No. 637,647. Patented Nov. 21, 1899.

J. J. NEF.

AIR BRAKE.

(Application filed Oct. 2, 1896. Renewed Oct. 27, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

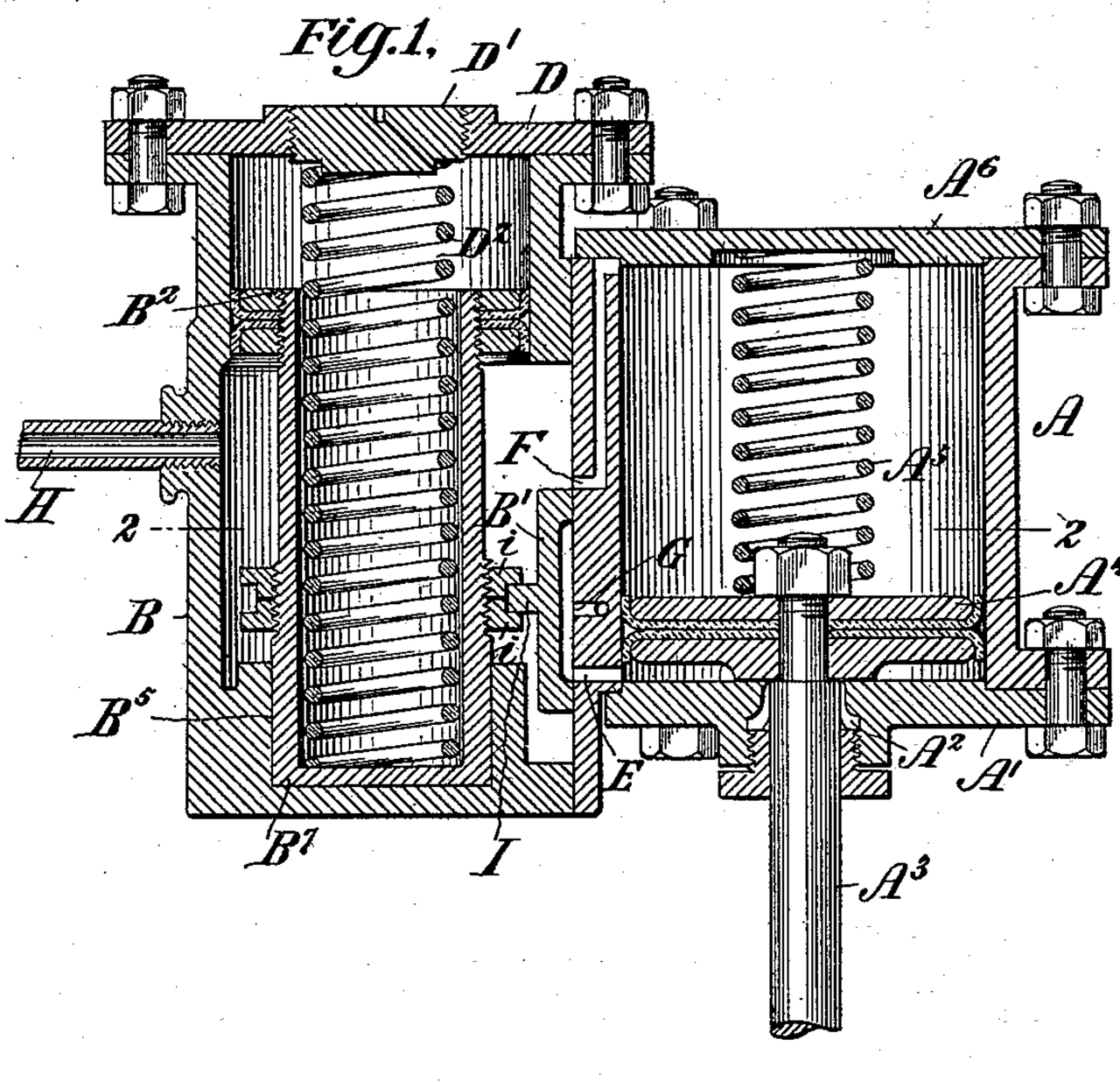

Fig. 2.

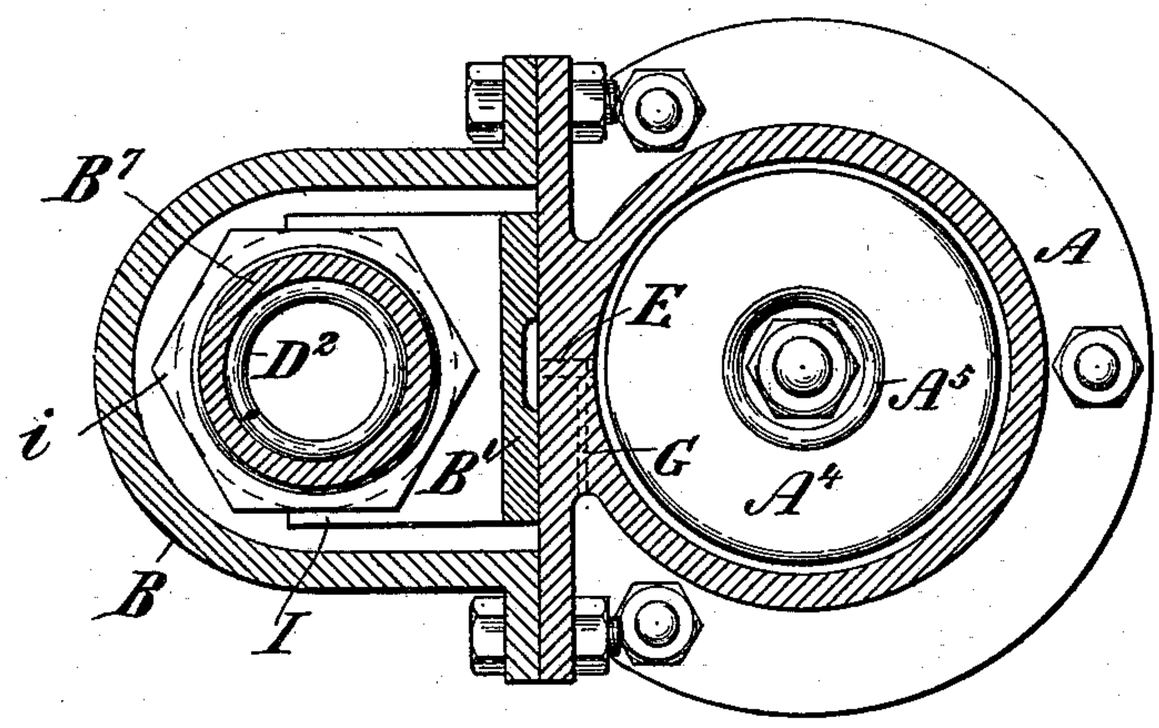

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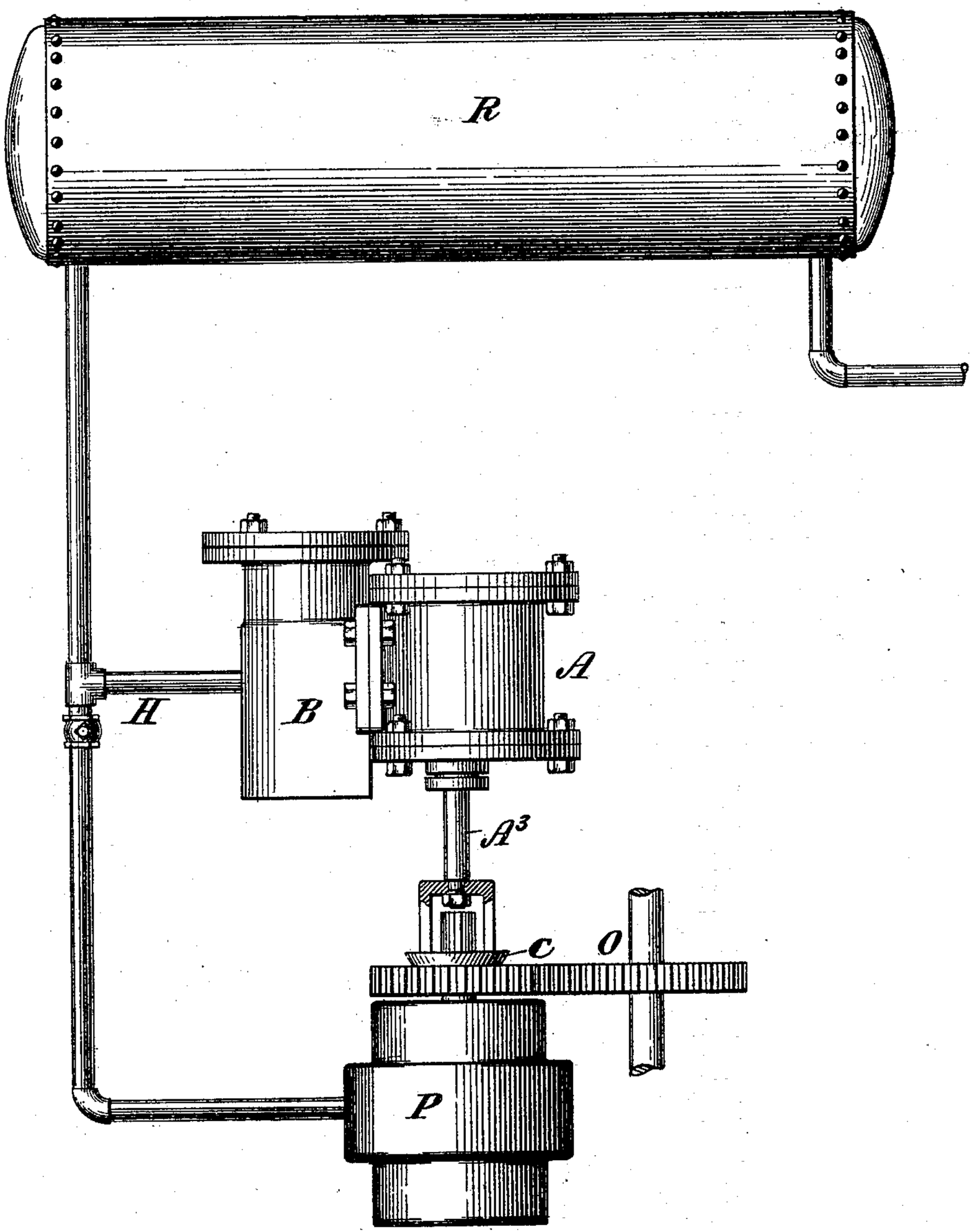
Fig. 3.



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UNITED STATES PATENT OFFICE.

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AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 637,647, dated November 21, 1899.

Application filed October 2, 1896. Renewed October 27, 1899. Serial No. 734,987. (No model.)

To all whom it may concern:

Be it known that I, JOHN JACOB NEF, a citizen of the United States, residing at the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Air-Brakes; and I do 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.

My invention has relation to automatic governors for air-brakes, and has for its object the provision of novel means for automatically throwing the pump in and out of operation, the same being effected by the variation of the air-pressure due to the alternate accumulation of pressure by the pump and the reduction of pressure proceeding from the operation of the brake.

My invention also consists in the novel construction, combination, and arrangement of parts hereinafter described.

Referring to the accompanying drawings, Figure 1 is a sectional view of my improved governor, and Fig. 2 a sectional view on the line 2 2 of Fig. 1. Fig. 3 shows the various parts of the system and their relative positions.

A designates a cylinder having a head A′, with stuffing-box A^2, through which passes a piston-rod A^3, carrying a piston A^4. The piston-rod A^3 is connected to a clutch C or other connecting device interposed between the moving parts of the pump P and its actuating mechanism O. A spring A^5 is interposed between and bears against the head A^6 and the piston A^4, a recess being formed in head A^6 to receive one end of the spring.

Upon the side of cylinder A is bolted a valve-chamber B, which contains a specially-adjusted slide-valve B′. One end of the chamber B is cylindrical and contains a properly-packed piston B^2, into which is screwed a hollow piston-rod B^5. A little below the center of this hollow piston-rod are screwed on two hexagonal nuts *i i*, with shoulders that embrace the projection I from the back of slide-valve B′. One end of the chamber B is closed by a flanged head D, in the center of which is an adjustable screw-plug D′, and a spring D^2 is interposed between the plug D′ and a seat B^7 at the bottom of hollow piston-rod B^5, so that by the adjustment of the plug the resistance of the spring may be increased or diminished. Ports E and F lead from the valve-chamber to the cylinder A, but at different sides of the piston contained in said cylinder, and a passage G leads from the hollow of slide-valve B′ to the open air.

H is a pipe leading from the reservoir R, Fig. 3, in which the compressed air is stored. The positions of the ports E F are such that when the piston B^2 is raised by the increase of pressure in the pipe H, leading from the reservoir, the hollow piston-rod B^5 rises and carries with it the slide-valve B′, connected thereto, thereby closing the port F from the stored energy in the reservoir and opening an escape to the atmosphere through port G for air on the upper side of piston A^4. At the same time port E is opened, admitting air to the under side of piston A^4, thereby elevating the piston and disengaging the pump from its actuating mechanism. When the port E is admitting air to the under side of piston A^4, should the pressure fail to elevate the piston and disengage the moving parts of the pump from its actuating mechanism, thereby allowing the pump to compress air above the maximum point, the surplus pressure will through its action on piston B^2 carry the slide-valve above the exhaust-port G and form a free escape of air from the reservoir R to the atmosphere.

Operation: The parts being in position, as shown in the drawings, let it be supposed that the reservoir contains no air and the pump is thrown into operation by the acting of the spring A^5, interposed between the head A^6 of cylinder A and piston A^4. This spring is of sufficient tension to connect the moving parts of the pump to its actuating mechanism until sufficient air has been accumulated to hold this connection. As the air from pipe H enters the valve-chamber B it passes through port F, leading to the upper side of piston A^4. This position is maintained until the pressure reaches the maximum, whereupon the piston B^2 is forced back against the resistance of the spring D^2, closing the port F from the stored energy and forming a communication from upper end of cylinder A through it

to the open air through passage G. At the same time port E is opened, allowing the air to enter the cylinder A below the piston and elevate the same. The position of the parts last described is maintained while the pressure is at the maximum, and the pump having been stopped by the elevation of the piston A^4 remains inactive so long as the piston remains in its elevated position. The gradual decrease of the air-pressure to the minimum point, due to the operation of the brake, results in the gradual descent of the piston B^2 and slide-valve B′ to the position shown in the drawings, which closes communication between the reservoir and the lower end of cylinder A and opens communication through passage G to the open air, whereupon the air passes through the port F, which has been opened by the operation just explained and entering above the piston A^4 pushes it down and starts the pump. The operation of connecting and disconnecting the pump-operating mechanism is thus accomplished in a perfectly automatic manner solely by the variation in pressure by the operation of the brake.

Having described my invention, I claim—

1. In an air-brake system the combination of a cylinder and a piston therein connected to the pump-operating mechanism, a valve-chamber having a port adapted to receive air under pressure, supply-ports affording a passage for said air from said valve-chamber to said air-cylinder on each side of said piston, a reciprocating slide-valve arranged in said valve-chamber and adapted to alternately close each of said ports leading from said valve-chamber to said air-cylinder and open the other, means whereby said valve is operated in one direction by the pressure of said air in said valve-chamber above a predetermined point, and means for operating said valve in an opposite direction when the air-pressure falls below said predetermined point substantially as described.

2. In an air-brake system the combination of a cylinder and a piston therein connected to the pump-operating mechanism, a valve-chamber having a port adapted to receive air under pressure, supply-ports affording a passage for said air from said valve-chamber to said air-cylinder on opposite sides of said piston, an exhaust-port, a valve in said valve-chamber adapted to alternately close each of said supply-ports and open the other, and also to open the exhaust-port to that end of the cylinder to which the supply is closed, a piston connected to said valve arranged and adapted to be operated in one direction by the pressure of said air in said valve-chamber above a predetermined point, and by a spring in the other direction, substantially as described.

3. The combination in an air-brake system of a pump and pump-operating mechanism of an air-cylinder and piston, a spring for forcing the piston in one direction to connect the pump with its operating mechanism, a valve-chamber, a port leading from said valve-chamber to the opposite side of said piston, an exhaust-port, a valve arranged in said valve-chamber and means acting under variations of air-pressure upon a relatively-fixed part of the valve mechanism for operating said valve to alternately open and close the air-cylinder to the valve-chamber and the exhaust, substantially as described.

4. The combination in an air-brake system of a pump and pump-operating mechanism of an air-cylinder and piston, a valve-chamber, supply-ports connecting said valve-chamber with said air-cylinder on opposite sides of said piston, an exhaust-port, a slide-valve working in said chamber and arranged and adapted to open communication with each end of the cylinder while closing the opposite end and opening same to the exhaust, a piston adapted to be operated in one direction by air under pressure above a predetermined point and having a hollow stem to which the valve is connected and a spring seated in said piston-stem arranged and adapted to operate the piston and move the valve in the opposite direction when the air falls below said predetermined point, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN JACOB NEF.

Witnesses:

IDA NATHAN,

R. L. CUTHBERT.