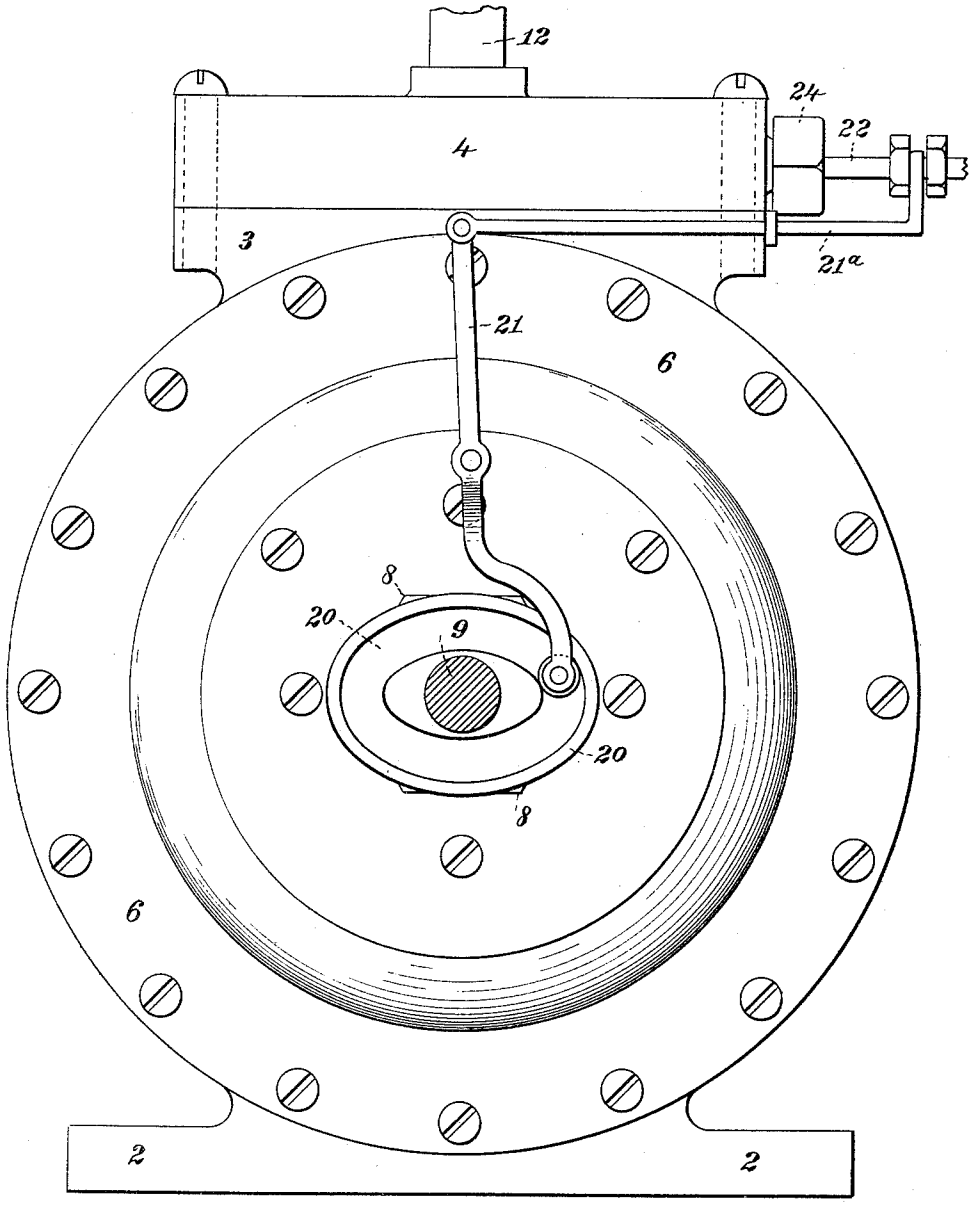
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J. S. BYERS.

ROTARY STEAM ENGINE.

No. 394,242. Patented Dec. 11, 1888.

FIG. 1.



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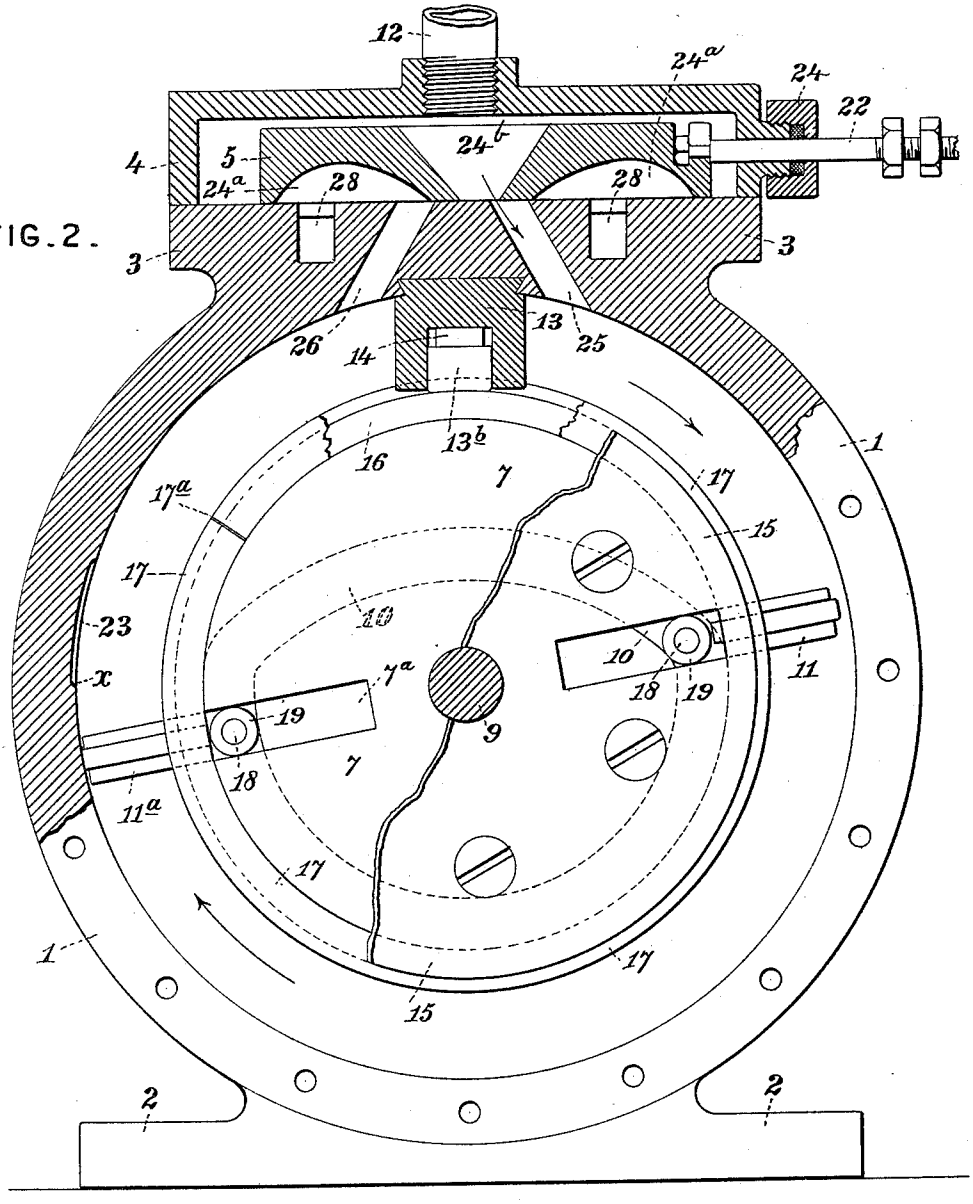
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FIG. 2.



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ROTARY STEAM ENGINE.

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FIG. 3.

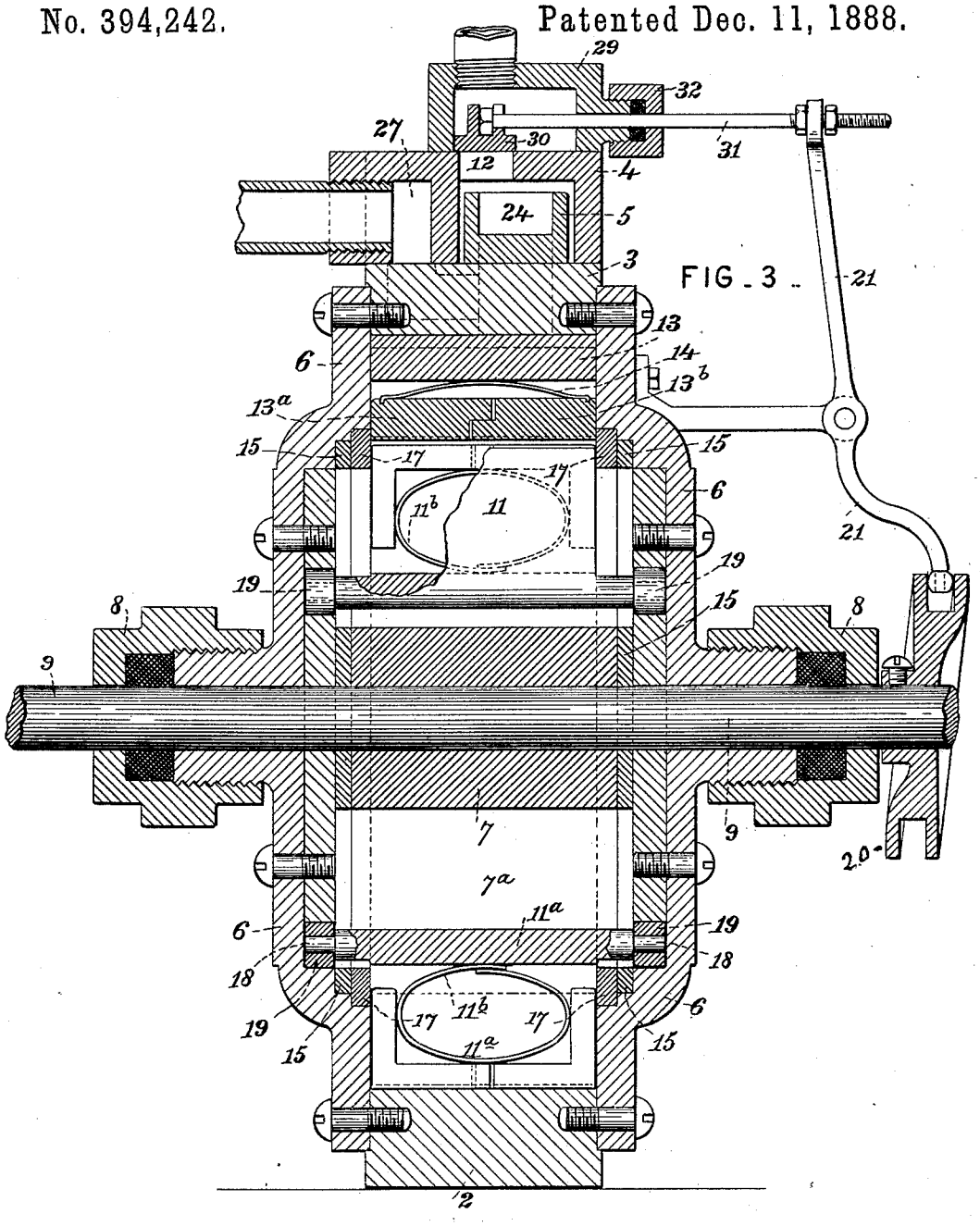
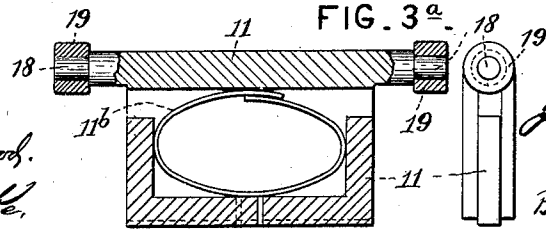


FIG. 3a.



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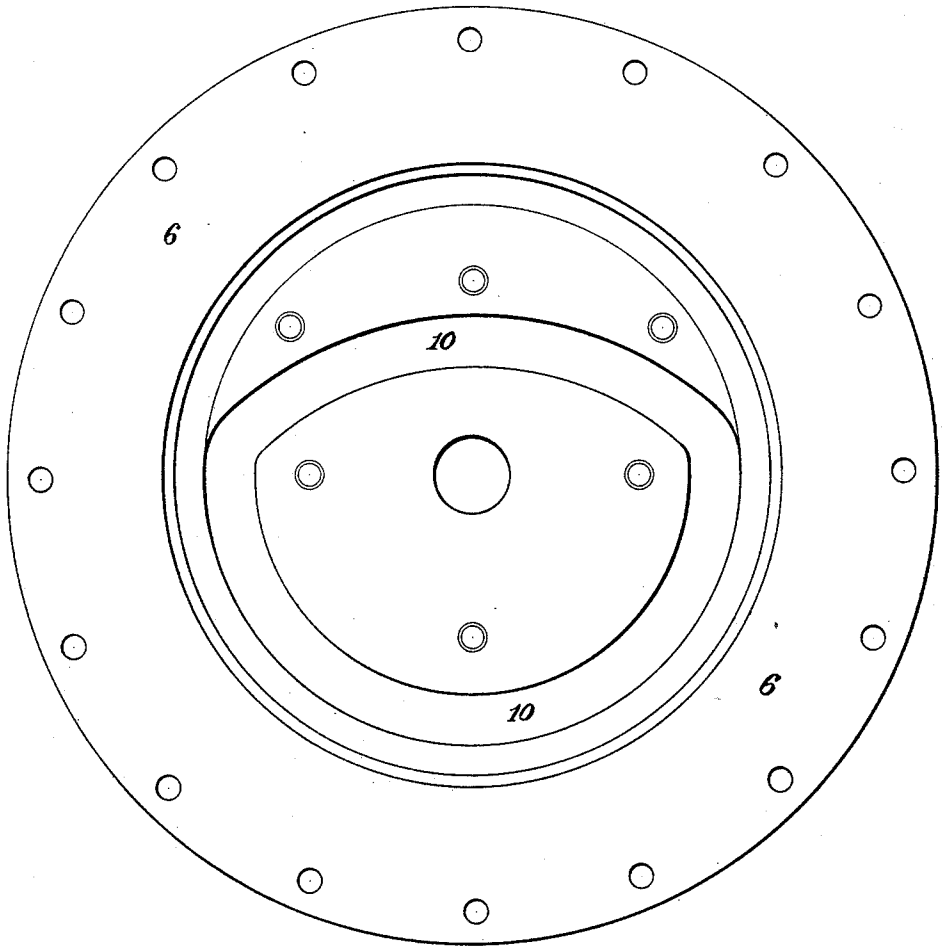
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ROTARY STEAM ENGINE.

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FIG. 4.



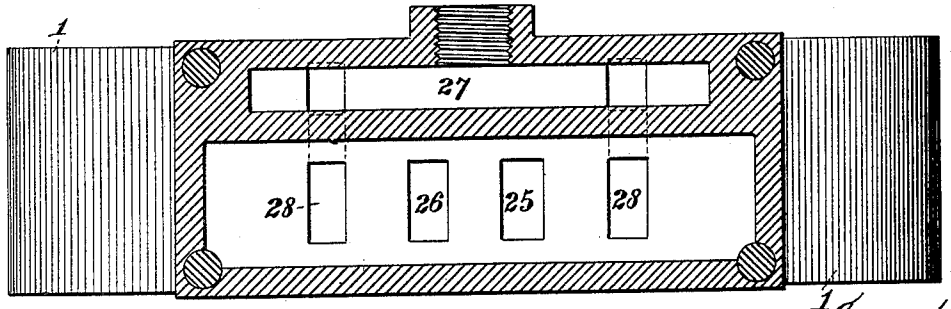


FIG. 5.

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UNITED STATES PATENT OFFICE.

JESSE SIMPSON BYERS, OF KNOXVILLE, ILLINOIS, ASSIGNOR OF ONE-HALF TO A. P. CHARLES, OF SAME PLACE.

ROTARY STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 394,242, dated December 11, 1888.

Application filed March 19, 1888. Serial No. 267,756. (No model.)

To all whom it may concern:

Be it known that I, JESSE SIMPSON BYERS, a citizen of the United States, residing at Knoxville, in the county of Knox and State of Illinois, have invented certain new and useful Improvements in Rotary Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of this invention is to procure in a rotary engine a greater amount of power from the same steam-pressure heretofore used; also, to obtain through the movements of the slide-valve an amount of power by the expansion of the steam; and the invention consists in certain features of novelty, which are hereinafter particularly pointed out in the claims, being first described with reference to the accompanying drawings, in which—

Figure 1 is a side elevation of an engine with my improvements applied. Fig. 2 illustrates the engine with one of the caps or side plates removed, exposing the piston-carrying head and showing the upper part of the casing, together with the valve and valve-chamber, in vertical section. Fig. 3 is a vertical section of the engine through the piston-heads. Fig. 3ª represents detail views of one of the piston-heads. Fig. 4 is an inside view of one of the side plates, showing the cam-groove which operates the piston-heads. Fig. 5 is a section through the valve-casing, omitting the slide-valve to clearly show the steam-ports.

The casing of the engine is a simple band or ring, 1, formed on its periphery, with projections 2 3, having flat outer faces, the portion 2 serving to secure the engine in working position either vertically or horizontally, as the case may require, and the portion 3 serving as a support for the valve-casing 4 of the slide-valve 5. Side plates or caps 6 are secured on each side to the edge of band or ring 1, and form a chamber within which the piston 7 revolves. These cap-plates 6 are provided with stuffing-boxes 8, through which passes the shaft 9, which is rigidly secured to and carries the piston 7. The cap-plates 6 are further provided on their inner faces with cam-grooves 10, (see Fig. 4,) which act on the piston-heads 11ª 11 to retract and project them at the proper time.

Secured within the ring 1, directly beneath the steam-inlet 12, is a head-block, 13, which carries a block, 13ª 13ᵇ, held against the periphery of the piston 7 and inner face of expanding packing-rings 17 by a spring, 14, for the purpose of securing a steam-tight joint. The block 13ª 13ᵇ is divided in the center and provided with lap-joint to allow for expansion and contraction of the metal and always keep a steam-tight joint.

The piston 7 is chamfered or cut out on its edges and provided on each side with plates 15, which, together with the chamfers, form annular grooves 16, (see Fig. 2,) for the reception of expanding packing-rings 17, which run in annular grooves in the cap-plates 6. These rings 17 are split at 17ª and are sprung into the grooves of the cap-plates, and, as the ports wear, the rings spring out and take up the wear, thus keeping a perfectly-tight joint.

The piston-heads 11 are formed on their inner extremities with lugs or pins 18 carrying friction-rollers 19, which run in the cam-grooves 10 of cap-plates 6.

Secured to the shaft 9 (see Figs. 1 and 3) is a cam, 20, which acts on lever-arm 21 and operates the slide-valve 5 through the medium of rods 21ª and 22, the latter passing through stuffing-box 24 on valve-casing 4. This construction is for the purpose of increasing and diminishing the steam-port at the proper time to put greater or less pressure on the heads 11ª 11.

It is desirable in some engines to accomplish this result in the manner shown in Fig. 3, where 29 represents a steam-box placed upon valve-casing 4 and inclosing a slide-valve, 30, which controls inlet 12 and operated by rod 31, passing through stuffing-box 32, connecting with lever-arm 21, operated by cam 20.

In Fig. 1 I have represented the cam 20 operating the slide-valve 5 to control the steam-port 25, while in Fig. 3 I have represented a supplementary valve controlling the inlet 12 of valve-casing 4. The action of the steam upon the piston-heads will be the same in either case. As represented in Fig. 3, the

valve 30 has closed the port 12, so that the engine is running by the expansion of the steam which has passed the valve 5. When the pistons reach the position shown in Fig. 2, the valve 30 is withdrawn by cam 20 and the full head of steam from the boiler strikes against the head that has at that instant been extended by cam-groove 10.

When the heads are as shown in Fig. 2, the head 11^a is receiving the pressure, but when it has reached the point x the opposite head 11 will be forced out by the cam-groove 10 and will receive the pressure of the steam. At this point the head 11^a comes over groove 23 and allows the confined steam between the heads to escape to the exhaust and prevents head 11^a from binding by making an equal pressure on both sides. The cam-grooves 10 then act and withdraw the head 11^a down within the cavity 7^a of piston 7 and beneath head-block 13. The pistons 11^a 11 are kept in contact with the inner face of casing 1 and cap-plates 6 by springs 11^b. These pistons are divided in the center, as shown in Fig. 3^a, to allow them to form a tight joint on all sides.

The slide-valve 5 is constructed to give steam through its center and to exhaust at its ends. The central opening is at all times connected with the steam-inlet 12 and registers with one or the other of the main ports 25 26. The ends of the valve 5 are formed with semicircular chambers 24^a, which connect the port which is exhausting with the exhaust-chamber 27 of the valve-casing 4, through the medium of port 28. (See Fig. 2.) Should the valve be shifted to bring opening to register with port 26, it will be seen that the operation will be reversed and the engine will run in the opposite direction.

The operation is as follows: Referring to Fig. 2, the steam from the boiler enters at 12, passes through port 25, and in the position shown is acting upon head 11^a and driving in the direction of the arrows. When the heads 11^a and 11 reach a horizontal position, they will both be extended and head 11 will receive the pressure. 11^a will relieve itself of pressure through groove 23 and cam-groove 10 will withdraw it, so as to pass head-block 13. This operation will continue, the heads 11^a and 11 relieving each other as long as the valve 5 is left in the position shown. When the heads 11^a and 11 are as seen in Fig. 3, it is desirable to lessen the pressure of steam, and the cam 20 acts on arm 21 and operates slide-valve 30 through rod 21 to diminish the size of port 12, and the instant head 11 is out to working position the valve 30 is operated to increase the port 12 and give full force of steam. It will be seen that by this operation I obtain the force of expansion of steam in the valve-chamber and engine.

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

1. In a rotary engine, the combination, with the casing 1 and valve-supporting plate 3, having ports 25, 26, and 28, and exhaust-chamber 27, constructed as described, of the head-block 13, plates 6, having cam-grooves 10, valve-chest 4, slide-valve 5, having central steam-port and semicircular chambers 24^a, inlet 12, packing-rings 17, spring 14, blocks 13^a 13^b, piston 7, having slots 7^a, piston-heads 11 11^a, springs 11^b, lugs 18, friction-rollers 19, cam-grooves 10, cam 20, lever-arm 21, rods 21^a 22, stuffing-box 24, valve 30, valve-rod 31, stuffing-boxes 8 and 32, and driving-shaft 9, all arranged and operated substantially as set forth.

2. In a rotary engine, the combination, with casing 1, formed with main steam-ports 25 26 and exhaust-ports 28, and provided with head-block 13 and cap-plates 6, having cam-grooves 10, of slide-valve 5, having central main steam-port, 24^b, and end exhaust-chamber, 24^a, for connecting the ports 25 26 with the ports 28, as shown, and for the purpose described.

JESSE SIMPSON BYERS.

Witnesses:
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