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Patented Oct. 21, 1902.

E. S. BOWEN.  
SPARKING MECHANISM FOR GAS ENGINES.

(Application filed July 5, 1901.)

(No Model.)

2 Sheets—Sheet I.

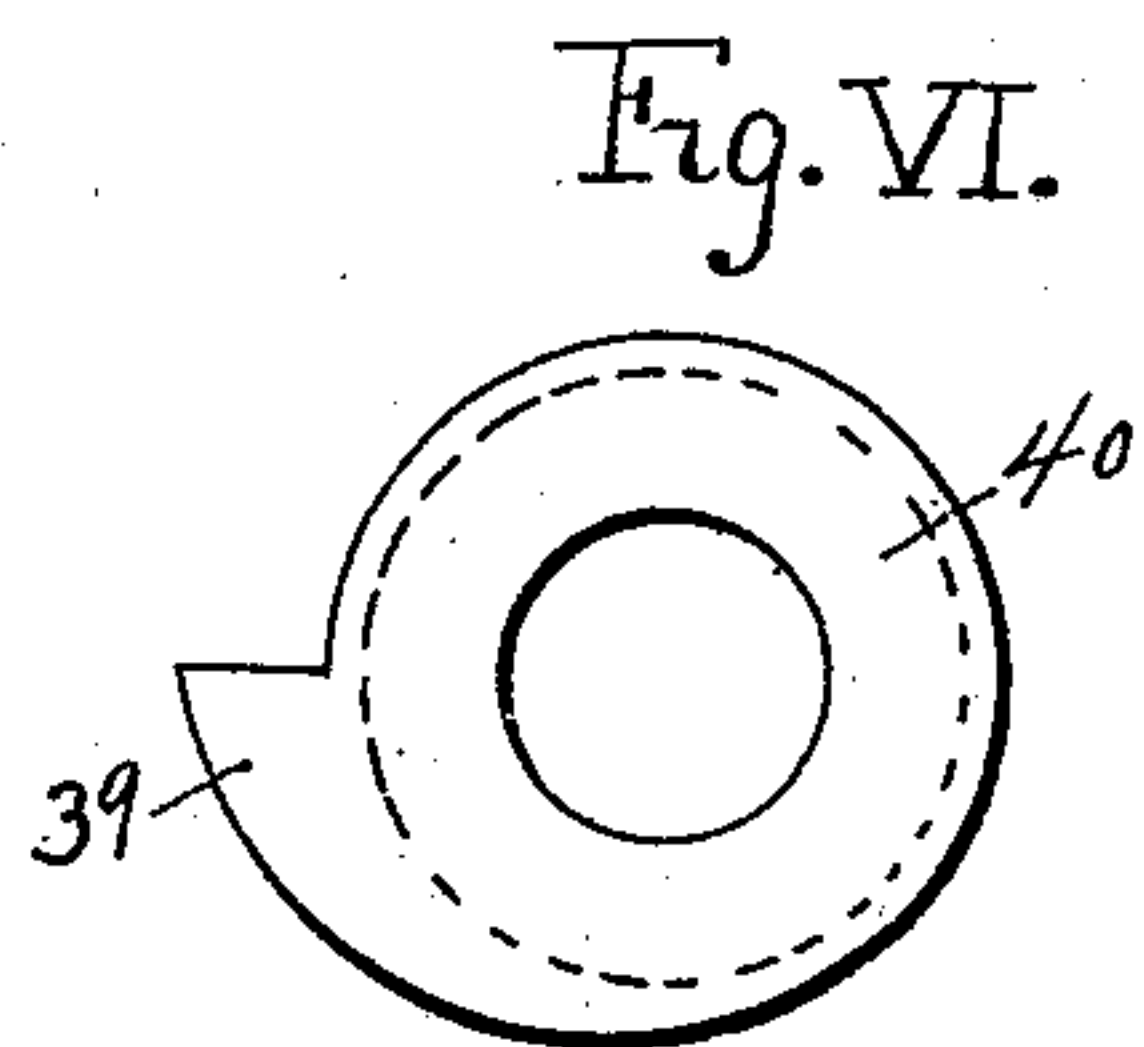
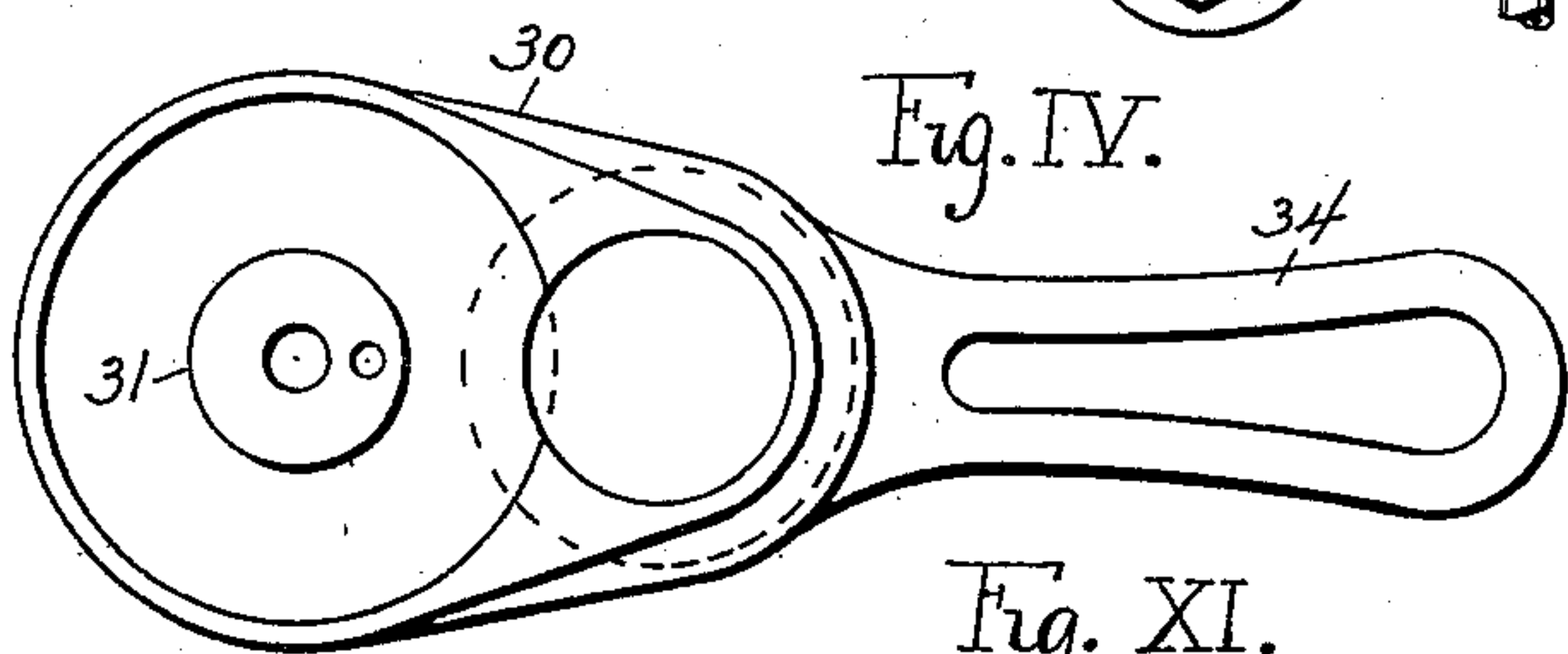
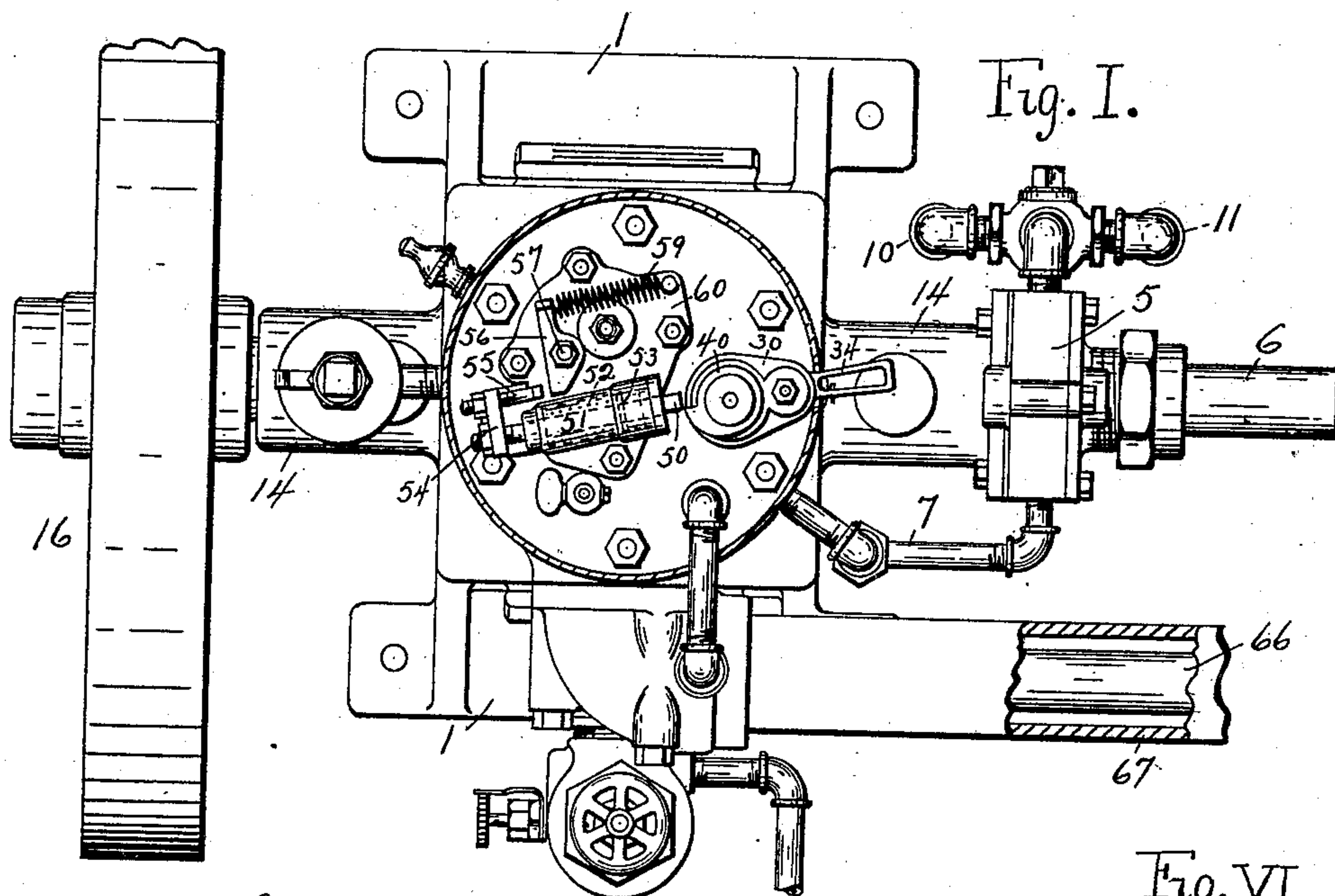
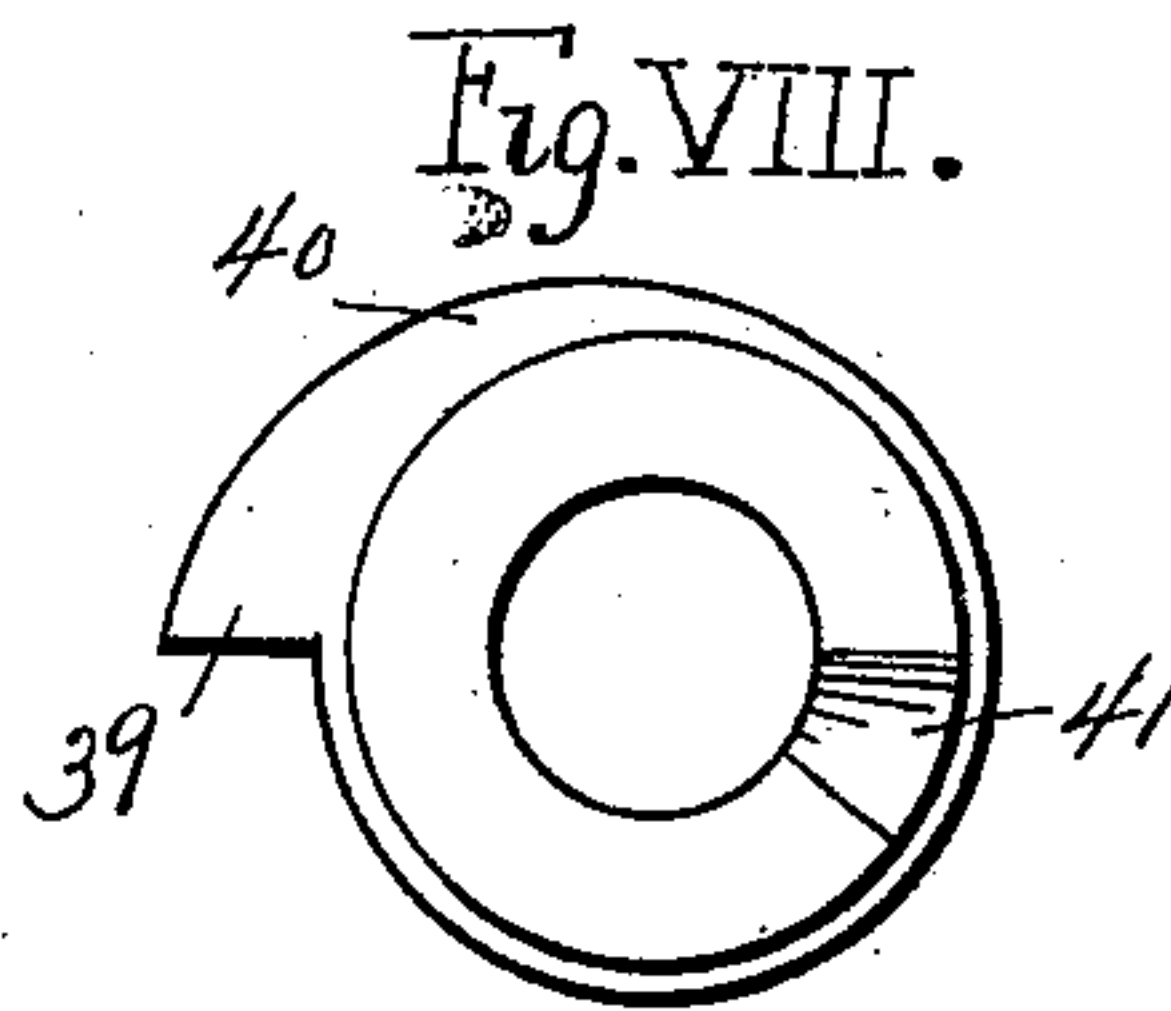
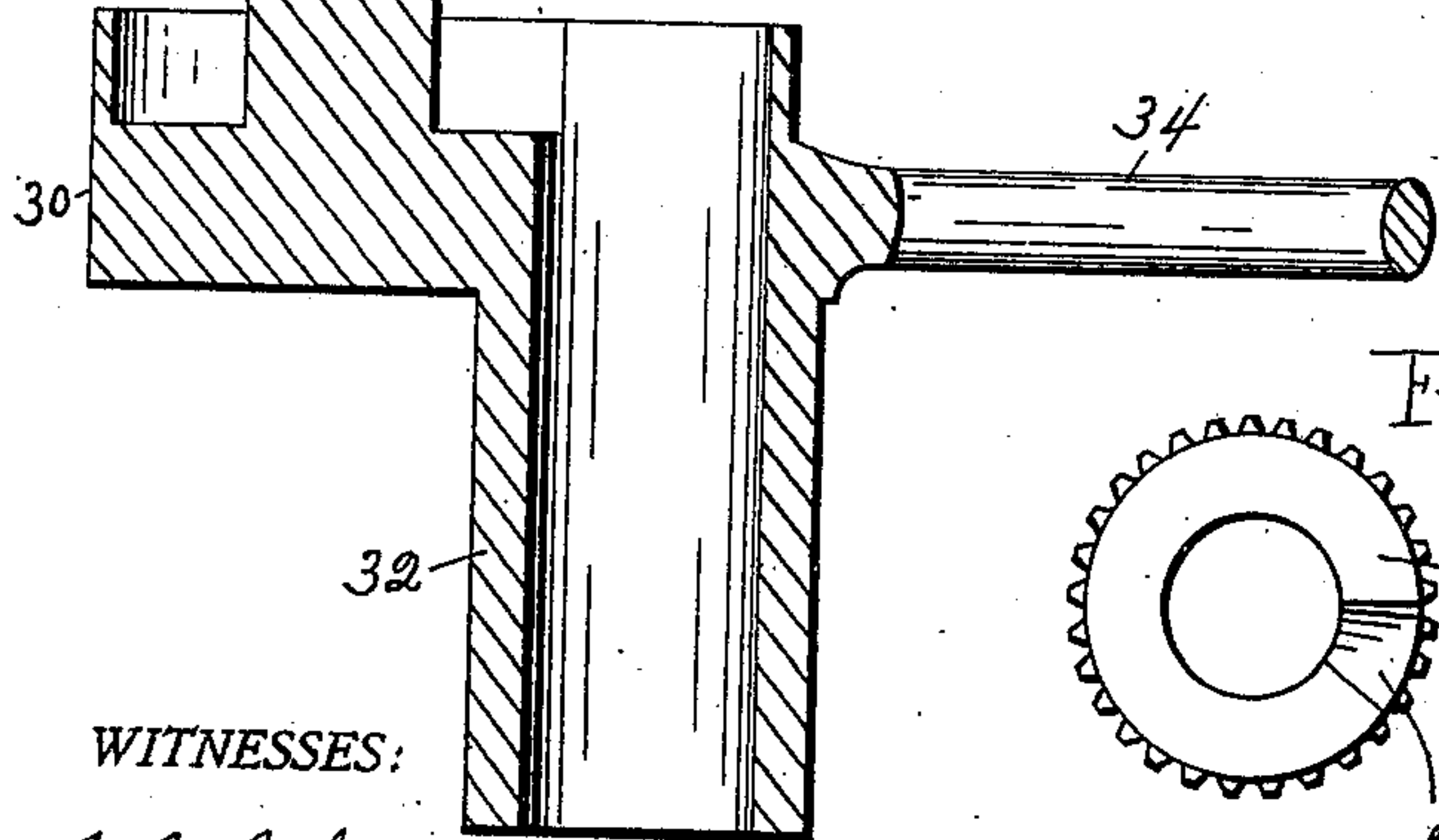
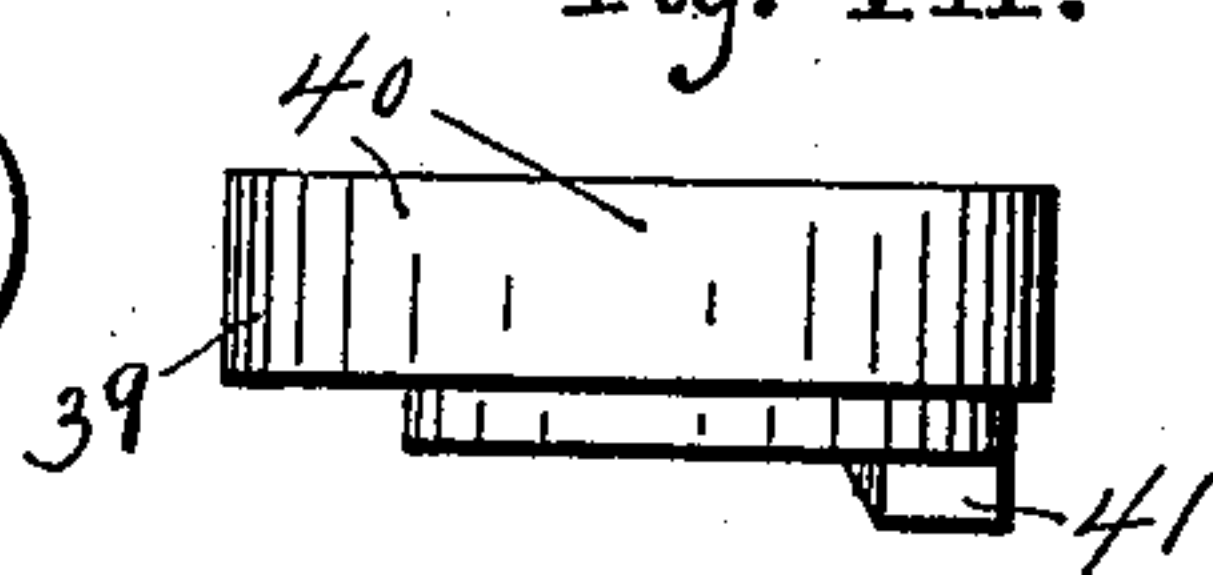
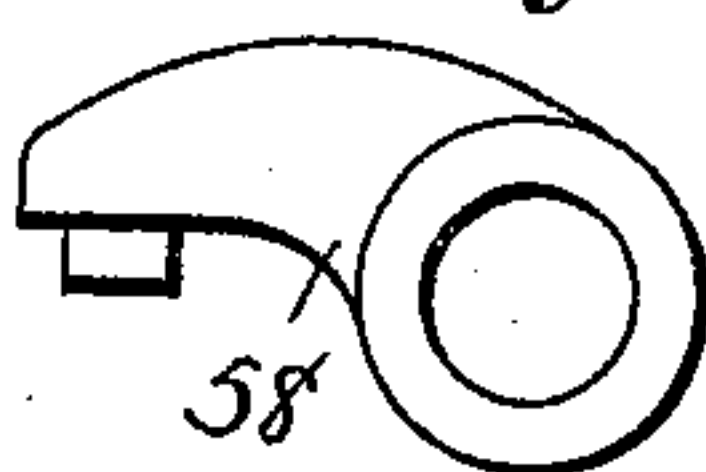
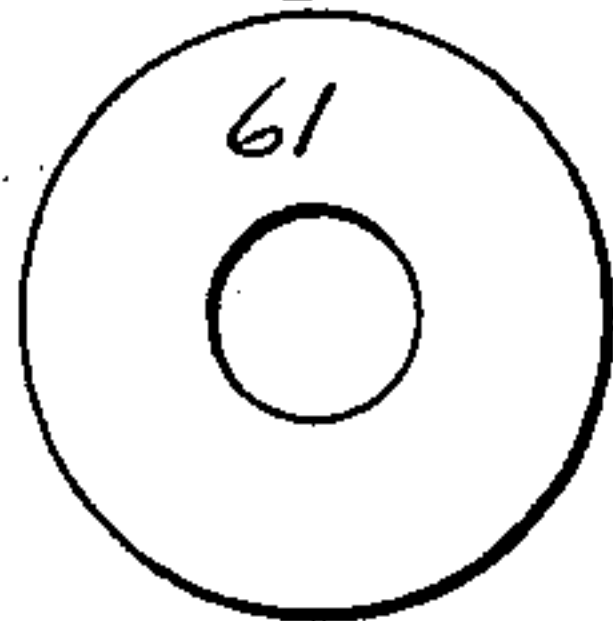
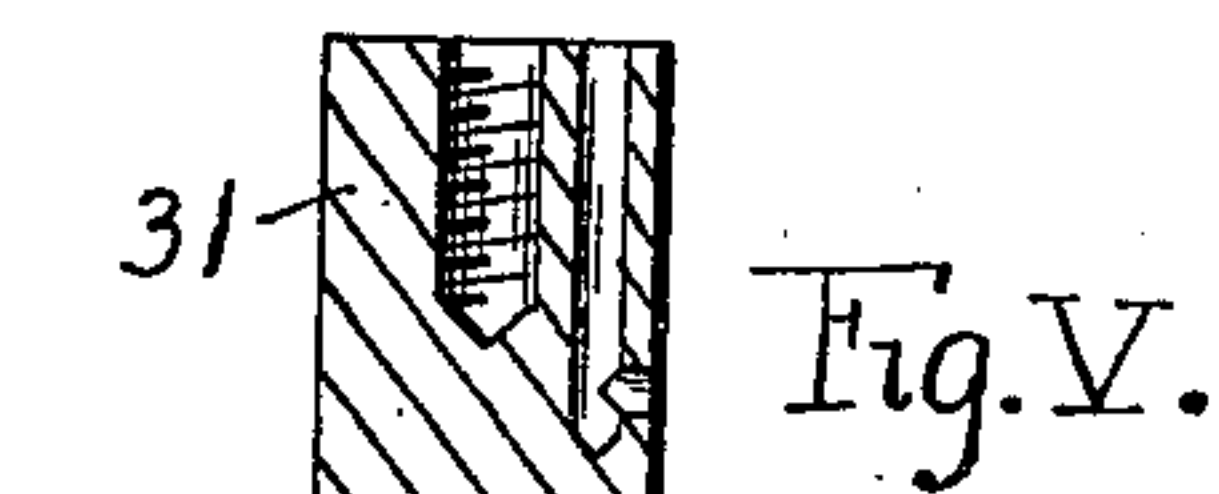


Fig. XI.

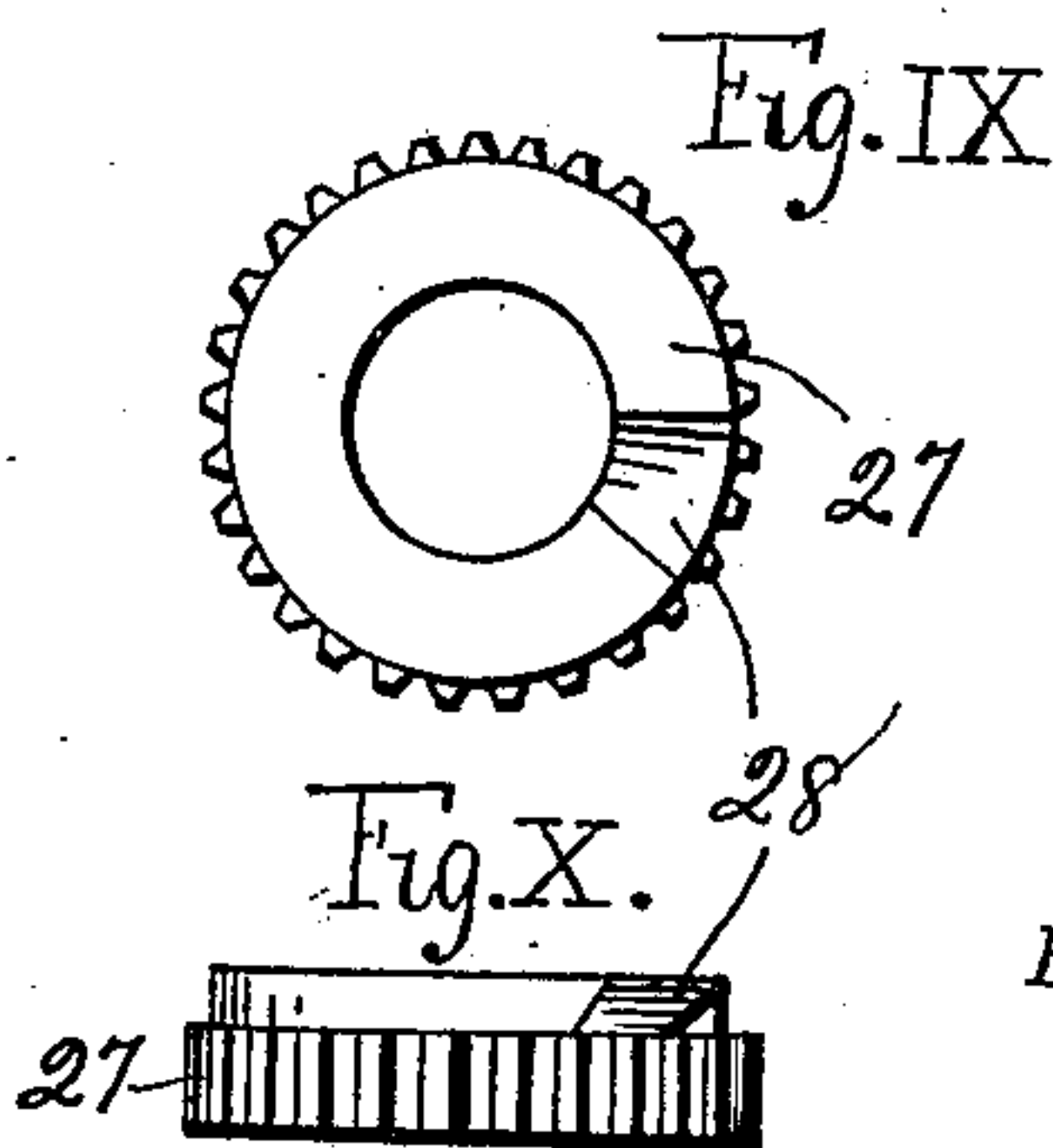
Fig. XII.

Fig. VII.



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No. 711,652.

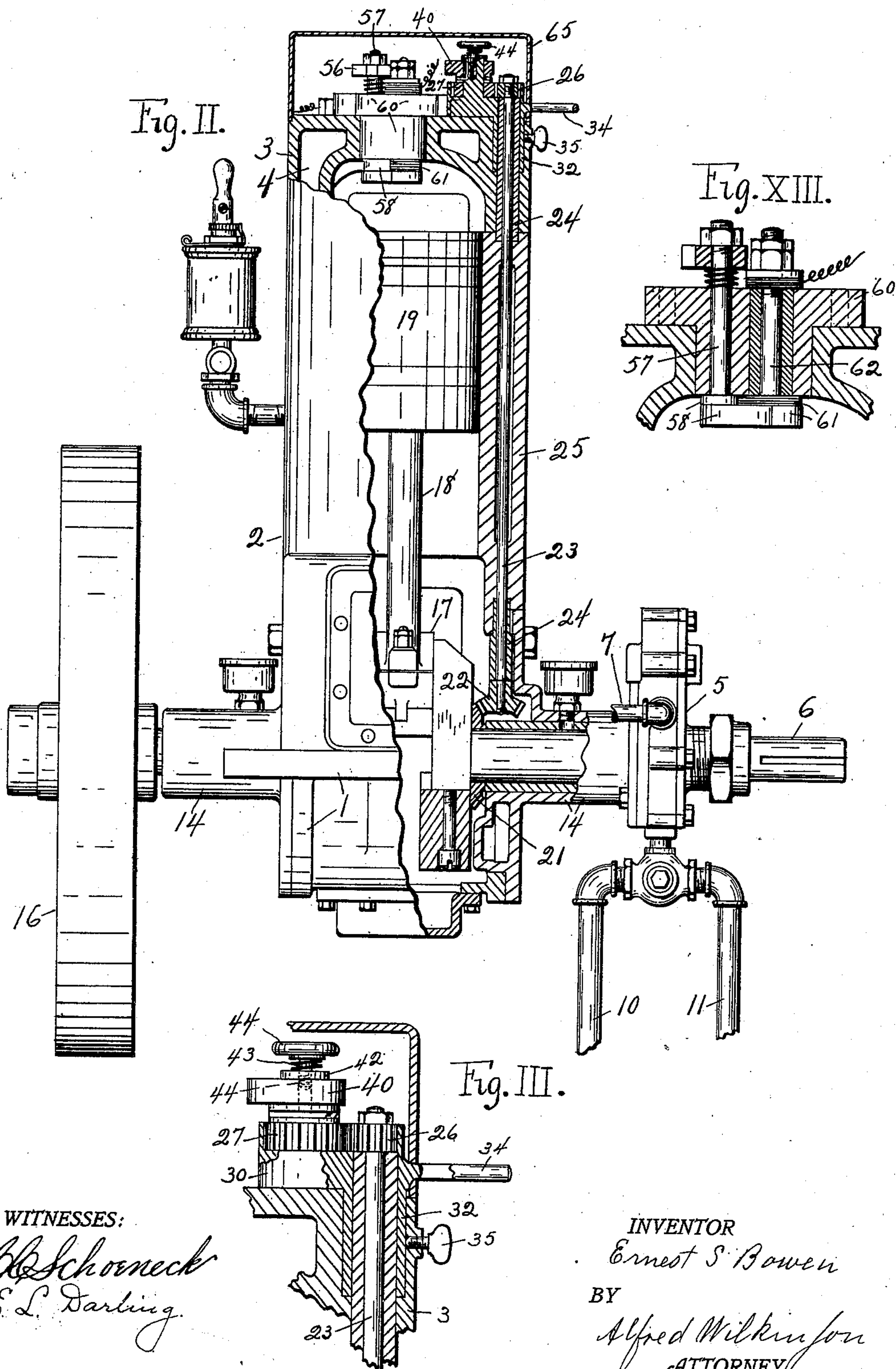
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# UNITED STATES PATENT OFFICE.

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## SPARKING MECHANISM FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 711,652, dated October 21, 1902.

Application filed July 5, 1901. Serial No. 67,108. (No model.)

*To all whom it may concern:*

Be it known that I, ERNEST S. BOWEN, of Auburn, in the county of Cayuga, in the State of New York, have invented new and useful  
5 Improvements in Sparking Mechanism for Gas-Engines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to a gas or explosive  
10 engine; and it consists in a new and improved construction and arrangement of parts by which a simple, safe, reliable, and compact engine is produced, and in a new igniting or  
15 sparking mechanism for the engine easily adjusted to control the time of the spark and the speed.

My invention will be understood by reference to the accompanying drawings, in which the same reference-numerals indicate the  
20 same parts in all the figures.

Figure I is a top plan view of the engine. Fig. II is a vertical elevation thereof with portions broken away and portions shown in section. Fig. III is a portion of Fig. II enlarged. Fig.  
25 IV is an enlarged plan of the speed-controlling lever detached. Fig. V is a vertical section thereof. Figs. VI, VII, and VIII are respectively top plan, side elevation, and bottom plan of the cam detached.  
30 Figs. IX and X are respectively top plan and side elevation of the cam-pinion detached. Figs. XI and XII show in plan the two contacts or terminals. Fig. XIII is a vertical section of plug and parts thereof.

35 In the figures, 1 indicates the engine-base, 2 the cylinder, and 3 the cylinder-head, entirely surrounded by a water-jacket, the water being supplied to the spaces 4 by the rotary pump 5 on the crank-shaft 6, of which  
40 7 is the outlet, 10 and 11, respectively, the sea-suction and the bilge-suction, the latter being adapted to pump out boat in case of leak.

14 14 are the bearings for the crank-shaft, of which 16 is the fly-wheel, 17 the crank, and 18 the pitman to piston 19, fitted to the  
45 cylinder. On the shaft is secured the bevel-gear 21, with which meshes bevel-gear 22 on the igniter-shaft 23, fitted to bearings 24 24 and entirely inclosed and protected in the tube  
50 25 on the side of the cylinder. To the upper end of this shaft is keyed the spur-gear 26,

meshing with pinion 27 to rotate the cam-wheel 40. This pinion 27 is provided with a ratchet-tooth 28 or ratchet-teeth on the lower surface and is journaled on the upper shank  
55 31 of the speed-controlling lever 30 (best shown in Figs. IV and V) and provided with lower shank 32, fitting around the igniter-shaft bearing 24 and over the spur-gear 26.

34 is the lever-handle, and 35 the thumb-  
60 screw to retain it in its adjusted position.

Cam-wheel 40 has integral cam 39 and on its lower surface a ratchet-tooth 41, engaging with ratchet-tooth 28 on pinion 27, by which the cam-wheel is rotated in the forward di-  
65 rection to separate the terminals and make the spark; but in case of accidental backward turn of the igniter-shaft the teeth slip over each other without rotating the cam or injuring the parts. The cam-wheel and pin-  
70 ion are held in yielding engagement by means of spring 43, retained in position by washer 42 and screw-cap 44. The rotating cam engages with plunger 50, arranged in shell 51 and held in engagement by spring 52 between  
75 shell and washer 53. To the opposite end of the plunger is fixed the cross-head 54, carrying igniter-pin 55 and engaging with the igniter-arm 56 on contact-pin 57, carrying contact 58 on its lower end within the cylinder  
80 and journaled in the plug 60 in the cylinder-head. 61 is the opposite contact on contact-pin 62, fixed in plug and suitably insulated.

59 is a spring attached to the igniter-arm and to a fixed point to retain the contacts in  
85 contact, except when separated by operation of the more powerful spring 52 on plunger 50, when it slips off the rotating cam and the igniter-pin 55 strikes arm 56.

65 is a false cover for mechanism on cylin-  
90 der-head.

66 is the exhaust surrounded by water-jacket 67.

By my invention at starting the cam carried on the lever may be arranged to make  
95 the spark exactly at the center; but after the engine is under way the lever and cam may be shifted easily to any desirable point to make the spark before the center and get the greatest power and speed. When it is desired to  
100 run slow, the lever is shifted in the opposite direction to make the spark after the center.



A very quick spark is obtained whether the engine is running slow or fast by the operation of the spring and the momentum of the plunger springing off the cam.

5 The controlling-lever and attached parts may be removed easily and the plug with the contacts and connected parts without affecting the adjustment. All the working parts of the motor are inclosed and protected, avoid-  
10 ing liability of breakage from accident and muffling the clicking and the exhaust.

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

15 1. In a gas-engine sparking mechanism, the combination with the terminals suitably supported and suitable electric connections thereto, of a speed-controlling lever suitably journaled, an igniter-cam journaled on the speed-  
20 controlling lever, means to rotate the cam and intermediate connections between the cam and the terminals to force their separation and thereby cause the spark.

2. In a gas-engine sparking mechanism, the  
25 combination with the engine, the terminals suitably journaled therein and suitable electric connections, of a speed-controlling lever suitably journaled, an igniter-cam journaled on the speed-controlling lever, means for ro-  
30 tating the cam operated from the crank-shaft to the engine, and connections operated by the cam to separate the terminals.

3. In a gas-engine sparking mechanism, a speed-controlling lever suitably journaled in  
35 the engine, an integral handle on the lever, an igniter-cam journaled on the lever having ratchet-teeth on its under surface, a pinion also journaled on the lever having ratchet-teeth to engage with the cam ratchet-teeth to  
40 rotate the latter in one direction, and a spring to hold said teeth in engagement.

4. In a gas-engine sparking mechanism, the combination with the engine-base, the cylinder extending therefrom, a vertical hollow  
45 projection on one side of the cylinder having bearings therein, and the crank-shaft arranged in the base, of a bevel-gear on the crank-shaft, a vertical igniter-shaft arranged in the hollow projection, a bevel-gear on the  
50 lower end of the igniter-shaft meshing with the crank-shaft gear, a spur-gear on the upper end of the igniter-shaft, a speed-regulating lever journaled on top of the engine hav-  
55 ing an upwardly-extending shank on its inner end, a downwardly-depending hollow shank fitting over the upper igniter-shaft bearing and said spur-gear, and an outwardly-extending handle, a pinion journaled on said up-  
60 per shank and meshing with the spur-gear and having ratchet-teeth on its upper surface, a cam-wheel journaled on said upper shank above said pinion having ratchet-teeth on its lower surface meshing with the pinion ratchet-teeth, an integral cam on the cam-wheel, a  
65 washer secured to said upper shank, a spring strung on said upper shank between said washer and cam-wheel, a screw to retain the

washer in position, a terminal cover secured to the top of the cylinder, a horizontally-ar-  
70 ranged plunger-shell on said cover, a plunger fitting said shell and adapted to be en-  
gaged by the rotating cam, a shoulder on said plunger, a spring arranged between said shoulder and the shell end to force the plun-  
75 ger outwardly into engagement with the cam, a cross-head on the opposite end of the plun-  
ger, a terminal pin secured to said cross-head parallel to the plunger, parallel vertical shafts  
80 journaled in said cover, one of said shafts being suitably insulated, nuts on said shafts re-  
taining them in position, terminals on the lower ends of said shafts normally in contact,  
an exterior arm on the upper end of one of  
85 said shafts, and a spring secured to said arm and to a fixed point to retain the terminals in contact, and suitable electrical connections to the terminals.

5. In a gas-engine sparking mechanism, the combination with an engine having a vertical hollow projection on one side of the cylinder  
90 and the crank-shaft, of a gear on the lower end of the igniter-shaft meshing with the crank-shaft gear, a spur-gear on the upper end of the igniter-shaft, a speed-regulating  
95 lever journaled on top of the engine having an upwardly-extending shank on its inner end, a pinion journaled on said shank meshing with the spur-gear and having ratchet-teeth, a cam-wheel also journaled on said  
100 shaft and having ratchet-teeth engaging with the pinion ratchet-teeth, an integral cam on the cam-wheel, a plunger arranged on top of the cylinder, a spring for forcing said plun-  
105 ger into engagement with the cam, a terminal pin carried on said plunger, terminal shafts journaled in the top of the cylinder, one of said shafts being suitably insulated, nuts on  
110 said shafts for retaining them in position, terminals on the lower ends of said shafts normally in contact, an arm on the upper end of one of said shafts adapted to engage with  
115 the terminal pin, and a spring secured to said arm and to the fixed pin to retain the terminals in contact, and electrical wires connected to said shafts.

6. In a gas-engine sparking mechanism, the combination with the engine, a vertical hollow projection on one side of the cylinder pro-  
120 vided with bearings and the crank-shaft, of a beveled gear on the crank-shaft, a vertical igniter-shaft in the hollow projection, a beveled gear on the lower end of the igniter-shaft meshing with the crank-shaft gear, a spur-gear on the upper end of the igniter-shaft, a speed-  
125 regulating or cam-shifting lever journaled on top of the cylinder and having an upwardly-extending shank on its inner end, a pinion journaled on said upper shank having ratchet-teeth on its upper surface and meshing with the spur-gear, a cam-wheel journaled on said  
130 upper shank having ratchet-teeth on its lower surface meshing with the pinion ratchet-teeth, an integral wheel on the cam-wheel, a spring yieldingly to retain said ratchet-teeth in en-



gagement, a terminal cover secured to the top of the cylinder, a plunger-shell on said cover, a plunger fitting said shell and adapted to engage with the rotating cam, a spring 5 to force said plunger into engagement with the rotating cam, a cross-head on the plunger, a terminal pin secured to said cross-head, vertical terminal shafts journaled in said cover, one of said shafts being suitably insulated, terminals on the lower end of said shafts normally in contact, an arm on the upper end of one of said shafts adapted to be engaged by said terminal pin, a spring connected to said arm to retain the terminals in 15 contact, and suitable electrical connections to the terminals.

7. In a gas-engine sparking mechanism, the combination with the terminals suitably supported and suitable electric connections to 20 the terminals, of a speed-controlling lever suitably supported, a cam-wheel journaled on the lever, an integral cam on the cam-wheel, a pinion, connections between the pinion and the cam-wheel, whereby the pinion rotates 25 the cam-wheel in one direction but not in the other, means to rotate the pinion, and intermediate connections between the cam and the terminals to separate the terminals.

8. In a gas-engine sparking mechanism, the combination with the terminals suitably supported and suitable electric connections thereto, of a speed-controlling lever suitably journaled, a cam-wheel journaled on the lever, an integral cam on the cam-wheel, a pinion 35 journaled on the lever beneath the cam-wheel, means to retain the cam-wheel and the pinion in engagement, so that they will rotate together in one direction, but disengage and not rotate together in the other, means to 40 rotate the cam-wheel, and intermediate connections between the cam and the terminals to separate the terminals

9. In a gas-engine sparking mechanism, the combination with the terminals suitably supported and electric wires connected thereto, of a speed-controlling lever suitably journaled on the engine, a cam journaled on the lever, a gear on the engine crank-shaft, an

igniter-shaft suitably supported, a gear on the igniter-shaft engaging with the crank- 50 shaft gear, a spur-gear on the igniter-shaft, connections between the spur-gear and the cam to rotate the cam in one direction but not in the other, and intermediate connections between the cam and the terminals to 55 separate the terminals.

10. In a gas-engine sparking mechanism, the combination with a fixed and suitably-insulated terminal, a suitably-journaled terminal engaging therewith, a spring connected to the 60 journaled terminal to maintain it in engagement with the fixed terminal, a speed-controlling lever suitably journaled, a cam journaled on the speed-controlling lever, means to rotate the cam, and intermediate connections 65 between the cam and the journaled terminal to force it out of engagement with the fixed terminal and thereby cause the spark.

11. In a gas-engine sparking mechanism, the combination with the terminals suitably supported and suitable electric connections thereto, of a speed-controlling lever supported on the engine, so that its position may be shifted, an integral handle on the outer end of the lever, a hollow downwardly-extending shank 75 on the same end of the lever, a solid upward shank on the inner end, a set-screw in the cylinder to engage with the lever and retain it in position, an igniter-shaft suitably journaled and arranged within said hollow shank, 80 means to rotate the igniter-shaft, a spur-gear thereon above the lever, a pinion journaled on the solid shank engaged with the spur-gear, a cam-wheel carrying an integral cam also journaled on the solid shank and engaging 85 with the pinion to be rotated thereby, and connections operated by the cam to separate the terminals and thereby cause the spark.

In testimony whereof I have hereunto 90 signed my name.

ERNEST S. BOWEN. [L. S.]

Witnesses:

C. C. SCHOENECK,  
E. L. DARLING.