J. ASTROM.

AIR CHARGING AND PRIMING DEVICE FOR SUCTION PUMPS.

APPLICATION FILED MAR. 17, 1913.

1,074,098. Patented Sept. 30, 1913.

3 SHEETS—SHEET 1.

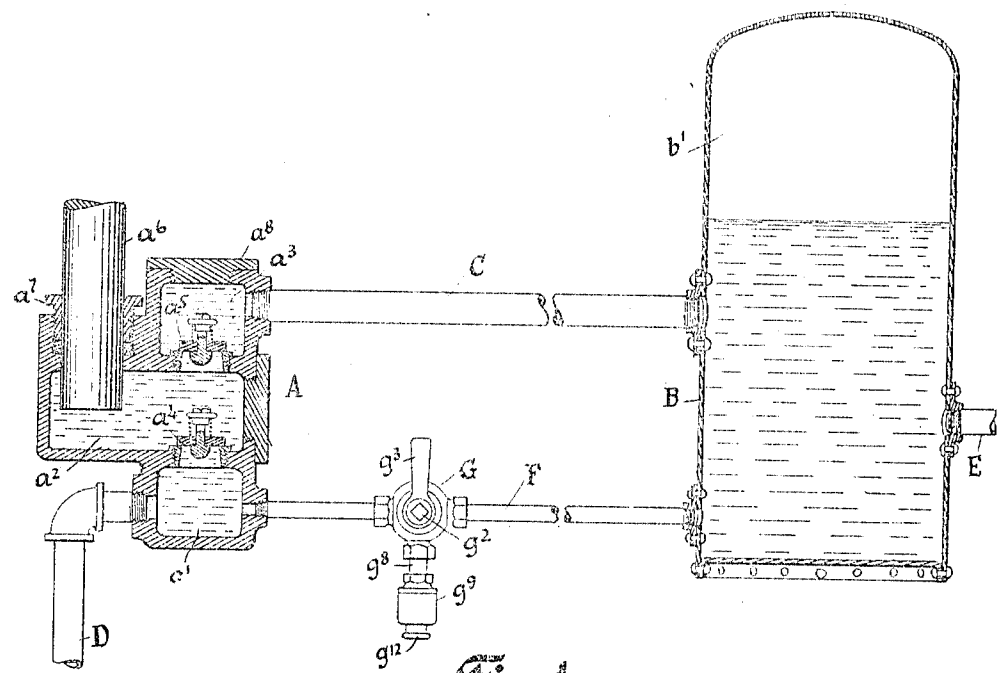

Fig. 1

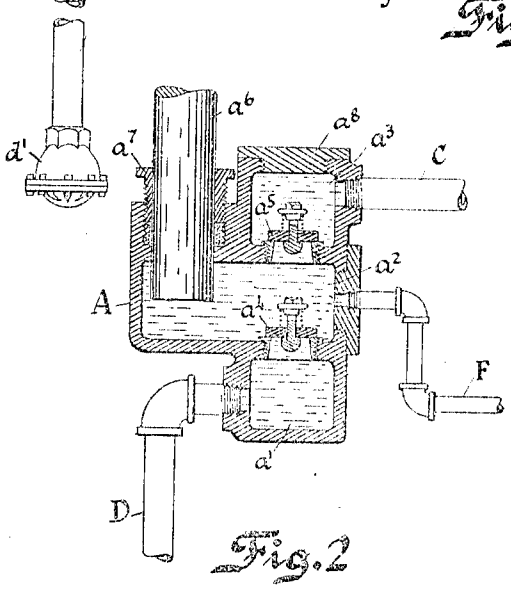

Fig. 2

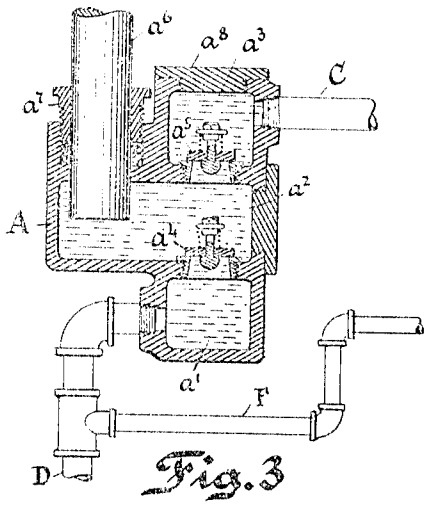

Fig. 3

Witnesses

Edward Kozick

Eleanor Rink

John Astrom, Inventor,

By George Wetmore Collins Attorney

J. ASTROM.

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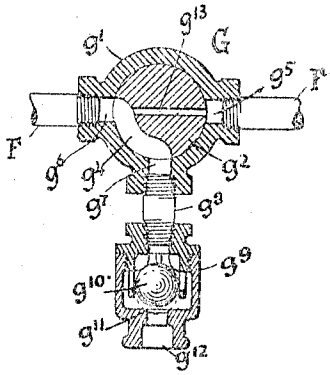

Fig. 4

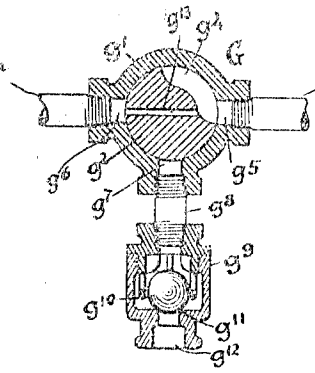

Fig. 5

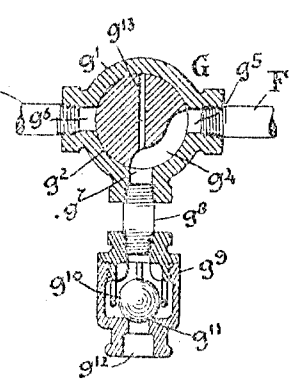

Fig. 6

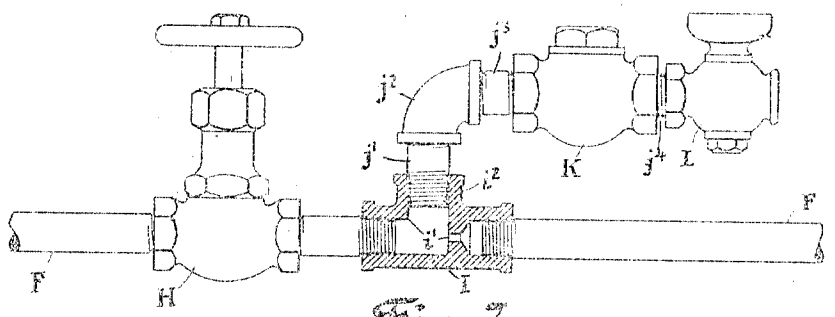

Fig. 7

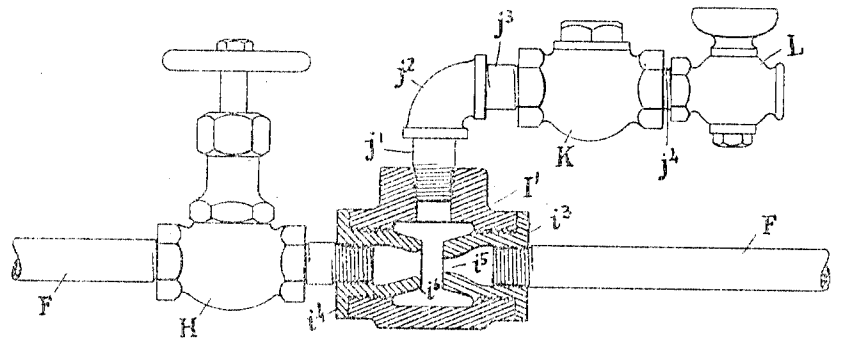

Fig. 8

John Astrom, Inventor

Witnesses

Edward Kozick

Eleanor Rink

By [illegible] Attorney

J. ASTROM.

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3 SHEETS—SHEET 3.

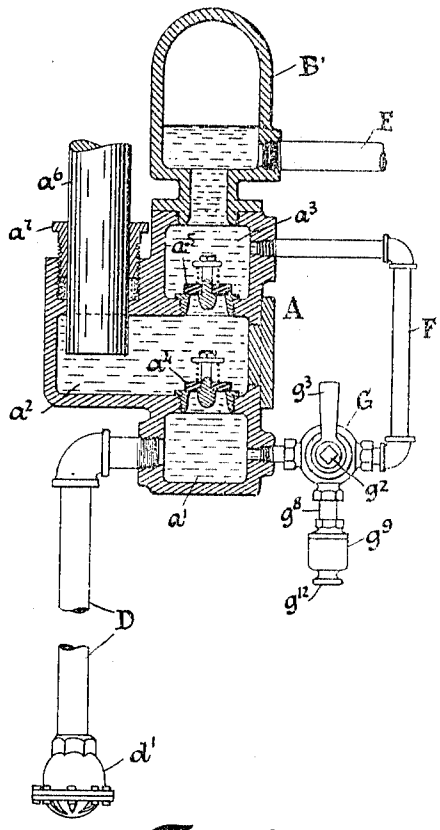


Fig. 9

John Astrom, Inventor

Witnesses

R. C. Broecker

Eleanor Rink

By George Peterson Collins

Attorney

UNITED STATES PATENT OFFICE.

JOHN ASTROM, OF FORT WAYNE, INDIANA.

AIR CHARGING AND PRIMING DEVICE FOR SUCTION-PUMPS.

1,074,098. Specification of Letters Patent. Patented Sept. 30, 1913.

Application filed March 17, 1913. Serial No. 754,679.

To all whom it may concern:

Be it known that I, JOHN ASTROM, of Fort Wayne, Indiana, have invented an Air Charging and Priming Device for Suction-Pumps, of which the following is a specification.

This invention relates to suction pumps and the object which I have in view is to provide means for remedying the defects of a common pump used in connection with a pneumatic storage system.

When a suction-pump is used in connection with a system in which a compressed-air receiver is used for the storage, and more particularly when the pump discharges into said receiver, the air is gradually absorbed by the passing water because of the well known fact that a larger amount of air is soluble in water under compression than under atmospheric pressure. This absorbed air must be replaced in the intake, and it is customary under such circumstances to provide a valve through which air can be admitted into the suction-compartment of the pump, which then is required to discharge this air with the water pumped into the receiver. The free air thus admitted expands of course to a volume corresponding to the suction-pressure or vacuum in the pump, and with high suction-lifts therefore only a small part of the pump's displacement of free air can be admitted without preventing the pump for drawing water. As soon as sufficient air is admitted to prevent the pump from drawing water, the air-pocket formed between the valves becomes big enough to prevent the pump from compressing the entering air sufficiently to discharge it against the water-pressure in the receiver. The pump accordingly becomes unprimed, as it will not again pick up water after the air-valve is shut. The adjustment of air-admission is delicate and the described method is invariably a failure with small pumps and high suction-lifts. What is said above applies equally to any force-pump provided with an air-chamber, as practically all force-pumps are; the air in the air-chamber is gradually absorbed by the water pumped through, which is incompletely saturated with air at the higher pressure. Unless the air is renewed from time to time the air-chamber ultimately becomes filled with water. It will be seen that the air-chamber is actually a small receiver mounted directly on the pump.

The object of my invention is to provide a simple device for air-charging which allows the pump to draw and charge part of its displacement of free air independently of height of suction-lift and water-pressure in the receiver, and it will also not unprime the pump, but instead can be used for re-priming the pump should it for any reason have become air-bound or unprimed.

The nature of my invention and in what manner it may be performed is best described by reference to the accompanying drawings, wherein,

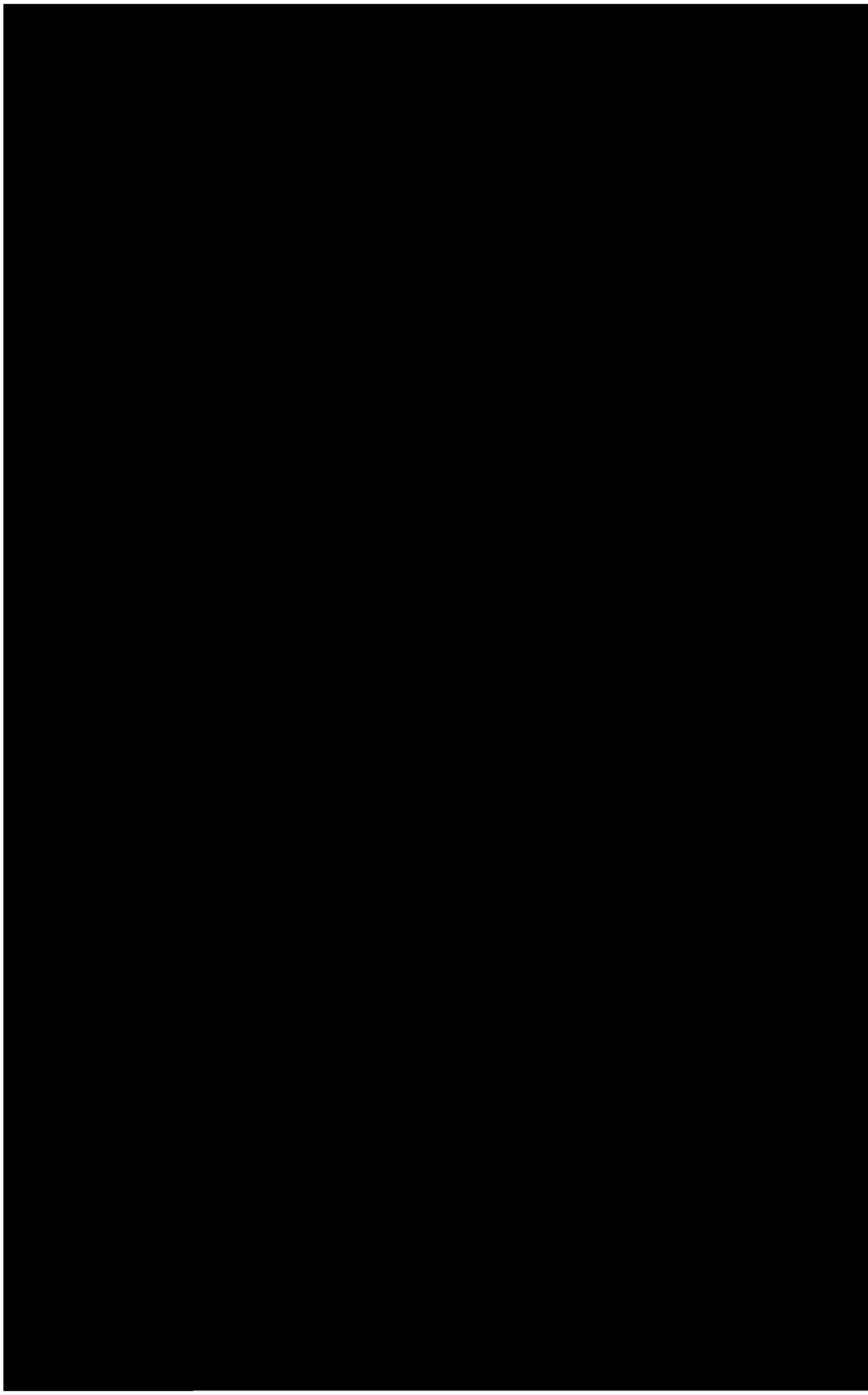
Figure 1 shows in more or less diagrammatic longitudinal section and part elevation a water-pumping system according to my invention; Figs. 2 and 3 illustrate alternative arrangements thereof; Figs. 4, 5 and 6 show different positions of the charging-and-priming device, namely the charging, priming and shut positions respectively; Figs. 7 and 8 show, partly in elevation and partly in section, alternative forms of the charging-and-priming device which will effect the same result; and Fig. 9 shows in longitudinal section the form which the invention will assume as in the case of a direct action force-pump.

The reference letters refer each to the same part in each figure of the drawings.

In Fig. 1 of the drawing there is illustrated a pump A, a receiver B, a discharge-pipe C connecting the pump with the receiver and discharging into the latter, and a suction-pipe D having on its end a foot-valve d', said suction-pipe discharging into the suction-chamber a' of the pump. The foot-valve d' acts as a check-valve to hold the pressure during the air-charging and priming operations.

At E is the service-pipe which leads to the water-distribution system. The receiver is partially filled with water, the upper part thereof forming an air-compression chamber b'.

The pump A comprises the suction-chamber a', the pump-chamber a^2, and the discharge-chamber a^3, separated from each other by pump-valves a^4, a^5 of any preferred style and pattern opening upward. The pump-plunger a^6 reciprocates through a stuffing box a^7 so as to alternately increase and diminish the water-volume in the chamber a^2 and thereby alternately draw water from the suction-chamber a' to the pump-chamber a^2 through the valve a^4, and dis-



a^3. Otherwise the construction and action are as hereinbefore described.

From the foregoing description it will be clear that the principle of my invention may be involved in various forms and arrangements, in addition to those already described, which are embraced within the scope of my claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with a pump, and a receiver connected with the discharge-side thereof, of a pipe leading from the discharge-side to the suction-side of the pump, a valve in said pipe, and means for admitting air through said valve.

2. The combination with a pump, and a receiver connected with the discharge-side thereof, of a pipe leading from the discharge-side to the suction-side of the pump, a valve in said pipe, means for admitting air through said valve, and means for independently shutting off the air while permitting the water to flow through said valve into the suction-side of said pump.

3. The combination with a pump, and a receiver connected with the discharge-side thereof, of a pipe leading from the discharge-side to the suction-side of the pump, a valve in said pipe, and means for admitting air into said pipe while the water is passing therethrough, whereby air is drawn into said pump along with the water from the receiver.

4. The combination with a pump, and a receiver connected with the discharge-side thereof, of a pipe leading from the discharge-side to the suction-side of the pump, a valve in said pipe, means for admitting air into said pipe while the water is passing therethrough whereby air is drawn into said pump along with the water from the receiver, and means for shutting off the air from said pipe while permitting the water to flow through said pipe.

5. The combination with a pump, and a receiver connected with the discharge-side thereof, of a pipe leading from the discharge-side to the suction-side of the pump, and a valve in said pipe, combined with a constricted nozzle for the water, and an air-passage leading to the outside of said nozzle whereby air is inspirated into said pipe when water flows therethrough.

6. The combination with a pump, and a receiver, connected with the discharge-side thereof, of a pipe leading from the discharge-side to the suction-side of the pump, a valve in said pipe, combined with a constricted nozzle for the water and an air-passage leading to the outside of said nozzle whereby air is inspirated into said pipe when water flows therethrough, and means for independently shutting off the air.

7. The combination with a pump, and a receiver connected with the discharge-side thereof, of a pipe leading from the discharge-side to the suction-side of the pump, a three-way cock in said pipe adapted to permit water to pass from the receiver into the suction-side of the pump, said cock having a side-inlet for air, and a check-valve in said side-inlet.

8. The combination with a pump, and a receiver connected with the discharge-side thereof, of a pipe leading from the discharge-side to the suction-side of the pump, a three-way cock in said pipe, and a check-valve adapted to admit air connected to the third way of said cock.

9. The combination with a pump, and a receiver connected with the discharge-side thereof, of a pipe leading from the discharge-side to the suction-side of the pump, and a three-way cock in said pipe, a check-valve adapted to admit air connected to the third way of said cock, said three-way cock having a rotatable plug which is formed with a quadrantal passage adapted to connect any two adjacent ways of the cock and a constricted diametral passage extending from one end of said quadrantal passage to the opposite side of said plug.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

JOHN ASTROM.

Witnesses:
ROSE G. SWETZ,
ARTHUR W. PARRY.