectile strikes a target squarely the pin will be driven backward upon the primer and the shell will be exploded. If however the projectile strikes a glancing blow the inertia of shoes 40 and 46 will prevail over the urging of spring 49 and the primer will be carried forward against the pin to explode the shell.

Various modifications and changes are contemplated

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and may obviously be resorted to without departing from the spirit and scope of the invention as hereinafter defined by the appended claims as only a preferred embodiment thereof has been disclosed.

We claim:

1. A delay action arming device for projectile fuses of the non-rotating type comprising a setback pin slidably movable upon acceleration of the fuse to withdraw from a passage formed in the fuse body, a ball movable in said passage, closed at one end thereof from a safe position to a fuse arming position, said ball normally held in said safe position by said setback pin a firing pin terminating at one end thereof in a piston fitting a longitudinal bore and resiliently urged to a fuse arming position, a time delay device comprising a segment wheel rotatably supported in said body and a spring driven pallet in driving relation therewith, said firing pin terminating in the other end thereof in a point normally seated in a recess in said segment wheel, a primer carried by said segment wheel support and disposed at substantially a right angle to the axis of said firing pin when the said pin is seated in the said recess, said primer rotatable through 270 degrees into fuse arming position upon forward travel of said pin and spring-biased slidably mounting means for said delay device in the fuze body adapted to move said delay device in a longitudinal movement to allow contact of said primer with said firing pin upon glancing engagement of the fuze with a target.

2. A delay action arming device for projectile fuses of the non-rotating type comprising delay action means for providing a predetermined lapse of time between firing of the projectile and arming of the fuse, a firing pin normally extending within said delay action means, a setback pin cooperating with a ball member to maintain said firing pin in the normal position, said delay action means comprising a segment wheel and a spring driven pallet in driving relation therewith, said segment wheel mounted for rotation in said fuse and including teeth radiating outwardly for substantially 270 degrees of its periphery, said pallet including a pin disposed to cooperate with spaces formed between the said teeth, a primer carried by said segment wheel mounting and normally disposed at substantially a right angle to the axis of the said firing pin whereby rotation of said segment wheel aligns the said primer with the said firing pin after the said predetermined lapse of time said segment wheel being mounted for longitudinal movement in the fuze body and spring means normally urging said segment wheel in spaced relation from said firing pin.

3. A delay action arming device for projectile fuses

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of the non-rotating type comprising delay action means for providing a predetermined lapse of time between firing of the projectile and arming of the fuse, a firing pin normally extending within said delay action means, a setback pin cooperating with a ball member to maintain said firing pin in the normal position, said delay action means comprising a segment wheel and a spring driven pallet in driving relation therewith, said segment wheel mounted for rotation in said fuse and including teeth radiating outwardly for substantially 270 degrees of its outer periphery, said pallet including a pin disposed to cooperate with spaces formed between the said teeth, a primer carried by said segment wheel mounting and normally disposed at substantially a right angle to the axis of the said firing pin, a pair of hemicylindrical shoes disposed in facing relation forming the said segment wheel mounting and longitudinally movable in the fuse body upon glancing engagement thereof with a target.

4. The invention according to claim 3 wherein a spring is provided to urge the said hemicylindrical shoes toward the base of the fuse.

5. A delay action arming device for projectile fuses of the non-rotating type comprising a casing, a booster cup threadedly engaging said casing to form an enclosed volume, delay action means for providing a predetermined lapse of time between firing of the projectile and arming of the fuse, a firing pin normally extending within said delay action means, a setback pin cooperating with a ball member to maintain said firing pin in the normal position, said delay action means comprising a segment wheel and a spring driven pallet in driving relation therewith, said segment wheel mounted for rotation in said fuse and including teeth radiating outwardly for substantially 270 degrees of its periphery, said pallet including a pin disposed to cooperate with spaces formed between the said teeth, a primer carried by said segment wheel mounting and normally disposed at substantially a right angle to the axis of the said firing pin, a pair of hemicylindrical shoes disposed in facing relation to form the said segment wheel mounting and longitudinally movable in the said volume.

References Cited in the file of this patent

UNITED STATES PATENTS

1,726,325	Varaud	Aug. 27, 1929
2,030,085	Woodberry	Feb. 11, 1936
2,486,362	O'Brien	Oct. 25, 1949

FOREIGN PATENTS

257,335	Great Britain	Aug. 27, 1926
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