(No Model.)

J. D. BLAGDEN.

ROTARY GAS ENGINE.

No. 575,517. Patented Jan. 19, 1897.

FIG. 2.

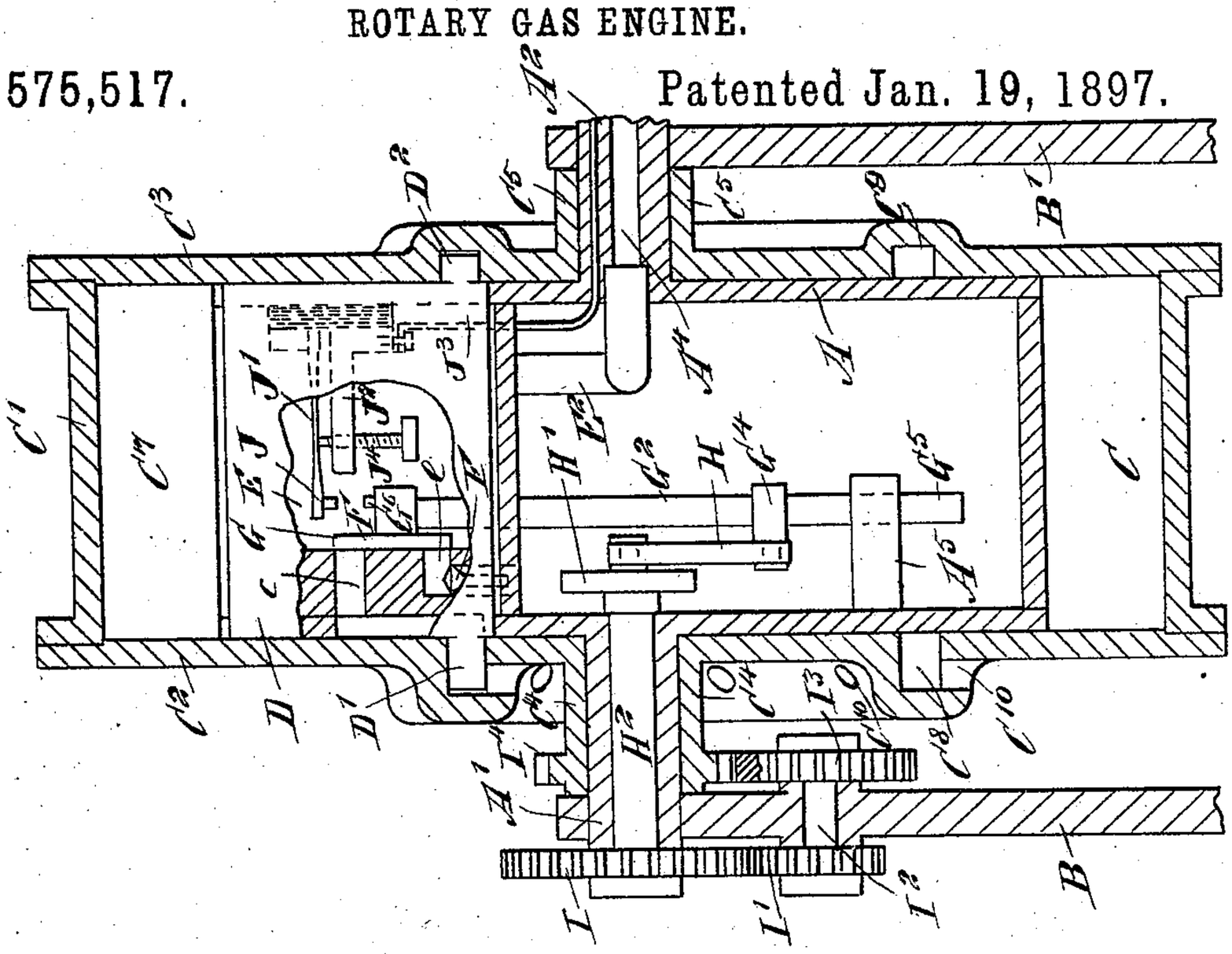
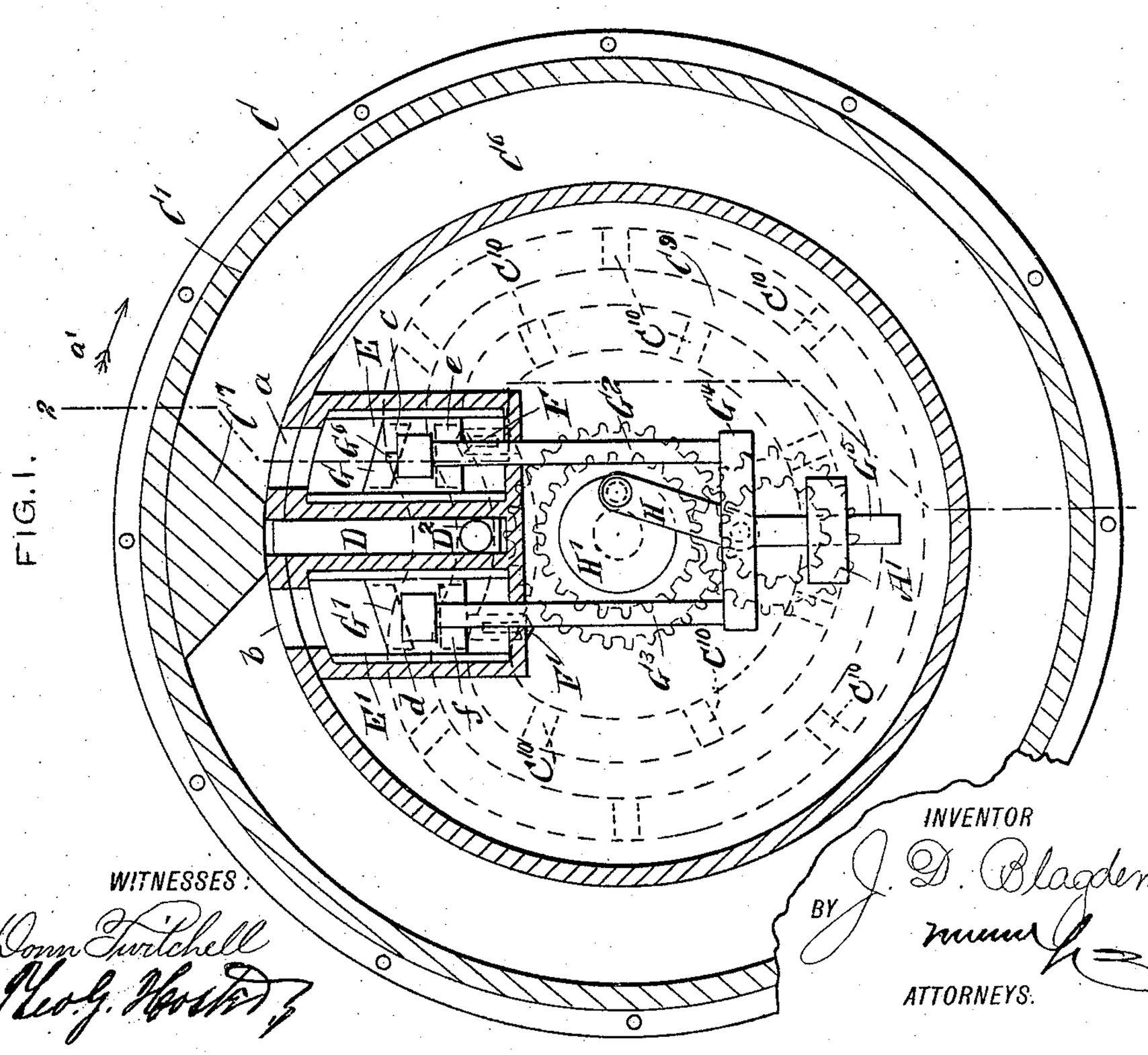


FIG. 1.



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ROTARY GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 575,517, dated January 19, 1897.

Application filed August 12, 1896. Serial No. 602,502. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. BLAGDEN, of Wood's Holl, in the county of Barnstable and State of Massachusetts, have invented a new and Improved Rotary Gas-Engine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved rotary gas-engine which is simple and durable in construction, very effective in operation, and arranged to utilize the motive agent to the fullest advantage.

The invention consists principally of a stationary casing forming a compressed-air reservoir and a cylinder revoluble on and inclosing the said reservoir.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the views.

Figure 1 is a sectional side elevation of the improvement, and Fig. 2 is a transverse section of the same on the line 2 2 of Fig. 1.

The improved rotary engine is provided with a stationary casing A, preferably made cylindrical and carrying at its ends central offsets or projections A' A^2, secured in standards B B', respectively. The stationary casing A is surrounded by a cylinder C, formed with a rim C' and with heads C^2 C^3, formed with hollow trunnions C^4 C^5, respectively mounted to turn on the projections A' A^2, respectively. The heads C^2 C^3 fit snugly against the ends of the casing A, and the rim C' is placed a suitable distance from the rim of the casing A, so as to form an annular working chamber C^6 between the said rims. Into this working chamber extends an abutment C^7, attached to the rim C' and abutting against the exterior surface of the rim of the casing A. (See Fig. 1.)

Into the working chamber C^6 is adapted to pass a piston D, fitted to slide radially in suitable bearings in the casing A, the said piston being provided on its sides with trunnions or friction-rollers D' D^2, engaging cam-grooves C^8 C^9, respectively formed on the inner faces of the heads C^2 C^3, respectively. The lower portions of the cam-grooves C^8 C^9 are concentric to the cylindrical casing A and the cylinder C, and the upper portion is grooved, so as to withdraw the piston D back into its bearings at the time the abutment C^7 passes over the bearing containing the said piston D.

On opposite sides of the bearing for the piston D are arranged the valve-chests E E', in communication at their upper ends by ports *a* and *b* with the working chamber C^6, as plainly shown in Fig. 1, to permit the air and gas to pass through the port *a* into the said chamber C^6 and allow the products of combustion to pass from the chamber through the port *b* into the chest E', from which the products of combustion can pass to the outside in the manner hereinafter more fully described. A gas-supply pipe E^2 connects with the interior of the valve-chest E, said pipe leading to the central opening A^4 in the projection A^2, the opening being connected with a suitable source of gas-supply.

In the chests E and E' are formed the ports *c e* and *d f*, respectively, of which the ports *c* and *d* connect with the cam-groove C^8, and the ports *e* and *f*, opening into the interior of the casing A, contain the check-valves F F', respectively. The ports *c e* and *d f* are controlled by the slide-valves G G', respectively, secured on valve-stems G^2 and G^3, extending through the bottoms of the chests E E' to connect at their lower ends and within the casing A with a cross-bar G^4, having a guide-arm G^5, fitted to slide in a bearing A^5, attached to the inside of the casing.

The cross-bar G^4 connects by a pitman H with a crank-disk H', secured on the inner end of a shaft H^2, mounted to turn in the projection A' of the fixed casing A. The outer end of this shaft H^2 carries a gear-wheel I in mesh with a pinion I', secured on a shaft I^2, mounted to turn in suitable bearings in the standard B and carrying a gear-wheel I^3 in mesh with a gear-wheel I^4, secured or formed on the hollow trunnion C^4. The gearing described is proportioned in such a manner that when the cylinder C makes two revolutions the crank-disk H' makes one revolution.

The annular groove C^8, previously mentioned, is connected by openings C^{10} with the outside, so that the products of combustion

can be discharged through the said openings to the outside and at the same time atmospheric air can pass through the openings C^{10} into the groove C^8, to pass from the latter by the port *c* into the valve-chest E.

On the valve G is held a contact-point G^6, adapted to make contact with a point J, secured on a spring-arm J′, attached to an insulated bracket J^2, held within the chest E. An insulated wire J^3 is connected with this bracket J^2 and passes through the projection A^2 to one pole of a battery or other source of electrical supply, the other pole being connected with a suitable part of the casing A. The spring-arm J′ and the arm J^2 are insulated from each other as well as from the chest E, and the spark is made between the adjusting-screw J^4 and the spring-arm J′, the spark being made while the valve is still moving upward. This admits of timing the spark so that the explosion will produce a maximum effect on the cylinder C, provided the position of maximum effect is reached before the valve G starts on its downward stroke.

The operation is as follows: When the several parts are in the position shown in Figs. 1 and 2 and the engine is in operation, then the cylinder C turns in the direction of the arrow *a*′. As soon as the abutment C^7 has passed the bearing of the piston D, then the latter, by the action of its trunnions D′ D^2 and the cam-grooves C^8 C^9, cause the said piston to move outward into the working chamber C^6 to form two chambers with the abutment C^7, in which the chamber at the left of the abutment is in communication by the port *a* with the interior of the chest E and the other chamber is in communication with the chest E′ by the port *b*. Now the products of combustion from the preceding explosion and contained in this last-mentioned chamber can pass through the said port *b* into the chest E′ and by the now open port *a* into the cam-groove C^8 and from the latter by the opening C^{10} to the outside. As both valves G and G′ move simultaneously downward at the beginning of the operation the ports *c* and *d* are uncovered to permit the escape of the products of combustion, as described, and to permit atmospheric air to pass through part of the cam-groove C^8 through the port *c* into the chest E and to the chamber formed between the piston D and the left end of the abutment C^7. The ports *e* and *f* remain closed during the downstroke of the valves G G′ and also during part of the upstroke—that is, until the cylinder C has made one complete revolution and the said valves G G′ have come back to the position occupied at the beginning of the operation, and as shown in Fig. 1. Now during the second revolution of the cylinder C the valves G G′ move upward to open the ports *e* and *f*, so that the air previously drawn into the working chamber C^6 is now compressed and forced through the port *b* into the chest E′ and from the latter through the port *f* and the check-valve F′ into the casing A, which thus forms the compressed-air reservoir for the engine. The compressed air discharged into this reservoir can pass through the other port *e* and the valve F into the chest E and from the latter through the port *a*, with the gas, into the cylinder C, to be ignited therein at the time the valve G just starts on the return stroke, as then a spark is produced between the contact-points G^6 and J, as previously explained. The force of the explosion gives an impulse to the cylinder at the abutment C^7. During the revolution of the cylinder C the valves G G′ move downward, back to their position shown in Fig. 1 at the end of the revolution. The above-described operation is then repeated. As the friction-roller or trunnion D′ engages the cam-groove C^8 between the ports *c d*, it is evident that the products of combustion can readily pass to the outer air through part of said groove, while fresh air passes through the other portion of the groove into the port *c* and to the chest E. The rotary motion of the cylinder C can be readily transmitted to other machinery by a belt passed around the rim C′ and to a pulley on the machinery to be driven. Thus a direct transmission of the developed power takes place and the motive agent is consequently utilized to the fullest advantage.

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

1. A rotary gas-engine, provided with a stationary casing forming a compressed-air reservoir, and a cylinder revoluble on and inclosing the said reservoir, substantially as shown and described.

2. A rotary gas-engine, provided with a stationary casing forming a compressed-air reservoir, and a cylinder revoluble on and inclosing the said reservoir, said cylinder or projection thereof being the power-transmitter, as set forth.

3. A rotary gas-engine, comprising a stationary cylindrical casing forming a compressed-air reservoir, a cylinder revoluble on and inclosing said reservoir and having an abutment extending in the working chamber between the cylinder-rim and the casing-rim, and a piston fitted to slide in said casing and adapted to pass into the said working chamber, substantially as shown and described.

4. A rotary gas-engine, comprising a stationary cylindrical casing forming a compressed-air reservoir, a cylinder revoluble on and inclosing said reservoir and having an abutment extending in the working chamber between the cylinder-rim and the casing-rim, a piston fitted to slide in said casing and adapted to pass into the said working chamber, and chests held in the said casing on opposite sides of the said piston, and provided with ports and valves for regulating the admission of the gas and air and the discharge of the products of combustion, said chests being connected with the interior of the said work-

ing chamber, substantially as shown and described.

5. A rotary gas-engine, provided with a stationary casing inclosed within a revoluble cylinder, chests held in the said casing and in communication with the working chamber, valves fitted to slide in the said chests, and control ports for the admission of the air and gas and the discharge of the products of combustion, substantially as shown and described.

6. A rotary gas-engine, provided with a stationary casing inclosed within a revoluble cylinder, chests held in the said casing and in communication with the working chamber, valves fitted to slide in said chests, and control ports for the admission of the air and gas and the discharge of the products of combustion, said valves having one full stroke to two revolutions of the cylinder, substantially as shown and described.

7. A gas-engine, having a stationary circular casing, an annular cylinder turning around the periphery of the casing and having an interior abutment engaging the periphery of the casing, a piston slidable in the casing and operated by the movement of the cylinder, and valves within the casing, the valves controlling the supply of gas and being also driven by the movement of the cylinder, substantially as described.

8. A gas-engine, having a casing with a compressed-air chamber and two valve-chests communicating with the air-chamber, an annular cylinder turning on the casing and having a cam-groove and also having an abutment engaging the periphery of the casing, a piston sliding in the casing and between the valve-chests, the piston being actuated by the cam-grooves of the cylinder, a valve for each valve-chest, and means for driving the valves in unison and from the movement of the cylinder, substantially as described.

9. In a gas-engine, the combination of a stationary casing, a piston moving radially in the casing, and an annular cylinder turning around the casing and provided with an abutment coacting with the piston, the cylinder also having an eccentric groove receiving a portion of the piston to actuate the piston in unison with the cylinder, substantially as described.

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Witnesses:
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