F. M. DEWING.

SIGNALING MECHANISM.

APPLICATION FILED MAY 20, 1904.

945,920. **Patented Jan. 11, 1910.**

2 SHEETS—SHEET 1.

Fig. 1.

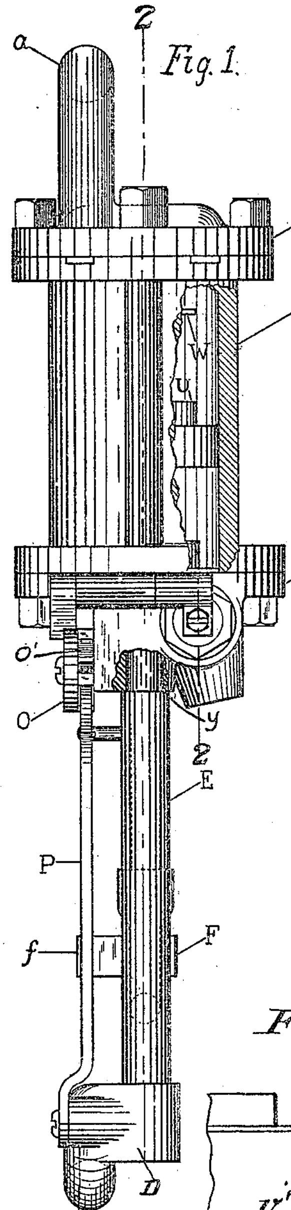


Fig. 2.

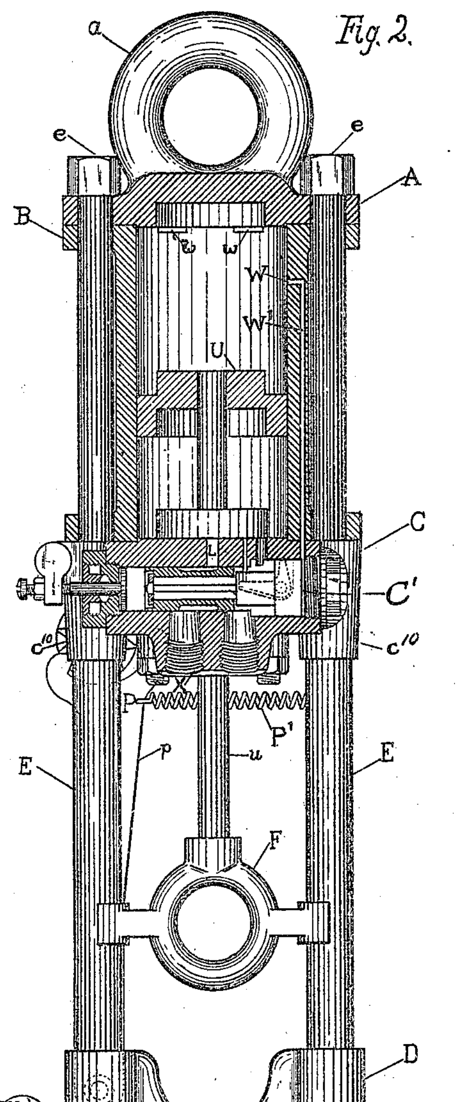
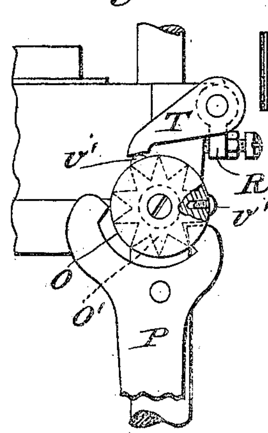


Fig. 8.



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2 SHEETS—SHEET 2.

Fig. 7.

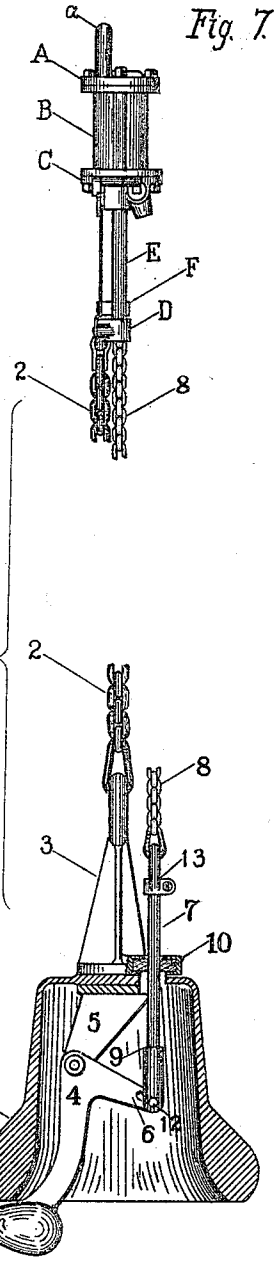


Fig. 3.

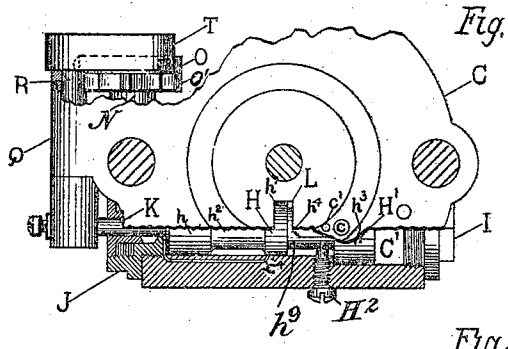


Fig. 4.

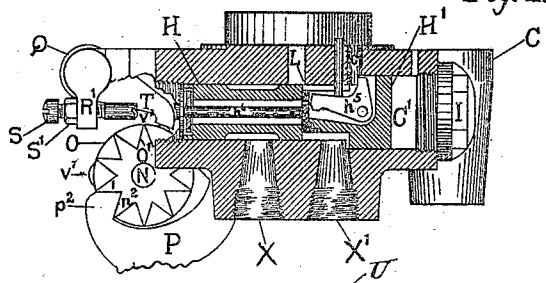


Fig. 5.

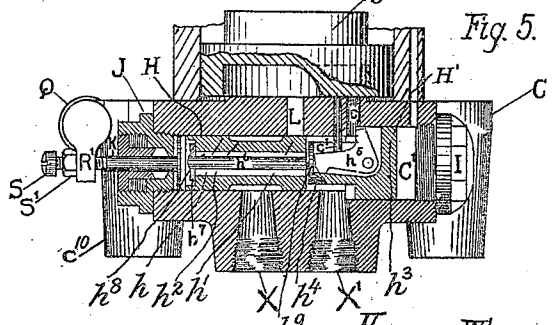
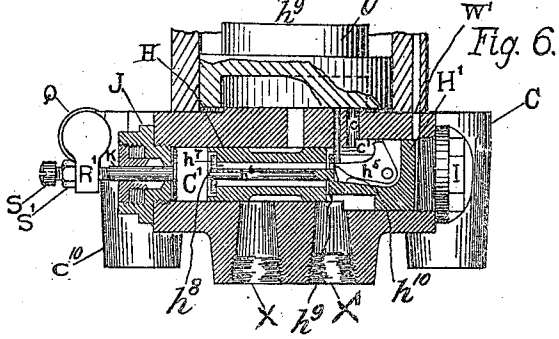


Fig. 6.



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SIGNALING MECHANISM.

945,920. Specification of Letters Patent. Patented Jan. 11, 1910.

Application filed May 20, 1904. Serial No. 208,817.

To all whom it may concern:

Be it known that I, FRED M. DEWING, a citizen of the United States, residing at Wollaston, in the county of Norfolk and State of Massachusetts, have invented a new and useful Improvement in Signaling Mechanism, of which the following is a specification.

My invention relates to improvements in signaling apparatus more especially adapted to submarine signaling whereby an elastic, expansive, gaseous medium may be utilized to exert a force by means of a piston or other suitable mechanical connection upon the sound producing mechanism.

The object of my invention is to provide a mechanism which shall be self-contained, practicable and capable of easy adjustment; which shall automatically produce a predetermined signal at regular intervals, and which can be placed in a readily accessible position without losing the proper alinement of its several parts and regardless of any motion of the object to which it is attached.

My invention will be understood by reference to the drawings in which—

Figure 1 is a side elevation of a mechanism embodying my invention, a portion of the cylinder being broken away to show its interior mechanism. Fig. 2 is a vertical section on line 2—2 of Fig. 1. Fig. 3 is a plan of the plate on which the cylinder rests, a portion of it being broken away and a portion of the front of the valve chest being shown in horizontal section. Figs. 4, 5 and 6 are vertical sections through the valve chest, Fig. 4 showing in addition code operating mechanism, and Fig. 7 shows an application of my invention to submarine signaling. Fig. 8 is a detail showing adjustable features described below.

The apparatus as shown is intended to be operated by steam, compressed air or the like. It consists primarily of a cylinder B having a cylinder head A provided with a suitable ring *a* whereby it may be hung in any convenient locality.

C is a lower cylinder head which is provided with suitable bosses c^{10} to receive the vertical rods E by means of which and suitable nuts *e* various parts of the apparatus are connected. The lower ends of these rods are connected by means of a yoke D and the upper portion of each rod from the point where it passes through the bosses c^{10} is made somewhat smaller in diameter so that a shoulder *y*, (Fig. 1), serves to support each boss and consequently the cylinder and connected mechanism. The upper ends of the rods are threaded and provided with nuts *e* so that the cylinder head and cylinder are clamped between the nuts *e* and the shoulders on the rods E. The rods E serve also as a guide for the cross-head F attached to the piston rod *u* which carries at its upper end a piston U. The cross-head F is preferably provided with a central ring which is connected by a suitable chain 8 to the bell hammer or other signaling means as described below. This signaling device is shown in Fig. 7 and in the form preferred at the present time comprises a bell 1 having a casting 3 mounted thereon connected by a supporting chain 2 with the yoke D. This casting is made either in one piece or is immovably mounted upon the bell and preferably stands quite high from the top of the bell so as to increase the stability of the bell.

A hanger or bracket 5, mounted within the bell, has pivoted to its lower end an angle lever 4, the lower end of which carries the hammer head by means of which the bell is struck. The short arm 6 of lever 4 is provided with a rod 7 which passes through a hole in the bell. The lower end of said rod is larger and forked to span the arm 6 to which it is attached. The hole in the bell is made large enough to allow the larger portion of the rod 7 to pass through it. I provide a buffer 10 which may be a piece of india rubber, mounted in the casting 3 on the top of the bell as shown, through which is a hole large enough to fit the smaller portion of the rod 7. In the upward movement of the rod 7 the shoulder 9 comes in contact with the buffer 10 bringing the rod 7 to a stop just before the bell is struck, but as the joint 12 is constructed in such a way as to allow a certain amount of independent movement, this leaves the hammer free to complete the stroke by its own momentum and to rebound, and allows free vibration of the bell. As shown the rod 7 passes up through the bell and the buffer. At the top end of the rod 7 is attached a ring 13 which is connected to the chain 8 which passes from the cross-head F as described above. The upward movement of the piston pulls the chain 8 and rod 7 and so causes the shoulder 9 to

strike the buffer 10, which is provided to take the jar off the chain, and the stroke is completed as stated above.

I will now describe the means whereby I prefer to supply, for example, steam to the cylinder to cause the proper operation of the hammer-moving mechanism; and I would say first, that I have arranged the piston U to be lifted by steam or air pressure and descend by gravity, and I have arranged the valve controlling the steam inlet and exhaust to move horizontally in order that its operation may not be affected by gravity. These matters, however, are details which are not essential in the embodiment of my invention.

The valve chamber C^1 is located in a cavity in the lower cylinder head C.

X is the live steam connection and X^1 is the exhaust connection. In the valve chamber C^1 is located the valve mechanism which comprises two parts one part, which I shall call the valve, being a spool-shaped part H and serving as the valve proper, and the other H^1, which I shall call the valve motor, being in the nature of a piston to assist the movements of the valve. As shown the valve H is spool-shaped comprising disks or cylindrical portions h, h^1 of equal diameter connected by a stem h^2 of less diameter. The portions h, h^1 of the valve fit in the longer portion of the valve chamber to slide therein. A passage h^8 extends through the valve and the disk h is chambered at its outer end to form a valve seat. The valve is moved in each direction by steam pressure applied at one end of the valve motor H^1 and at the other to the valve or disk h^7 attached to a stem h^6 carried by the valve motor H^1.

The valve-motor comprises a piston h^3 fitting that portion of the chamber C^1 which is of larger diameter, and a projection or stem h^4 which is of smaller diameter and is chambered to receive a ball crank lever h^5, the end of the stem nearest the valve being disk-like as at h^9 and being perforated as at h^{10} (see Figs. 4 and 6). To the part h^9 is attached the stem h^6 of the valve h^7 which stem is of such a length that the valve h^7 may close the passage through the valve H or open it according to the relative positions of numbers H and H^1. When the valve h^7 is off its seat a passage is formed for steam from the chamber at the left of the valve (see Fig. 4) through the passage h^8 and perforation h^{10} in the disk h^9 to the chamber containing the stem h^4 from which it passes out through the exhaust X^1. A guide screw H^2 running in a shallow slot (not shown) in the stem h^4 prevents the motor from accidental rotation.

A mechanical means for moving the valve motor in one direction comprises the bell crank lever h^5, Fig. 5, which is pivotally mounted in the chamber in the stem or projection h^4. Its vertical arm is adapted to engage a shoulder in the valve chamber which as shown is formed by the fixed pin c and its horizontal arm is engaged by the movable pin c^1 which is struck by the piston in its descent. This pin c^1 provides an abutment against the side of which the vertical arm of the bell crank strikes as the valve moves to the left so that the horizontal arm of the bell crank is lifted to set the pin c^1 in operative position. On the descent of the piston the pin c^1 is depressed thereby and depressing the horizontal arm of the bell crank, withdraws the motor H^1 to the right thereby closing its valve or disk h^7 on its seat and so that the steam in the left end of the chamber may return the valve to its starting position. The depression of the pin c^1 and consequently of the horizontal arm of the lever h^5 causes the vertical arm of the bell crank h^5 to push against the pin c and hence throws the valve motor H^1 to the right which drags the valve with it, owing to the action of the rod h^6 and valve or disk h^7 as above described.

The valve chamber is closed at its larger end by means of a screw plug I and at its smaller end by means of a screw plug J containing a stuffing box through which passes a stop pin K having a disk at its inner end by means of which the movement of the valve H is limited. A steam passage c^4, Fig. 3, connects the extremity of the chamber C^1 near the plug J with a point near the steam inlet, and an exhaust port W opening near the upper end of the cylinder is connected by the passage W^1 (see Fig. 2) with the valve chamber C^1 near the plug I.

L is a port connecting the valve chamber with the interior of the cylinder below the piston.

The operation of the mechanism hereinbefore described is as follows: The piston being in the position shown in Fig. 2 and the other parts as in Fig. 6, steam will pass in through the steam inlet X around the stem h^2 and through the port L into the cylinder below the piston, thus raising the piston until the port W is exposed when the steam passes down the passage W^1 and into the chamber C^1, Figs. 5 and 6, between the piston disk h^3 and the plug I and acting on the piston disk h^3 starts the valve motor H^1 toward the other end of the valve chamber unseating the disk h^7 thus opening a communication through H by means of the perforation in the head of the projection h^4 with the exhaust at X^1 and also carrying the valve H with it so that the valve closes the passage between the steam inlet X and the port L and opens a passage between the port L, Fig. 4, and the exhaust X^1. As the valve H moves, the vertical arm of the bell crank brings up against the shoulder formed by

the fixed pin c and as the valve continues its movement the horizontal arm of the bell crank lifts the pin c^1 into position to be struck by the piston in its descent. The passage between the port L and X^1 is opened but slightly so that the piston will fall slowly. As the piston approaches the bottom of the cylinder it strikes the top of the pin c^1, Fig. 5, and driving it down moves the bell crank lever and hence the valve motor back toward its original position, first closing the passage through the valve H by means of the disk h^7 by which together with the rod h^6 the valve is drawn forward. The valve in moving uncovers the steam passage c^4, Fig. 3, which allows steam to pass from the steam inlet to the rear of the valve so that the valve thereafter moves under steam pressure until the port L is open wide to the inlet of steam which now rushes freely into the cylinder and lifts the piston. Openings w, Fig. 2, are provided at the upper end of the cylinder to allow air etc. to escape as the piston rises. Each upward movement of the piston pulls the chain 8 and causes the hammer to strike the bell. It is evident that the space of time between any two blows upon the bell will be dependent directly upon the speed with which the piston descends and this may be governed by controlling the extent of movement of the valve H. It is for this purpose that I provide the stop pin K and I make it adjustable preferably in the following manner: The stop pin K, Fig. 5, projects through the plug J and brings up against a screw S threaded through the rocker arm R^1 which projects from the rock shaft R mounted on a bearing in the lug Q. The screw S is provided with a set nut S^1. By loosening the set nut S^1 and turning the screw S the outward movement of the pin K and disk can be adjusted and hence the extreme throw of the valve H will be determined and the size of the exhaust passage from the cylinder will be controlled.

The above described mechanism is rendered available for code signaling in the following manner: The rock shaft R which carries the rocker arm R^1 at one end carries the rocker arm T at the other end. A stud N, Fig. 4, is mounted on the boss c^{10}. Upon the extreme end of this stud is a disk O together with a ratchet wheel O^1. In the periphery of the disk O is a series of holes into which screws or pins v^1 may be inserted to project more or less above the periphery, so located as to slightly lift the rocker arm T from its normal position on the disk. It will be seen that by so lifting the rocker arm T the position of the rocker arm R^1 will be changed and thus the position of the inner end of the screw S, which movement lessens the outward movement of the pin K shortening the throw of the valve H.

The ratchet wheel O^1 is operated by means of the double pawl P, which is pivoted to one end of the yoke D, (see Figs. 1 and 2), and is so located that it will be moved by means of an arm f carried by the cross-head F which is reciprocated by the piston U. Thus the lifting of the piston will throw the double pawl P in one direction and will cause a slight rotation of the ratchet wheel and the spring P^1 will cause the pawl to return to its original position when released by the arm f. The ends of the pawl fit between the teeth of the ratchet wheel in a manner well known and cause the rotation of the code disk O. The head of the pins v^1 lift the arm T from time to time and by shortening the throw of the valve H its position with relation to the exhaust port L is controlled so that the piston will fall either rapidly or slowly according to whether the next stroke to be given to the bell should be given within a shorter or longer time from the last stroke. By arranging the number and relation of the pin heads v^1 the apparatus can be adjusted to sound a given code signal, say a blow, a short pause, a blow and a long pause, the pause indicating the periods of time during which the piston is falling.

It will be noted that the two ends of the valve chamber are of different diameters so that the exhaust as it passes from the cylinder into the valve chamber between the disk h^3 and the plug I will act upon a larger surface and hence will overcome the pressure acting against the disk h^7 at the other end of the valve structure.

What I claim as my invention is:—

1. In a signaling apparatus, a sounder and means for operating the same comprising a piston movable in one direction under pressure and in the other direction by gravity, and means whereby the speed of its movement in one direction may be automatically varied to give signals at varying intervals whereby groups of signals may be given, as set forth.

2. In a signaling apparatus, a sounder and means for operating the same comprising a piston, a cylinder and means automatically operating whereby the speed of the piston stroke in one direction may be varied from time to time to cause a signal to be given at varying intervals, as set forth.

3. In a signaling device, a sounder and means for operating it comprising a cylinder, a piston contained therein and operatively connected to said sounder, a port to allow the steam to enter said cylinder to lift the piston and to escape therefrom to allow the piston to fall by gravity and a valve controlling said port, and means to move it in one direction to allow a free inlet of steam to said cylinder, and means controlling the movement of the valve in the opposite direction to open said port to a greater or less

extent for the escape of steam whereby a more or less rapid fall of the piston is secured, as and for the purposes set forth.

4. In a signaling device, a sounder and means for operating the same comprising a cylinder, a piston adapted to move in the said cylinder, an inlet to introduce steam or the like under said piston to lift it, a port located near the top of said cylinder in a position to be passed by said piston in its upward movement, a valve chamber, one end of which is connected to said port, a passage connecting the other end of said valve chamber to said inlet, and a valve located in said chamber adapted to be moved in one direction by the steam passing from said cylinder through said port, and in the other direction by steam passing from said inlet through said passage, as described.

5. In a signaling apparatus, a sounder and means for operating it comprising a cylinder, a piston, a port located at or near one end of the cylinder and adapted to be uncovered by said piston, a valve chamber connected to said port, a passage connecting said valve chamber with said cylinder and located at the other end of said cylinder from said port, a steam inlet and an exhaust each connected to said valve chamber, and a valve located in said valve chamber to control the entrance to said passage and its connection with said steam inlet and exhaust, as described.

6. In a signaling apparatus, a sounder and means for operating the same comprising a cylinder, a piston, means whereby steam may be supplied to and exhausted from said cylinder beneath said piston, a valve coöperating with said means and adapted when in one position to allow a free passage for the inlet of steam to said cylinder and movable a greater or less distance from said position to allow a more or less constricted passage for the outlet of steam from said cylinder, in combination with means for controlling the movement of said valve whereby the intervals between the piston strokes may be varied to cause the striking of a code signal on the sounder.

7. In a signaling apparatus, a sounder and means for operating the same comprising a cylinder, a piston, a valve chamber, a port leading from said valve chamber into said cylinder below said piston, said valve chamber having a steam inlet and an exhaust outlet, a valve adapted to move in said chamber to open and close said port, and adjustable means located outside said valve chamber whereby the length of stroke of said valve may be adjusted at certain strokes thereof to constrict the outlet passage from the cylinder.

8. In a signaling apparatus, a sounder and means for operating the same comprising a cylinder and piston, a valve chamber, a port located in said cylinder below said piston and a port located in the upper part of said cylinder and adapted to be passed by said piston, said latter port being connected with said valve chamber whereby when the piston has been raised beyond a certain point steam from said cylinder will flow to said valve chamber, in combination with a compound valve and means operated by said piston in its descent adapted to engage said valve to move it into position to allow the entrance of steam to the cylinder.

9. In a signaling apparatus, a sounder and means for operating the same comprising a cylinder, a piston, means for supplying steam to said cylinder beneath said piston comprising a valve chamber, a port connecting said cylinder and said valve chamber, a horizontally-movable, compound valve comprising a valve proper, the surfaces of which are engaged by the steam in its passage to and from said port, and means for moving said valve comprising a piston motor, a lever pivoted therein, a shoulder in said valve chamber adapted to engage said lever, and means operated by the piston whereby said lever is caused to engage said shoulder and move said piston motor and said valve, as described.

10. In a signaling device, a sounder and means for operating the same comprising a vertical cylinder, a piston adapted to move therein, a port in said cylinder below said piston, a valve chamber having a steam supply and an exhaust passage, said port connecting said cylinder and said valve chamber, a valve adapted to control said port, means whereby the exhaust stroke of said valve may be adjusted to control the speed of the falling piston comprising a disk located in said valve chamber, and means whereby it may be adjusted to engage said valve in its exhaust movement, as set forth.

11. In a signaling device, a sounder and means for operating the same comprising a cylinder, a piston moving therein, a passage through which steam may pass into said cylinder and be exhausted therefrom, a steam inlet and an exhaust, a valve for connecting said passage with said steam inlet and exhaust, and means for automatically controlling the movement of said valve with relation to said passage when said passage is connected to said exhaust whereby the rapidity of the exhausting stroke of said piston may be varied according to a predetermined code, as described.

12. In a motor adapted for signaling purposes, a cylinder, a piston adapted to move therein, a passage to allow steam to enter and exhaust from said cylinder and means whereby said passage is opened and closed comprising a valve chamber, a valve adapted to be moved therein across the mouth of said passage, means for controlling the

length of stroke of said valve comprising a movable pin extending out from said valve chamber, a rock shaft carrying a rocker arm having a screw communicating with the outer end of said movable pin and a second rocker arm, a code wheel located in operative relation to said second rocker arm, said code wheel being provided with means for temporarily changing the position of said second rocker arm and operating said screw, and means whereby said code wheel is rotated, as set forth.

13. In a motor adapted for signaling use, a cylinder, a piston adapted to move therein and having a piston rod, a port for supplying steam to said cylinder below said piston and allowing steam to exhaust therefrom, a valve, and a stop pin, and means for adjusting the location of said stop pin with relation to said valve comprising a rock shaft carrying rocker arms, a code wheel located to support and move the free end of one of said rocker arms, and means for operating said code wheel comprising an escapement lever, a spring adapted to throw said lever in one direction and an arm carried by the piston rod to throw said lever in the opposite direction, as set forth.

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Witnesses:

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