(No Model.) 3 Sheets—Sheet 1.

P. C. SAINSEVAIN.

GAS OR GASOLINE VAPOR ENGINE.

No. 461,802. Patented Oct. 20, 1891.

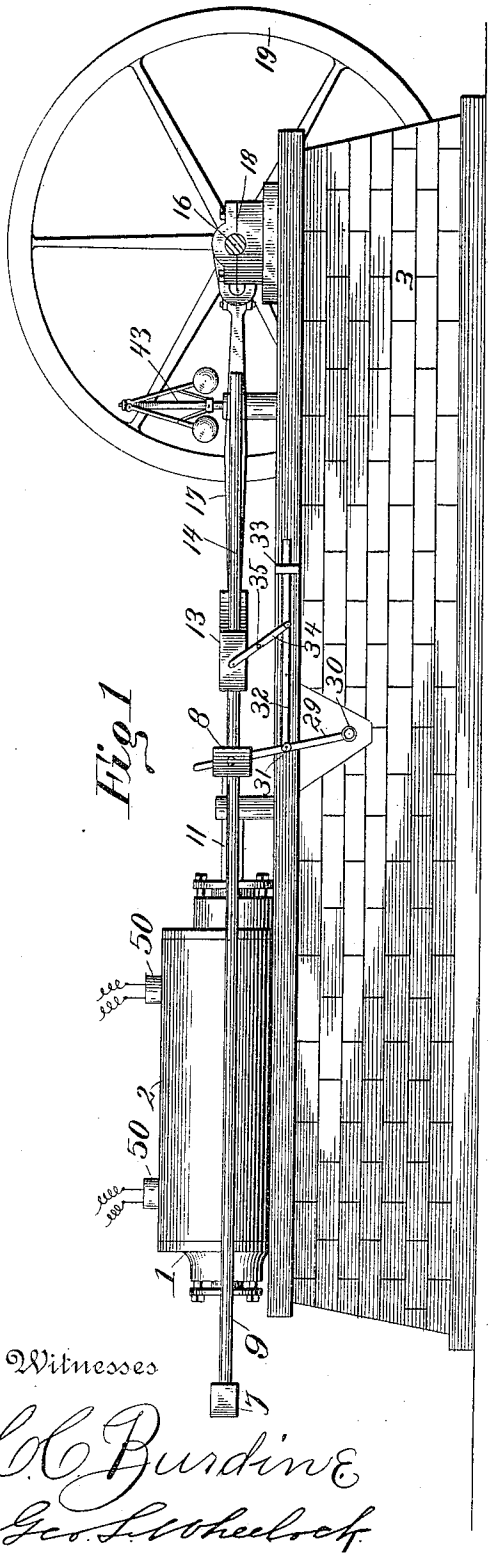

Fig 1

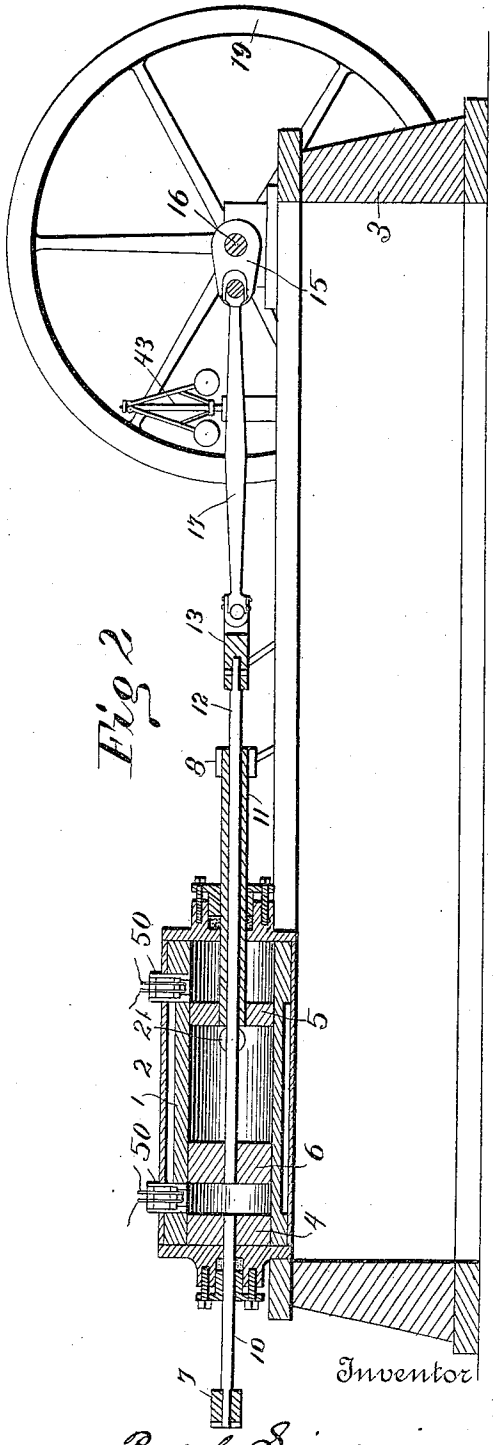

Fig 2

Witnesses

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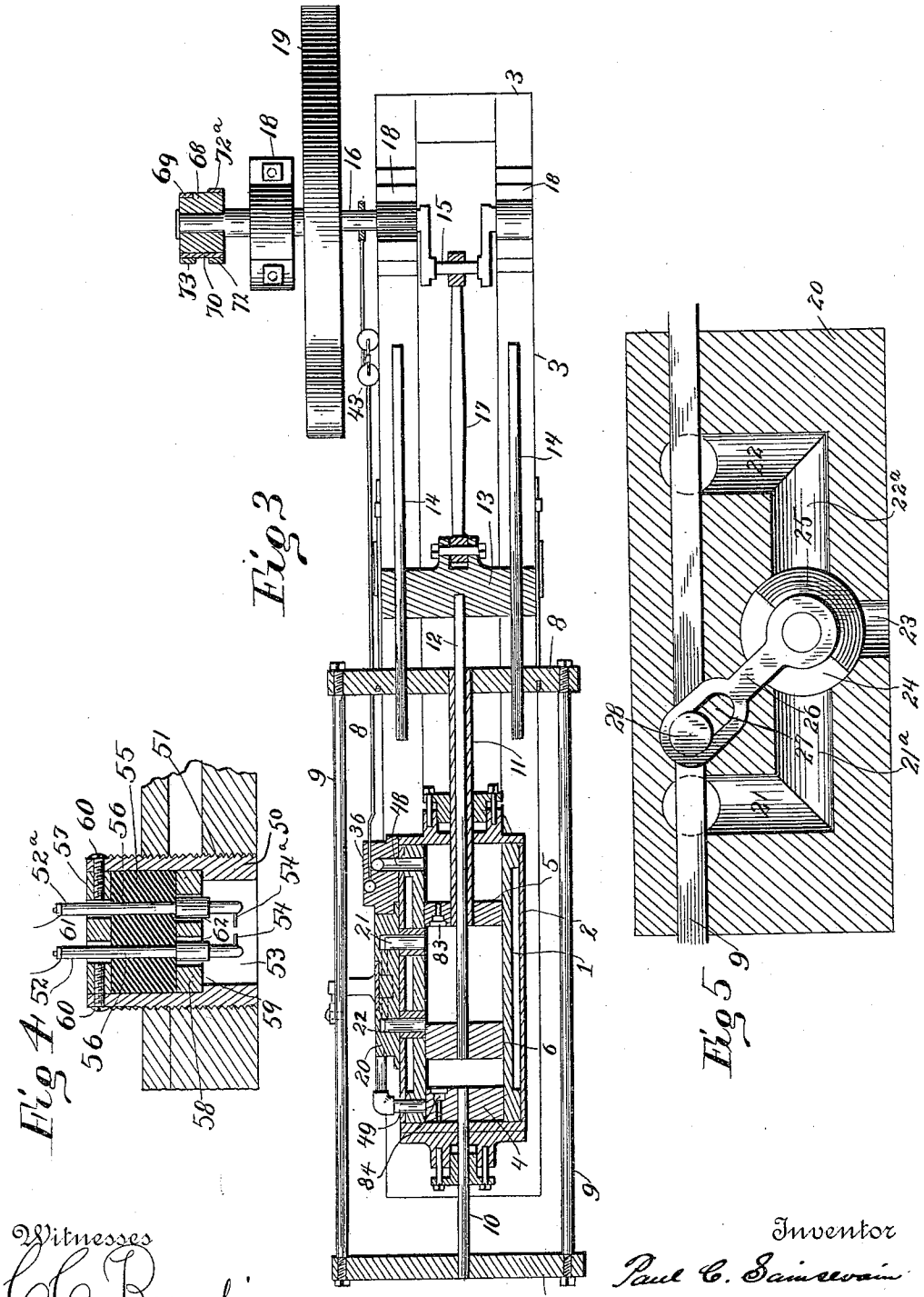

Fig 3

Fig 4

Fig 5

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Fig 6

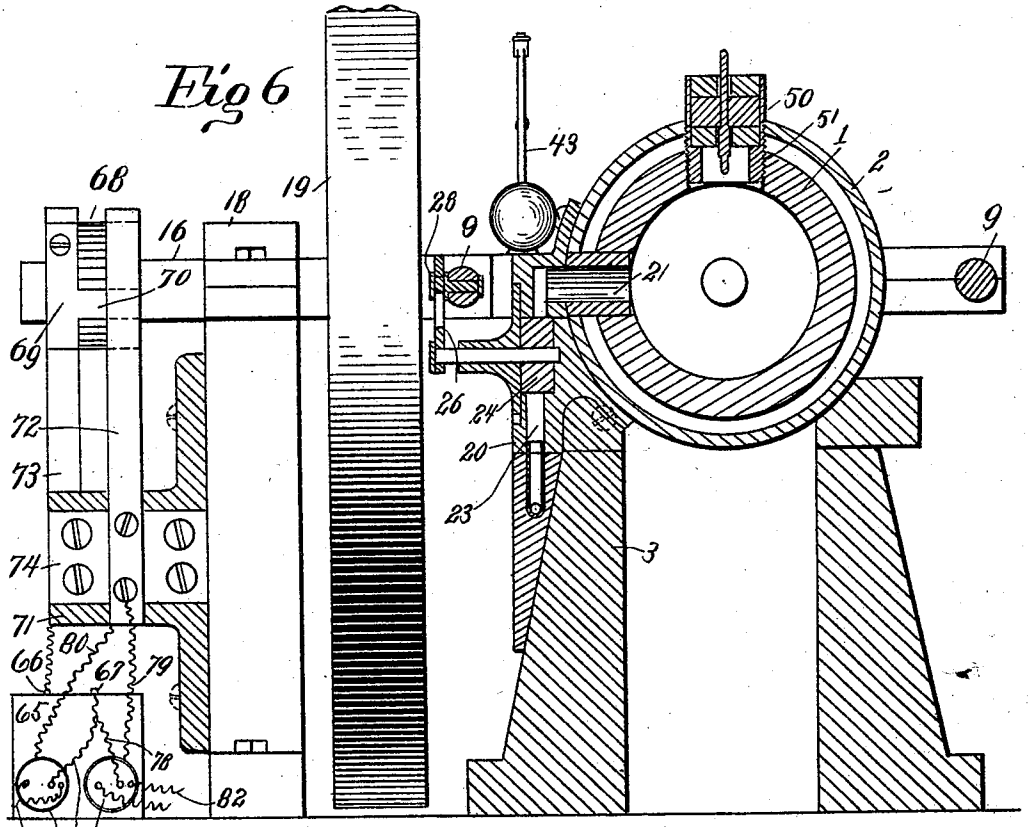
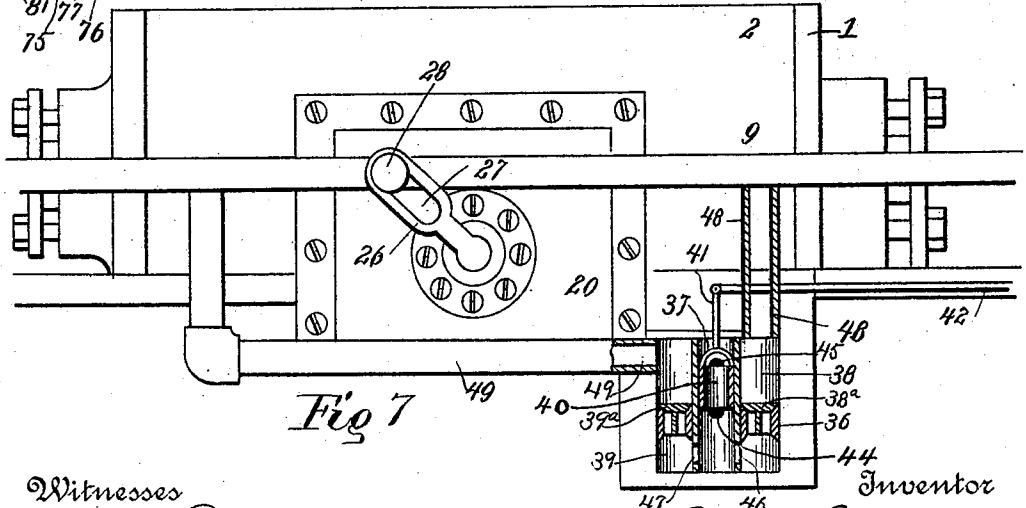


Fig 7



Witnesses

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UNITED STATES PATENT OFFICE.

PAUL C. SAINSEVAIN, OF SAN JOSÉ, CALIFORNIA.

GAS OR GASOLINE-VAPOR ENGINE.

SPECIFICATION forming part of Letters Patent No. 461,802, dated October 20, 1891.

Application filed September 30, 1890. Serial No. 366,685. (No model.)

To all whom it may concern:

Be it known that I, PAUL C. SAINSEVAIN, a citizen of the United States, residing at San José, in the county of Santa Clara and State of California, have invented certain new and useful Improvements in Gas-Engines, of which the following is a specification.

My invention relates to a gas-engine, its object being to produce a more desirable engine, wherein motion of the pistons is caused by the sudden explosion of gas in the closed chamber.

With this end in view my invention consists in certain features of construction and combinations of parts, to be hereinafter described, and then particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of my gas-engine. Fig. 2 is a vertical longitudinal section thereof. Fig. 3 is a horizontal section of the engine. Fig. 4 is a detail sectional view of the ignitor attachments. Fig. 5 is a detail section showing the exhaust-passages and the cut-off valve. Fig. 6 is an end view of the engine, partly in elevation and partly in section. Fig. 7 is a side elevation of the cylinder, showing the gas and air inlet regulating mechanism.

The cylinder 1 is surrounded by a water-jacket 2. The bed or base 3 supports said parts as well as the remaining parts of the engine.

4 and 5 are the charging-pistons arranged, respectively, in opposite ends of the cylinder. 6 is the main piston that works between the charging-pistons 4 and 5. At the rear end of the cylinder 1 is a cross-head 7, and at the front end thereof is another cross-head 8. The ends of these cross-heads are connected at each side of the cylinder by rods 9. Cross-head 7 works charging-piston 4 through the medium of piston-rod 10, and cross-head 8 works charging-piston 5 through the medium of piston-rod 11. This piston-rod 11 is tubular or hollow, and through it passes the piston-rod 12 of the main piston 6.

13 is a cross-head which is guided on ways afforded by the parallel rods 14, which project from the cross-head 8. Cross-head 13 is connected to the crank 15 of the drive-shaft 16 by means of pitman 17. The drive-shaft is journaled in boxes 18 at the front end of the engine and is provided with a fly-wheel 19.

At one side of the cylinder 1 is a valve-casing 20, having two exhaust-passages 21 22, which communicate with the interior of the cylinder and are provided with lateral branches 21^a 22^a, the outer ends of which lead into an outlet-port 23. The outlet from the branch passages 21^a 22^a is controlled by a semi-cylindrical valve 24, which turns within a chamber 25. Projecting from the valve 24 is a valve-lever 26, which is provided with a slot 27 to receive the stud or pin 28, projecting from one of the rods 9.

As the motion of the main piston 6 only is positively produced by the main drive-shaft, some means must be provided for producing the automatic motion of the charging-pistons. This is accomplished by pivoting a lever 29 to the bed-plate at its lower end or at point 30 and by pivoting its upper end to cross-head 8. The lever 29 is pivoted between its upper and lower ends at one end of a horizontal slide 32, the other end of which works in a guide 33 attached to the base 3.

34 is a link formed of two parts jointed at 35, and the upper and lower ends of which are respectively pivotally connected to the cross-head 13 and slide 32. The operation of this automatic movement will be described later on.

Referring to Fig. 7, which shows the gas and air inlet mechanism, 36 represents a chambered box or casing. 37 is a central vertical chamber, and 38 and 39 outer vertical chambers. 40 is a hollow or tubular piston-valve, which depends from a piston-rod 41, that works through the top of central chamber 37. This piston-rod 41 is connected to one end of a governor-rod 42, the other end of which leads from the governor 43 of any desired design. At one side of the chamber 37 is a gas-inlet opening 44, above which is located an air-inlet opening 45, and these openings are controlled by the piston-valve 40. Intermediately in the side chambers 38 and 39 are arranged check-valves 38^a and 39^a, respectively, below which and in the intermediate walls between the central and side chambers are ports 46 47. The governor, through the medium of the rod 42, regulates the piston 40

in its motion in the central or regulating chamber 37. When the speed increases, the regulating-piston is pushed down and closes the gas-inlet 44 and opens the air-inlet 45, and vice versa. The charges of gas are alternately drawn through the openings closed by the check-valves 38[a] 39[a], and into the respective ends of the cylinder 1 through the inlet-pipes 48 49, leading, respectively, into the upper ends of the side chambers 38 39. When the charge is in the cylinder, the pressure closes the check-valves, thereby cutting off communication with regulating-chamber 37.

At the respective ends of the cylinder 1 at its top is an ignitor, the construction of each of which is clearly shown in Fig. 4. One being similar to the other, I will describe each as consisting of an externally screw-threaded short brass tube or shell 50, which is screwed into a screw-threaded opening 51 in the cylinder.

52 52[a] is a pair of posts, the lower ends of which project into the exploding-chamber 53 and carry platinum points 54 54[a] to produce the spark. The insulator-disk 55 fits snugly in the tube 50 and it securely holds the posts 52 52[a] within its opening 56. The insulator 55 is confined by means of an upper plate or disk 57 within the tube 50, and a lower plate or disk 58, that rests upon an interior ledge or shoulder 59, turned in the tube. The upper plate 57 is secured by means of screws 60, tapped through the tube or shell and into the same. The upper plate 57 and the lower plate 58 are provided with openings 61 62, respectively, which are large enough to leave spaces surrounding the posts 52 52[a], thus preventing the contact of the latter. Line-wires lead from the electrical apparatus now to be described and are connected to the posts 52 52[a].

65 is a battery-cell, and 66 67 the poles of the same, Fig. 6.

68 is an insulator placed on shaft 16, upon which is secured the contact-ring 69, which is provided with a projection 70. The frame 71 supports a pair of brushes 72 72[a] and a brush 73, said brushes being insulated therefrom by insulator 74. The brush 73 is always in contact with ring 69 at its upper end. The brushes 72 72[a] are arranged one on each side of the shaft 16 (see Fig. 3) and may contact with projection 70 at their upper ends.

75 and 76 are the induction-coils.

The brush 73 is connected to the pole 66 of the cell 65, and to the other pole 67 is attached one of the primary wires 77 of the induction-coil 75, and one of the primary wires 78 of induction-coil 76. The other end 79 of the primary wire of induction-coil 76 is connected to the brush 72, and the other end 80 of the primary wire of induction-coil 75 is connected to the brush 72[a]. The two ends of the secondary or line wires 81 from the induction-coil 75 are connected to the posts 52 52[a] in the ignitor at the inner end of the cylinder, and the two ends of the secondary or line wires 82 of the induction-coil 76 are connected to the posts 52 52[a] of the ignitor at the outer end of the cylinder.

As the shaft 16 revolves and the projection of contact-ring 69 comes in contact with the brush 72, it charges the induction-coil 76 and sends a current through the secondary wires 82 and forms a spark in the ignitor, to which they lead, and as the projection comes in contact with brush 72[a] it forms a spark in the ignitor, to which secondary wires 81 lead.

Having described the operation of the various parts, excepting that of the pistons and their operating mechanism, I will now describe the same. When the charge of gas is exploded between pistons 4 and 6 the force of the explosion pushes piston 6 the full length of its stroke; but while making three-fourths of its stroke no motion is imparted to the pistons 4 and 5. In the moving of the piston 6 to its three-fourths stroke the cross-head 13 will cause the jointed link 34 to double up without acting on slide 32; but when the piston 6 reaches three-fourths of its stroke the jointed link 34 straightens out and the cross-head 13 will pull upon slide 32 and shift the lever 29, thus moving the cross-head 8 twice the distance made by the cross-head 13 while completing its motion. During this movement the pistons 4 and 5 will be moved in the same direction as the piston 6, the piston 4 drawing in a fresh charge of gas behind it and piston 5 emptying the charge behind it through the check-valve 83 therein and into the space between it and the main piston 6, where it is ready to be exploded. Valve 24 has also been shifted so as to open the outlet of pipe 21, permitting the smoke between pistons 5 and 6 to escape when the explosion takes place. Piston 4 has a check-valve 84 for a similar purpose to check-valve 83. These motions are repeated in the opposite direction on the return of the main piston 6, and vice versa. The engine may be either vertical or horizontal.

Various slight changes can be made in my improved gas-engine by skilled mechanics or engineers without departing from the spirit and scope thereof.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a gas-engine, of a cylinder, a pair of connected pistons in the cylinder, a main piston between the pair of pistons, and means for exploding and discharging the charges of gas between the pistons, substantially as set forth.

2. The combination, in a gas-engine, of a cylinder, a pair of connected valved pistons in the cylinder, a main piston between the pair of pistons, and means for exploding and discharging the charges of gas between the pistons, substantially as set forth.

3. The combination, in a gas-engine, of a cylinder, a pair of connected pistons in the cylinder, one of which is provided with a hollow piston-rod, a main piston between said connected pistons having a piston-rod passing

through and working in said hollow piston, and means for exploding and discharging the charges of gas between the pistons, substantially as set forth.

4. The combination, in a gas-engine, of a cylinder, a pair of connected pistons, a main piston between said pistons, and mechanism for actuating the pair of pistons from the main piston, consisting of a slide, a pivoted lever connected with the slide intermediately of its pivot and its connection with the pair of pistons, and a pivoted link connected with the main piston and the slide, substantially as set forth.

5. The combination, in a gas-engine, of a cylinder provided with outlet-passages meeting at one place, a pair of connected pistons in the cylinder, a main piston between the pair of pistons, and a cut-off valve arranged at the point of meeting of said passages and operated by the connected pistons to open one or both of the passages, substantially as forth.

6. In a gas-engine, the combination, with a cylinder provided with a pair of connected pistons and an intermediate main piston, of gas-inlet pipes at each end of the cylinder, a governor, and gas-inlet-regulating mechanism for admitting gas through the pipes into the cylinder and controlled by the governor, substantially as set forth.

7. In a gas-engine, the combination, with a cylinder provided with pistons, and inlet-pipes for admitting gas into the cylinder at each end, of means for regulating the amount of gas admitted, comprising a box or casing provided with two outer chambers and an intermediate chamber having communication therewith, an automatically-operated piston-valve controlling an air and a gas inlet opening to the intermediate chamber, and check-valves arranged in the outer chambers, from which latter the gas-inlet pipes lead, substantially as set forth.

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Witnesses:
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