

No. 701,695.

Patented June 3, 1902.

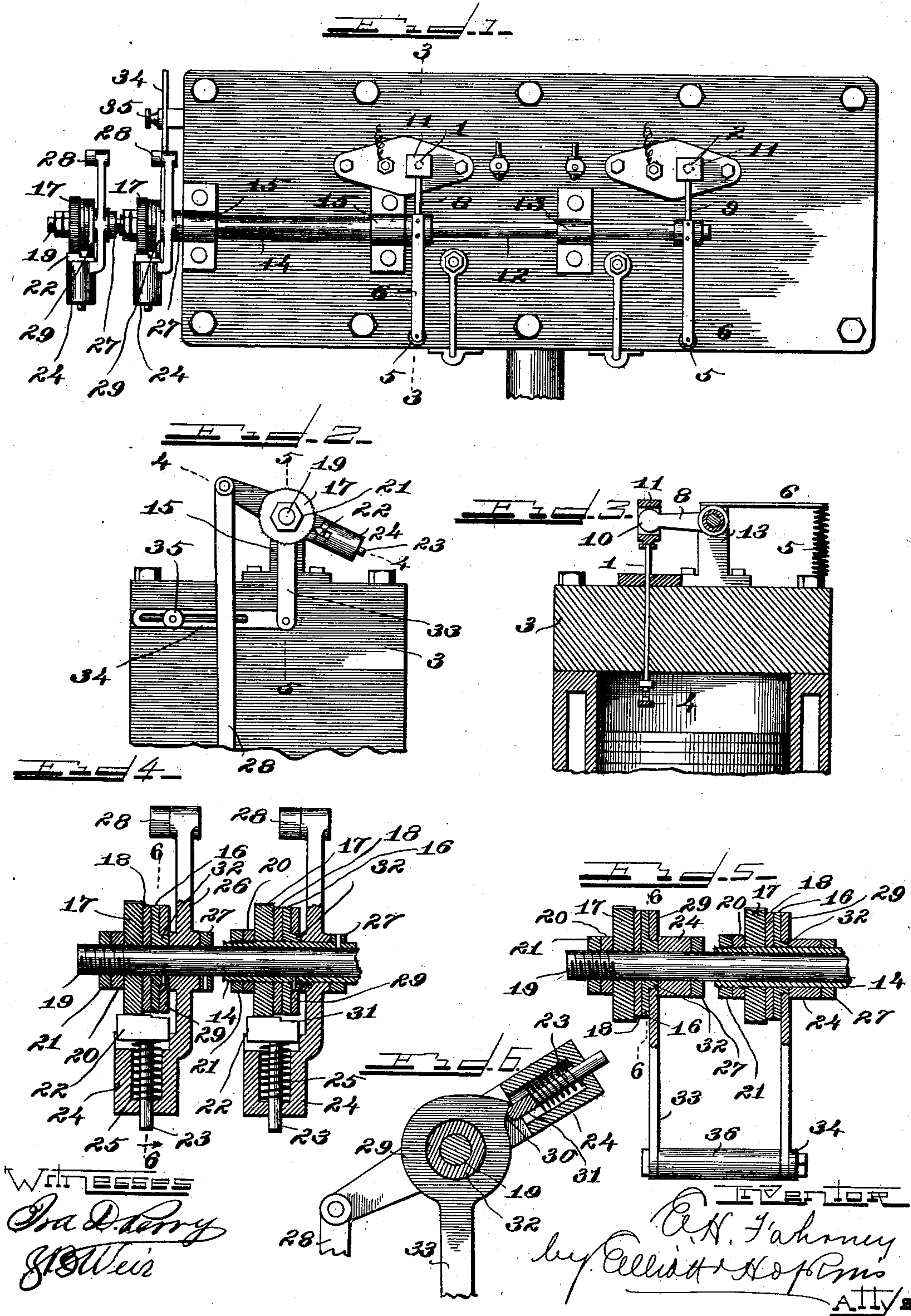
E. H. FAHRNEY.

ELECTRIC IGNITER FOR EXPLOSION ENGINES.

(Application filed Sept. 10, 1900.)

(No Model.)

3 Sheets—Sheet 1.



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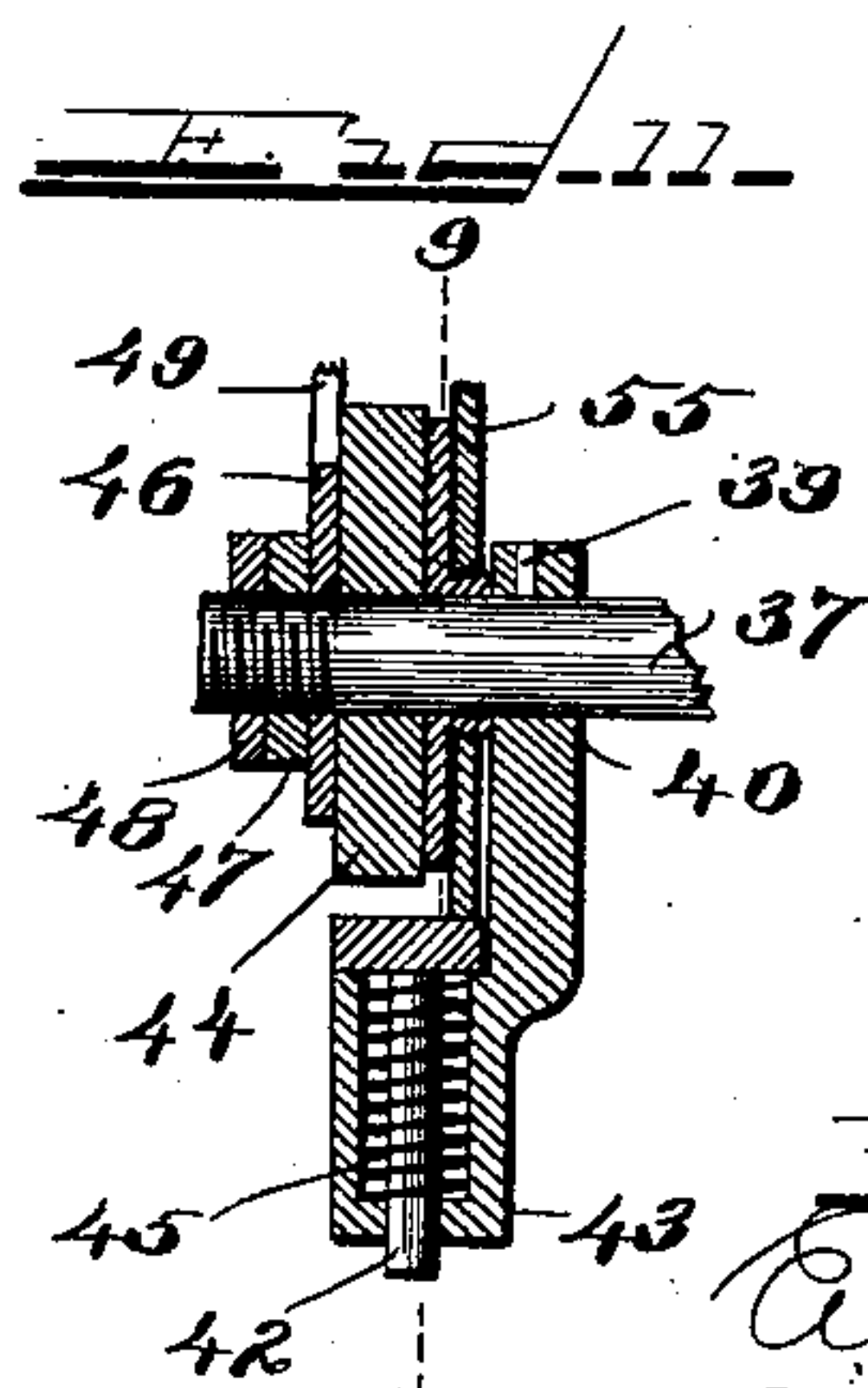
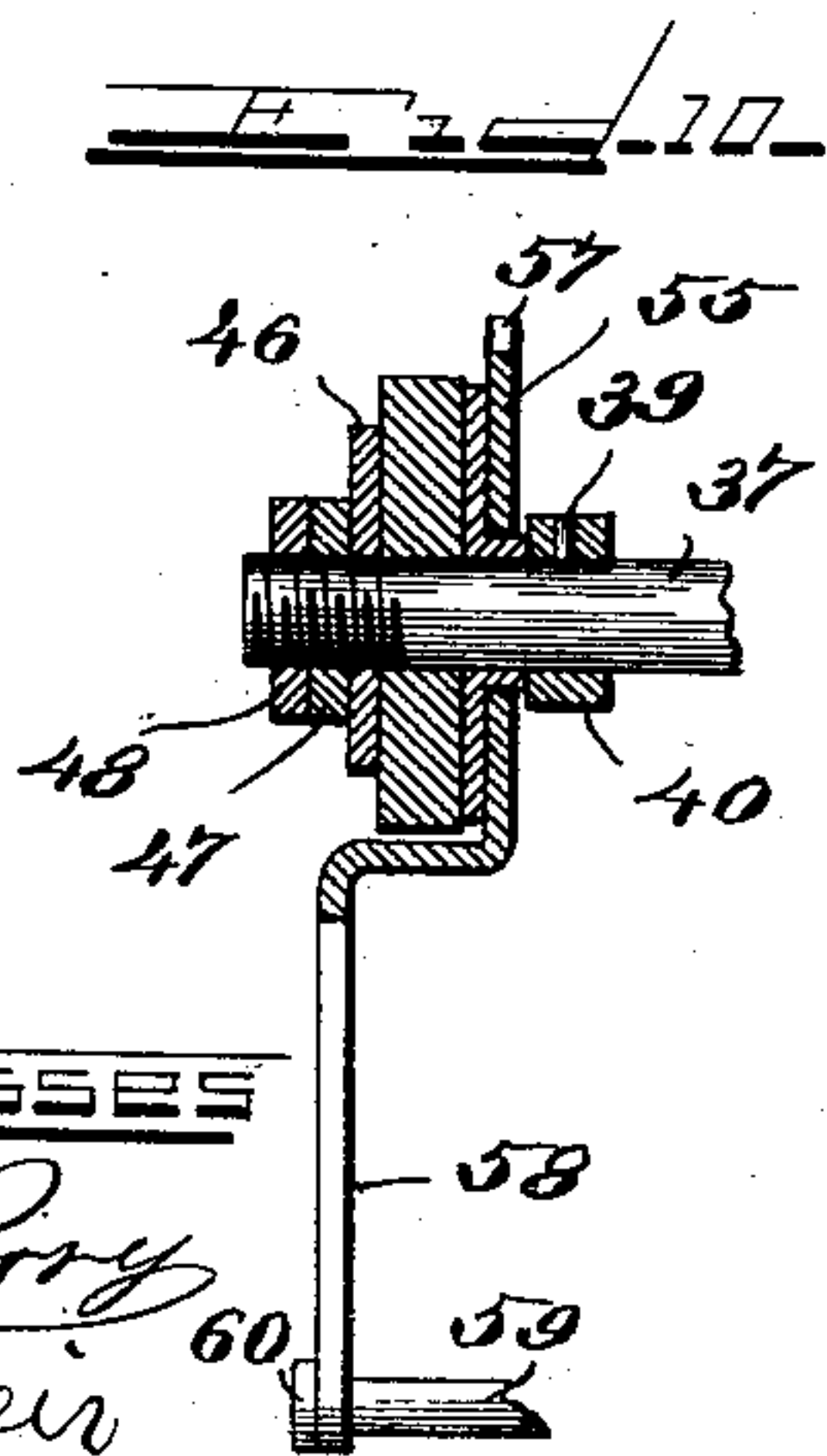
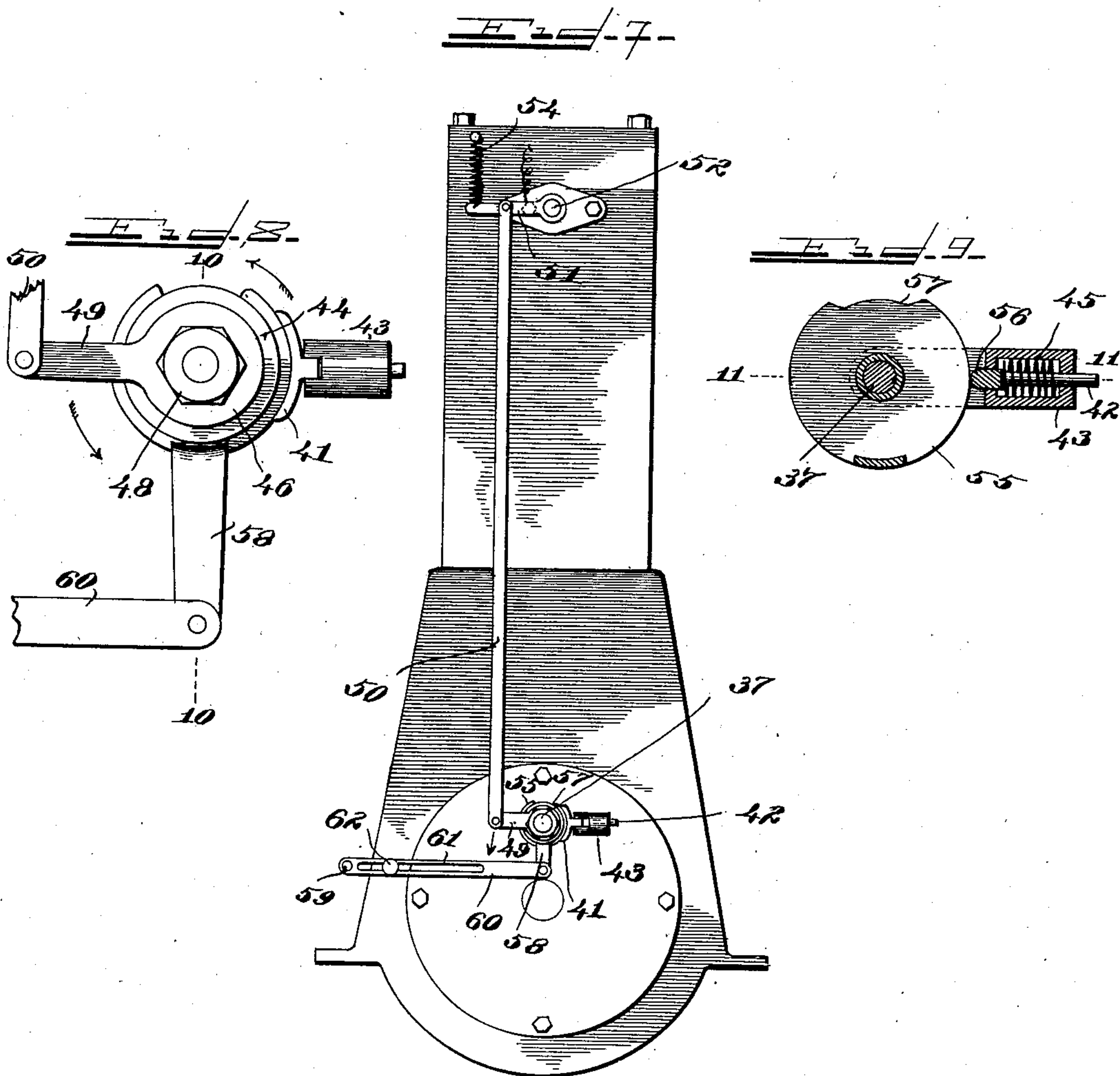
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WITNESSES
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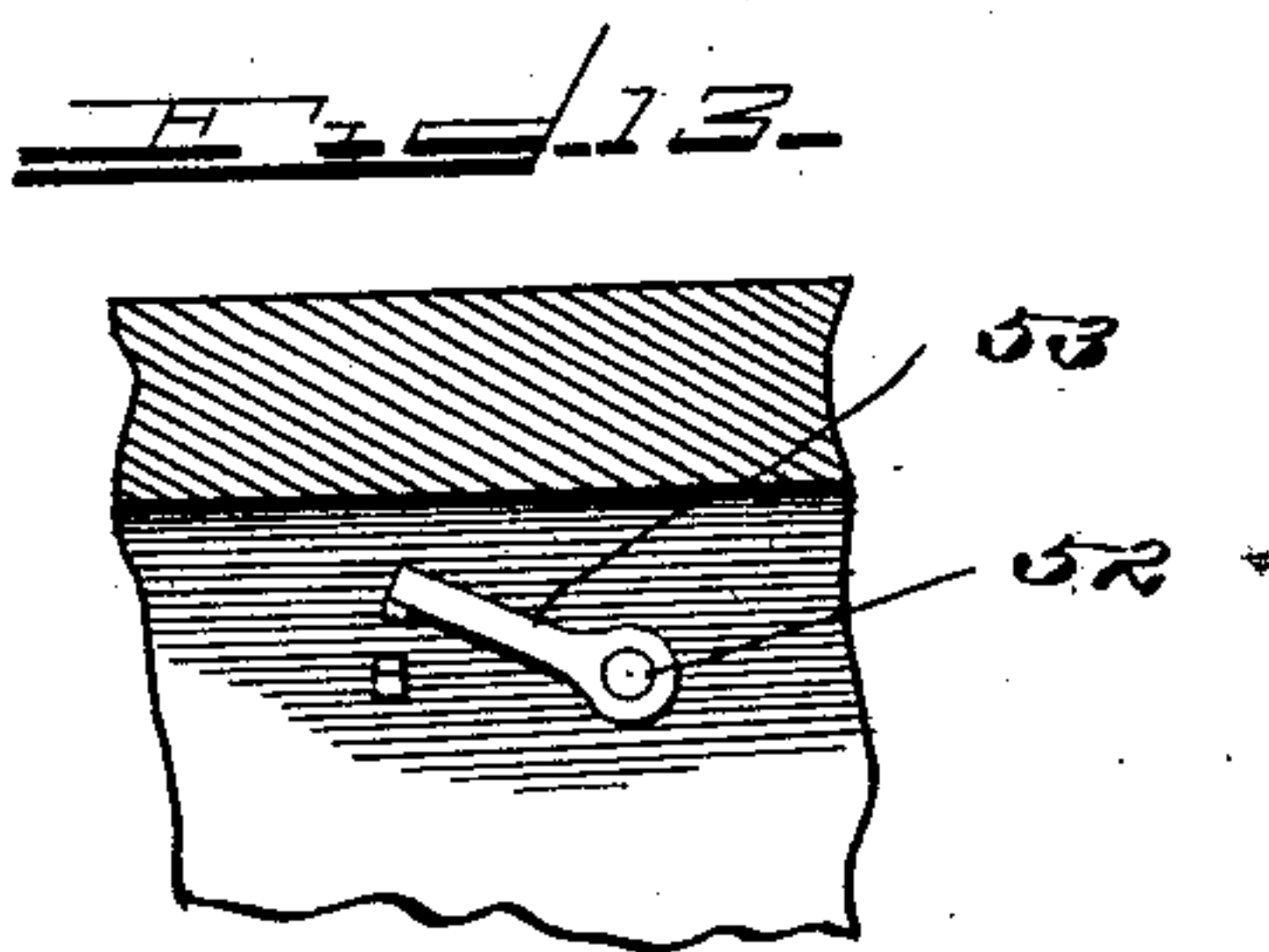
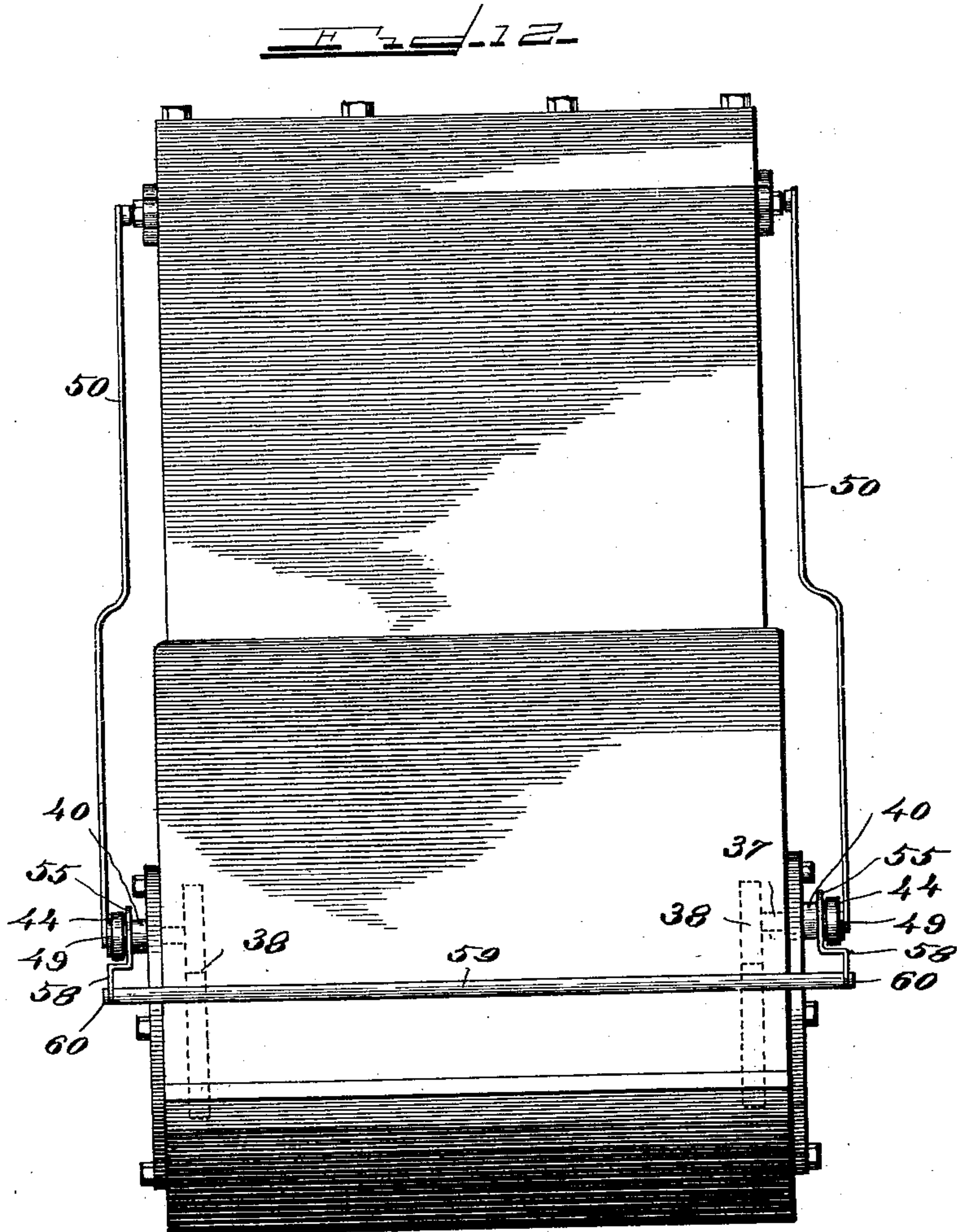
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3 Sheets—Sheet 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

EMMERY H. FAHRNEY, OF CHICAGO, ILLINOIS.

ELECTRIC IGNITER FOR EXPLOSION-ENGINES.

SPECIFICATION forming part of Letters Patent No. 701,695, dated June 3, 1902.

Application filed September 10, 1900. Serial No. 29,508. (No model.)

To all whom it may concern:

Be it known that I, EMMERY H. FAHRNEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric Igniters for Explosion-Engines, of which the following is a full, clear, and exact specification.

My invention relates more particularly to that class of electric igniters for gasoline-engines and other internal-combustion engines in which the electrodes are thrown apart by means of a spring or other device having a similar function; and my invention has for its primary object to provide improved and efficient means for forcing the electrodes together against the inertia of said separating-spring and suddenly releasing them with great certainty and accuracy at the desired instant.

More specifically stated, the primary object of my invention is to hold the electrodes together by a frictional resistance of sufficient power to overcome the separating-spring and to be able to release such resistance at any predetermined instant or point in the stroke of the engine-piston.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said objects and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings, and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a plan view of a double-cylinder explosion-engine provided with my improved igniter. Fig. 2 is an end view thereof. Fig. 3 is a transverse section taken on the line 3 3, Fig. 1. Fig. 4 is an enlarged longitudinal detail sectional view taken on the line 4 4, Fig. 2. Fig. 5 is a detail sectional view taken on the line 5 5, Fig. 2. Fig. 6 is an enlarged transverse sectional view taken on the line 6 6, Figs. 4 and 5. Fig. 7 is an end elevation of the engine, showing the same equipped with my improved igniter of a modified construction. Fig. 8 is an enlarged detail end view of the friction-clutch mechanism for holding the igniter-electrodes together. Fig. 9 is a detail transverse section taken on the line 9 9, Fig. 11.

Fig. 10 is a longitudinal section taken on the line 10 10, Fig. 8. Fig. 11 is a horizontal section taken on the line 11 11, Fig. 9. Fig. 12 is a side elevation of the engine, showing the same supplied with the form of igniter illustrated in Figs. 7 to 11, inclusive; and Fig. 13 is a detail view of the form of electrodes employed therewith.

Like signs of reference indicate like parts throughout the several views.

In the accompanying drawings I have shown my invention applied to a double-cylinder engine; but it will nevertheless be understood that the same is equally applicable to a single-cylinder engine with modifications that are obvious and do not need explanation.

In the example shown in the drawings, 1 2 represent the upper movable electrodes, which are inserted through the cylinder-head 3 and contact with the lower fixed electrodes 4 when forced together against the inertia of springs 5, secured to arms 6 7, which are in turn connected to rocker-arms 8 9, respectively, each having a head or knuckle 10 fitting in a strap 11, secured to the upper end of each of the movable electrodes 1 2. The arm 9 is secured to a rocker-shaft 12, mounted in suitable bearings 13 and passing through a tubular shaft 14, which is mounted in bearings 15 and to which tubular shaft the arm 8 is secured, thus providing for the independent oscillation of the arms 8 9.

To the outer end of each of the shafts 12 14 is secured a friction-clutch mechanism having means of positive operative connection with some moving part of the engine, which clutch mechanisms being the same in construction and operation a description of one will suffice for both. Secured to each of the shafts is a friction-disk 16, and journaled loosely upon the shaft is a disk or power-transmitting member 17, the former disk constituting the driven member and the latter the driving member of the friction-clutch, and between these two disks 16 17 is interposed a friction-leather 18 or other device suitable for imparting the rotary motion of the driving member 17 to the driven member 16. In order that the degree of friction between the two members may be sufficient for the purpose of rotating the shaft against the inertia of the springs 5, the end of

the shaft is threaded, as shown at 19, and upon the threaded end is placed an adjusting-nut 20 and a jam-nut 21. The periphery of the disk or member 17 is serrated or provided with fine notches arranged as close together as possible, and engaging therewith is a pointed dog or pawl 22, having a stem 23, mounted in a keeper 24, and pressed normally against the periphery of the disk 17 by a spring 25, surrounding the stem 23 in said keeper. The keeper 24 is secured to or formed on one end of a rocker-arm 26, which is journaled on the shaft and held in place by a collar 27, while the other end of said rocker-arm 26 is connected to the upper end of a reciprocating link or connecting-rod 28, whose lower end may be attached or operatively related to some moving part of the engine—such, for instance, as a special eccentric usually provided for such purpose, but whose construction and operation being well known it need not be illustrated herein. Hence it will be seen that in the event of the use of my improved igniter on a four-cycle engine the rod 28 will be pulled downwardly at every other revolution, and as a consequence the dog 22 will impart a partial rotation to the disk 17, and thereby force the movable electrode against the fixed electrode and hold the circuit closed as long as the disk 17 thus continues to rotate. In order now that this rotation of the disk 17 may be checked at the desired instant for permitting the spring 5 to break the circuit and produce the spark, I employ a cam 29, having arm 33, pivoted to a slide 34, capable of being held to any desired adjustment by a set-screw 35, whereby the time of sparking may be varied at will by simply moving the slide 34 back and forth the desired distance. For the sake of uniformity of adjustment only one of the slides 34 is employed, and the arms 33 are connected together by a cross-bar 36, as shown in Fig. 5, so as to move in unison when the slide 34 is adjusted. This cam 29 is provided with an incline 30, which is engaged by a part 31 of the shoe 22 as the arm 26 oscillates, thus throwing the dog 22 out of engagement with the disk 17 and permitting spring 5 to rock the shaft 13 14 in the reverse direction, and thereby separate the electrodes.

In the form of my invention shown in Figs. 7 to 13, inclusive, the friction-clutch mechanism for holding the electrodes together is placed directly on the shaft 37, which in the other form is utilized for rotating the eccentric which reciprocates the rod 28, the shaft 37 being connected by suitable gearing 38 with the crank-shaft of the engine, and in this modified form one of these shafts 37 is arranged at each end of the engine, and the two clutch mechanisms for the respective igniters instead of being arranged side by side, as in the other form, are located at opposite ends of the engine on these shafts 37, respectively. The two clutch devices shown in Figs. 7 to 12, however, are the same in construction, and the description of one will suffice for both.

The shaft 37 is continuously revolved in one direction by the gear connection before described, and secured rigidly thereto by means of a pin 39 or other suitable device is an arm 40, (see Fig. 11,) which carries a friction shoe or dog 41, the latter being provided with a stem 42, arranged in a keeper 43, formed on the arm 40, and the dog 41 is pressed normally against the periphery of a disk 44 by means of a coil-spring 45, also located in the keeper 43. The disk 44 is loose on the shaft 37 and possesses no tendency to rotate therewith, excepting when the friction shoe or dog 41 is in engagement therewith, and mounted contiguous to the disk 44 on the shaft 37 is a disk or member 46, the latter constituting the driven member of a friction-clutch, while the disk 44 constitutes the driving member, and the disk 46 is held firmly in contact with the face of the disk 44 by means of a nut 47 and jam-nut 48, threaded on the end of the shaft 37, so that when the disk 44 revolves it will carry the disk 46 with it until the motion of the latter is checked by greater resistance. The disk 46 is provided with an arm 49, which is pivoted to the lower end of a link 50, whose upper end is connected to an arm 51 on a rocker-shaft 52, whose inner end carries the movable electrode 53, as shown in Fig. 13. Thus it will be seen that while the dog or pawl 41 is in engagement with the periphery of the disk 44 the arm 49 will be forced downwardly and the electrodes held firmly in contact; but the instant the shoe 41 is forced away from the periphery of the disk 44 a spring 54 or other suitable device will throw the electrodes apart and produce the spark. In order to effect this release of the dog 41, I arrange on the shaft 37 a cam 55, upon the periphery of which rests a runner 56, formed on the side of the shoe or dog 41 and serving to hold the latter out of engagement with the disk 44 until it reaches a notch or dwell 57 in the periphery of the cam 55, whereupon the shoe or dog 41 is allowed to engage the periphery of the disk 44 and throw the arm 49 downwardly to the full limit of the movement of the igniter-electrode 53. This dwell 57 is of comparatively short duration, so that the electrodes will be in contact only a short part of the stroke of the piston, and as a consequence the loss of current will be reduced to the minimum. As soon as the runner 56 rides out of the notch 57 the shoe 41 will be released from the disk 44, and the arm 49 being unrestrained the spring 54 will snap the electrodes apart. As shown in Fig. 10, the cam 55 is provided with an arm 58, which is offset to one side to permit the keeper 43 to revolve around the periphery of the disk 44, and, as shown in Fig. 12, these two arms 58 are connected together by a cross-bar 59, intermediate links 60 being provided between the arms 58 and bar 59, and one of such links, as shown in Fig. 7, being provided with slot 61, through which passes set-screw 62 for adjusting the link to the desired position, where-

by the time of sparking may be varied, as before explained.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In an electric igniter the combination of the electrodes, means for separating the same, a friction-clutch having its driven member operatively related to one of said electrodes for bringing them together and closing the circuit therethrough, a positively-moving dog engaging the driving member of said clutch for rotating the same, a cam or trip for releasing said dog from said driving member, a slide to which said cam or trip is connected and means for adjustably securing said slide in place, substantially as set forth.

2. In an electric igniter the combination of two sets of electrodes, means for separating the electrodes of each set, two clutches having their driven members operatively related to one electrode of each of said sets for bringing them together and closing the circuits there-through, means for positively moving the driving member of each of said clutches and adjustable means connected together so as to move in unison for rendering said clutch members inactive on the electrodes periodically, substantially as set forth.

3. In an electric igniter the combination of the electrodes one of which is movable, means for throwing said electrodes apart, a power-transmitting member having frictional operative relation to said movable electrode whereby it may continue to move after said electrode comes to rest and means for moving said member, substantially as set forth.

4. In an electric igniter the combination of the electrodes one of which is movable, means for throwing said electrodes apart, a power-transmitting member having permanent frictional operative relation to said movable electrode whereby said member may continue to move after said electrode comes to rest and means for intermittently moving said member, substantially as set forth.

5. In an electric igniter the combination of the electrodes one of which is movable, means for throwing said electrodes apart, a power-transmitting member having frictional operative relation to said movable electrode whereby said member may continue to move after said electrode comes to rest, means for engaging and moving said member, and means for tripping and releasing said engaging means, substantially as set forth.

6. In an electric igniter the combination of the electrodes one of which is movable, means for throwing said electrodes apart, a power-transmitting member having frictional operative relation to said movable electrode whereby said member may continue to move after said electrode comes to rest, means for engaging and moving said member and adjust-

able means for tripping and releasing said engaging means, substantially as set forth.

7. In an electric igniter the combination of the electrodes one of which is movable, a power-transmitting member having frictional operative relation to said movable electrode for forcing the latter electrode against the other electrode, means for intermittently moving said member and means for separating said electrodes offering less resistance than and adapted to be overcome by the friction of said power-transmitting member, substantially as set forth.

8. In an electric igniter the combination of the electrodes one of which is movable, a power-transmitting member rotatable continuously in one direction and having frictional operative relation to said movable electrode, means for intermittently moving said member and means for separating said electrodes offering less resistance than and adapted to be overcome by the friction of said power-transmitting member, substantially as set forth.

9. In an electric igniter the combination of two electrodes one of which is movable, a rotary power-transmitting member, a second member frictionally related to said first member and operatively connected with said movable electrode, means for engaging and rotating said first member until the electrodes meet, means for releasing said first member after the electrodes meet and means for throwing the electrodes apart, substantially as set forth.

10. In an electric igniter the combination of two electrodes one of which is movable, a shaft for operating said movable electrode, a rocker-arm loose on said shaft, a disk secured to said shaft, a second disk loose on said shaft and frictionally related to said first disk, a dog carried by said rocker-arm and adapted to engage said second disk, means for forcing said dog out of engagement with said second disk and means for throwing the electrodes apart when said dog is thus disengaged, substantially as set forth.

11. In an electric igniter the combination of two electrodes one of which is movable, a shaft for actuating said movable electrode in one direction, means for throwing said electrode in the opposite direction, a rocker-arm loose on said shaft, a disk secured to said shaft, a second disk loose on said shaft and frictionally related to said first disk, a dog carried by said arm and engaging said second disk for rotating it, a cam having a projection adjustable with reference to the circumference of said second disk and adapted to throw said dog out of engagement and means for adjusting said cam, substantially as set forth.

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Witnesses:

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