No. 883,730. PATENTED APR. 7, 1908.

J. F. MITCHELL.

DRILL.

APPLICATION FILED AUG. 24, 1906.

2 SHEETS—SHEET 1.

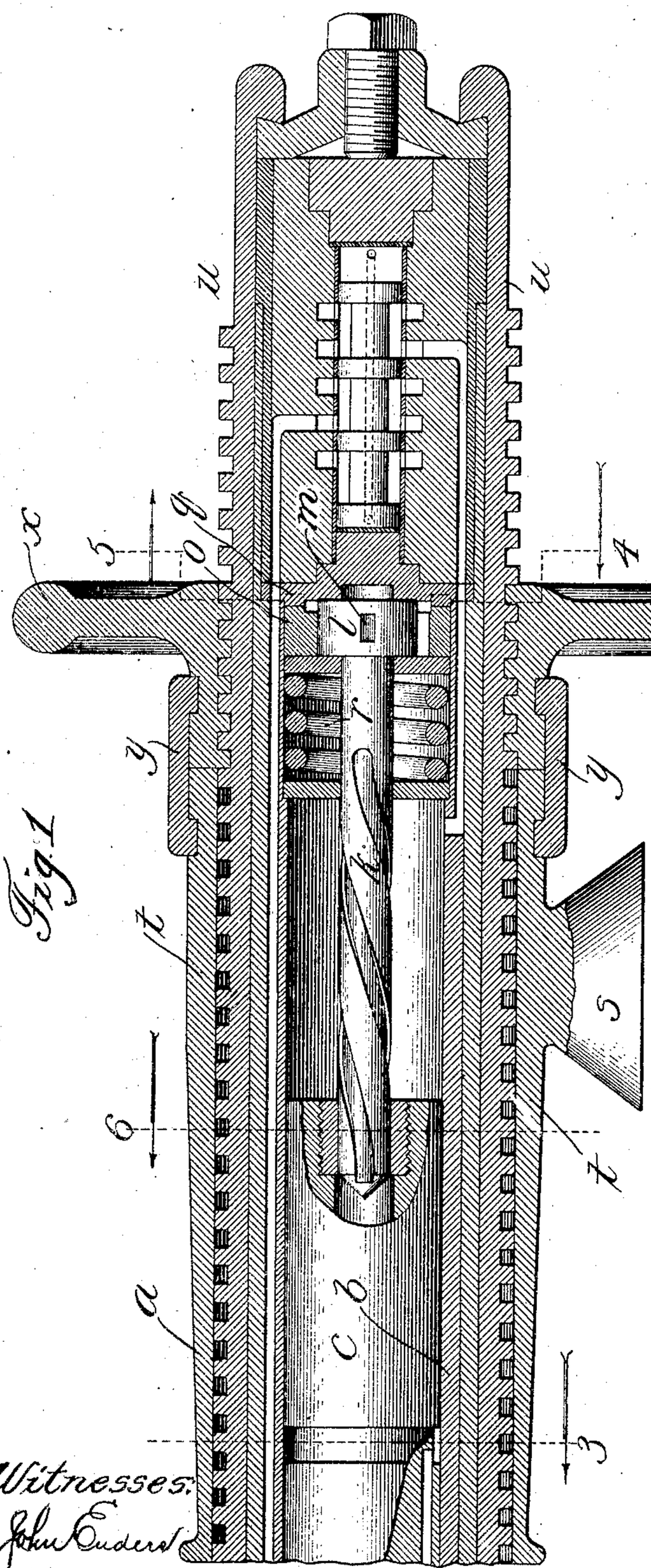

Fig. 1.

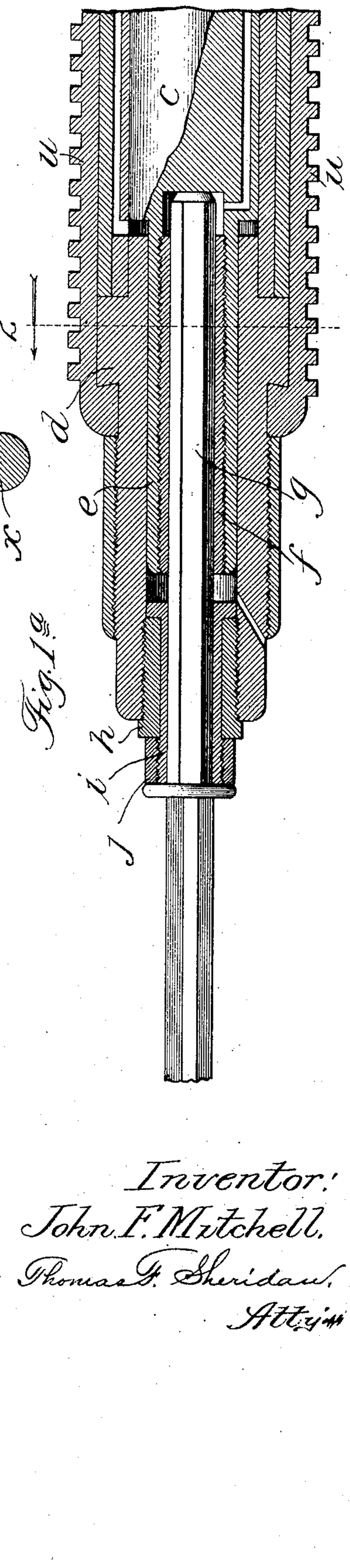

Fig. 1a.

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2 SHEETS—SHEET 2.

Fig. 2.

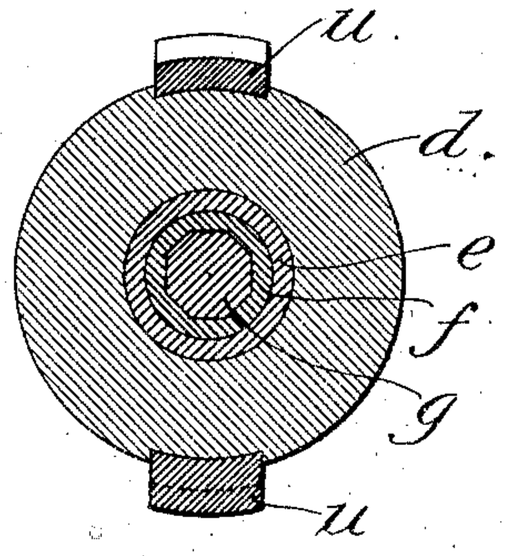


Fig. 3.

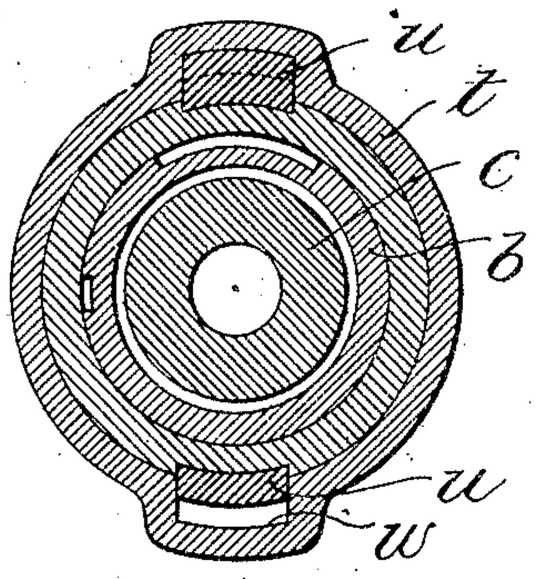


Fig. 4.

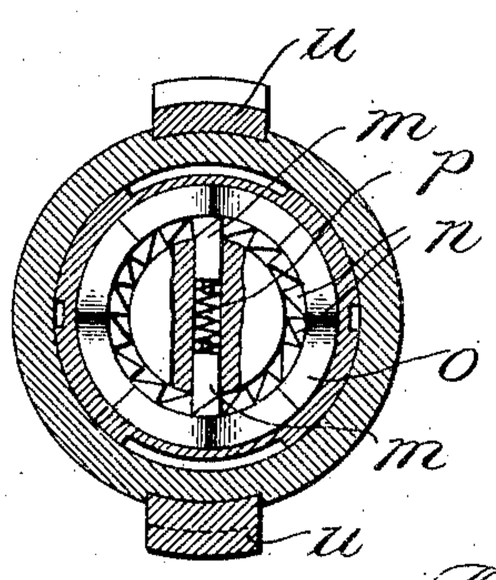


Fig. 5.

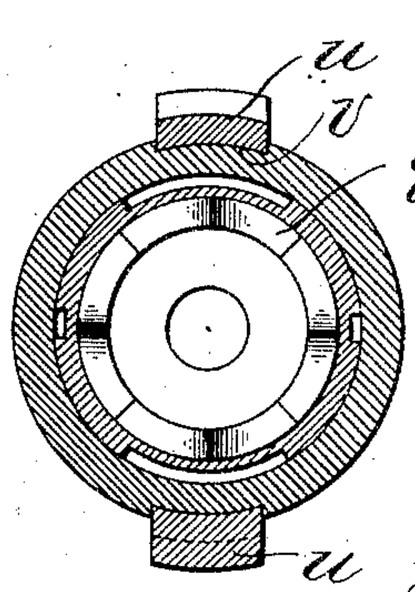


Fig. 6.

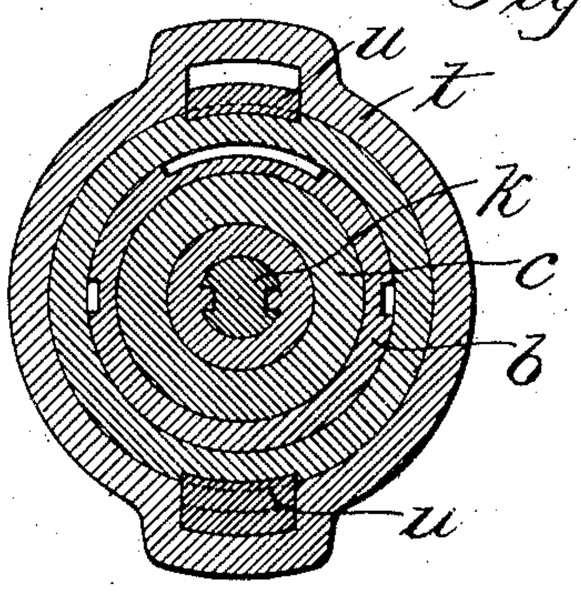
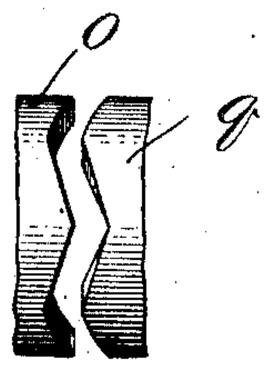


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN F. MITCHELL, OF TOPEKA, KANSAS.

DRILL.

No. 883,730. Specification of Letters Patent. Patented April 7, 1908

Application filed August 24, 1906. Serial No. 331,922.

To all whom it may concern:

Be it known that I, JOHN F. MITCHELL, a citizen of the United States, residing at the city of Topeka, in the county of Shawnee and State of Kansas, have invented certain new and useful Improvements in Drills, of which the following is a specification.

My invention relates to that class of drills known as rock drills; and has as its object the provision of a simple and durable device for holding the drill and turning the same in its reciprocation.

My invention is particularly adapted to be used with my fluid pressure engine as disclosed in my application Serial No. 246,546, filed February 20, 1905, though it is to be understood that the present disclosure may be used with any other form of engine which may be applied thereto.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a sectional elevation of the upper part of my device as applied to a fluid pressure engine. Fig. 1ª is a sectional elevation of the lower part of my device. Fig. 2 is a cross section upon the line 2 of Fig. 1ª. Fig. 3 is a cross section on the line 3 of Fig. 1. Fig. 4 is a cross section on line 4—5 of Fig. 1, looking in the direction indicated by the arrow, shown at 4. Fig. 5 is a cross section on the line 4—5, looking in the direction indicated by the arrow, shown at 5. Fig. 6 is a cross section taken on the line 6 of Fig. 1. Fig. 7 shows the details of the parts of Figs. 4 and 5.

In carrying out my invention I provide a main inclosing case *a* having a cylinder *b* therein, in which the hammer portion *c*—here shown as a fluid pressure piston—is adapted to reciprocate. Secured within the lower end of this cylindrical tube is a metallic sleeve *d* into which extends an elongated portion *e* of the hammer *c*, such portion having threaded within its bore a polygonal casing *f* formed of hard steel, adapted to engage the drill *g* to prevent the same from turning and to hold it in such close communication with the hammer portion *c* that the impacts will be given to the drill without loss due to friction. Threaded within the outer end of the portion *d* is the collar *h* forming the bearing for the sleeve *i* which is provided with a polygonal bore in which the drill *g* is adapted to oscillate, the portion *i* being adapted to be rotated with the drill within the bore of the collar *h*. The cap *j* is secured over the extending portion of the collar *i* to hold the same in place.

In using a device of this class for drilling in rock, it is desirable that the drill be slightly rotated at each stroke, and in order to accomplish this, the rifled guide bar *k* is fitted into the upper end of the hammer portion *c*, such that the oscillation of the latter upon its upward stroke causes a rotation of the guide bar *k*, but such that upon the downward stroke the rotation is given to the hammer portion and thereby to the drill. Upon the upper end of the guide *k* is the flange *l*, provided with a rectangular lateral cavity therethrough in which are placed the two ratchet portions *m* adapted to be pressed into registry with the ratchet teeth *n* in the ring *o* by the coil spring *p*. It will be readily seen that the guide bar *k* may be rotated in one direction, but that it cannot be rotated in the other direction without rotating the ring *o*, due to the registry of the ratchet portions *m* with the teeth *n*. It will, therefore, be seen that when the hammer portion oscillates it will be given an intermittent rotation, one impulse being received at each downward stroke of the hammer portion.

As shown in Fig. 7, the rings *o* and *q* are given regularly toothed faces which are pressed one against the other by the coil spring *r*. The ring *q* is rigidly secured within the tube *b* while the ring *o* is rotatably mounted within such tube, the object of this being to allow slight rotation of the ring *o* when the hammer portion first starts upon its downward stroke, so that the strain upon the teeth *n* will not be too great or, in case the drill becomes lodged in the hole which is being drilled, to allow all of the rotation to be taken up by the ring *o* instead of by the hammer portion and the drill. When the ring *o* is thus rotated, the toothed portions slide upon the similar portions of the ring *q*, and, due to the inclined plane construction of such teeth, the spring *r* is slightly compressed. The rings may return to their original position after the first shock or they may be relatively rotated—one or more teeth—if the resistance to rotation of the drill is very great.

This drill may be secured to a support, such as a tripod or column, by the conical extension *s* which is formed upon one side of the external casing *t*. When the drill is thus supported, it is desirable to feed the same up and down, and to provide ready and con-

venient means for this, the two threaded bars *u* are partially embedded upon opposite sides of the main casing *a* in the grooves *v* in such casing, the external casing *t* being provided with guideways *w* therein so that it can be moved longitudinally along the casing *a* but so that it cannot be rotated about such casing. The wheel portion *x* is provided with threads meshing with the threads in the bars *u* and is rotatably secured to the upper end of the external casing *t* by the two piece collar *y* which is provided with inwardly extending sleeve portions which are adapted to hold the wheel portion *x* and external casing *t* in firm connection, one with the other, but at the same time to allow the wheel portion to be rotated to raise or lower the drill portion. Spring *r* is adapted also to receive the impact from the upward stroke of the hammer *c* and thus to prevent the jar which would occur if the hammer came in contact with an unyielding shoulder.

While I have described a specific form of my invention, I do not wish to be unduly limited thereto, it being possible to substitute different forms for many of the parts here shown without departing from the spirit of scope of my invention.

I claim:

1. In a drill of the class described, the combination of an inclosing chamber, a hammer reciprocatingly and rotatively mounted therein, a rifled nut carried on such hammer, a rifled bar extending into the nut, ratchet teeth carried upon such bar, a ratchet ring adapted to be engaged by the ratchet teeth, a second ring rigidly secured within the inclosing chamber and having a toothed face against which a similarly toothed face of the ratchet ring engages, means for yieldingly holding such rings in engagement one with the other, whereby the ratchet ring is permitted to rotate within the inclosing chamber by overcoming such yielding means, and means whereby the bar is permitted to rotate in one direction within the ratchet ring and whereby it is prevented from rotating in the other direction within the ring.

2. In a drill of the class described, the combination of an inclosing chamber, a hammer reciprocatingly and rotatively mounted therein, a ratchet ring with its center on the axis of the chamber, a coacting pawl having a rifled connection with the hammer, and a fixed ring engaging the ratchet ring over an uneven surface.

3. In a drill of the class described, the combination of a frame, a hammer reciprocatingly and rotatively mounted in the frame, a ratchet and pawl mechanism having its center in the axis of the hammer, a rifled connection between the hammer and one member of the ratchet and pawl mechanism, and a connection through an uneven sliding contact surface between the other member of the ratchet and pawl mechanism and the frame.

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Witnesses:
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