

E. H. BOECKH.
MONOPLANE.

APPLICATION FILED SEPT. 27, 1909.

Patented Aug. 9, 1910.

3 SHEETS—SHEET 1.

966,424.

Fig. 1

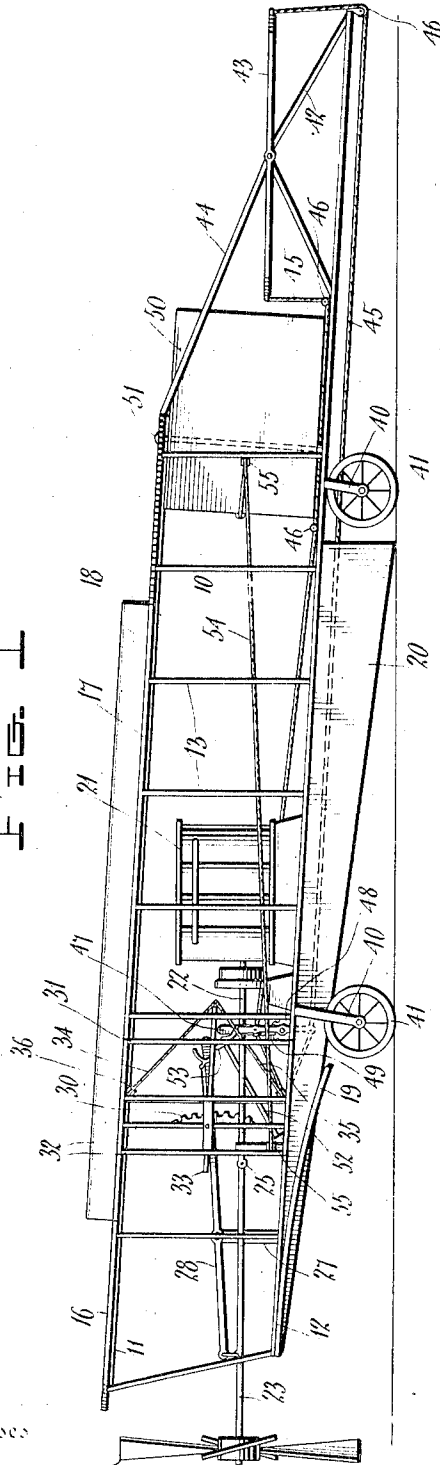
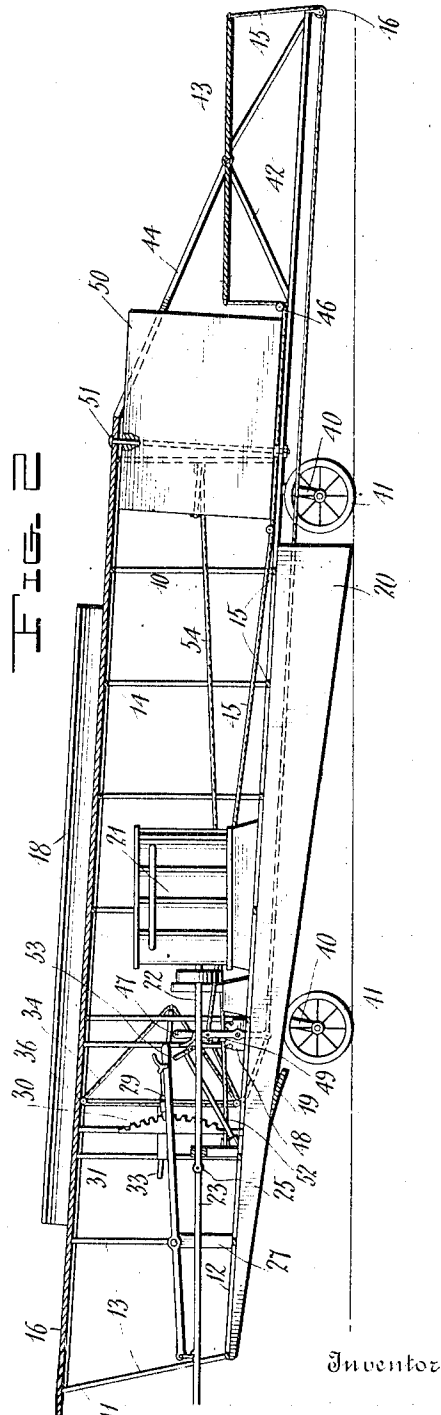


Fig. 2



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Witnesses

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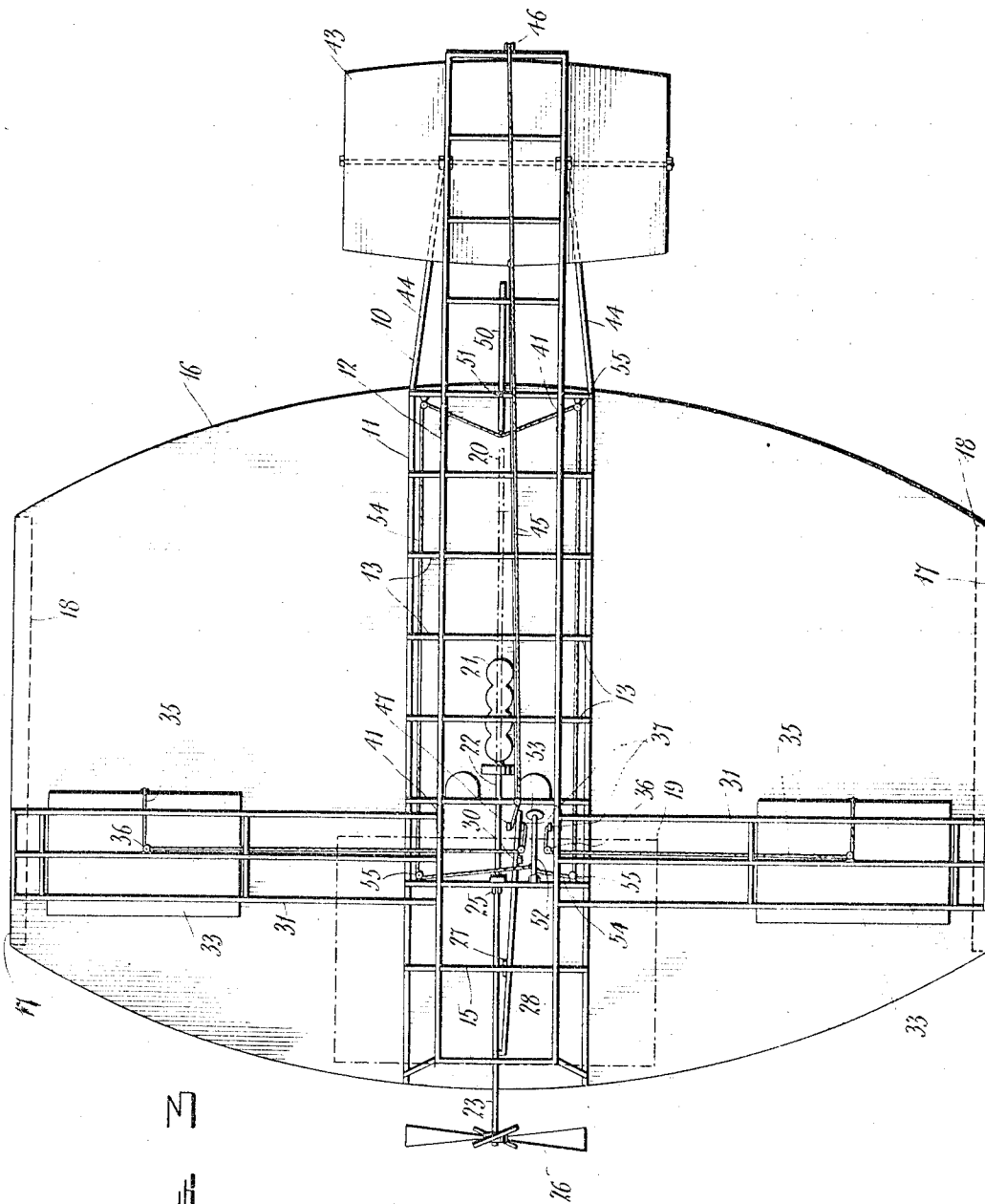


FIG. 2

Witnesses

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3 SHEETS—SHEET 3.

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FIG. 4

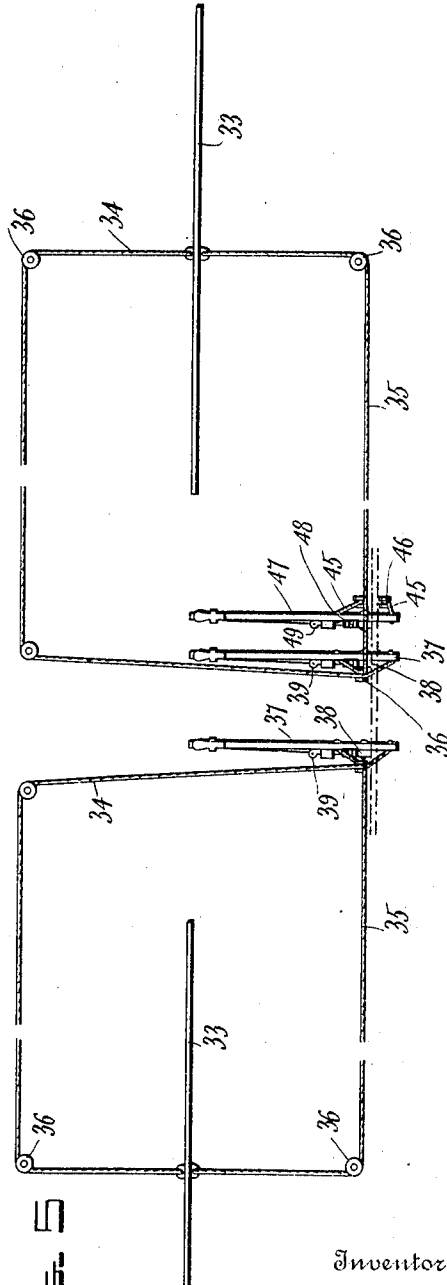
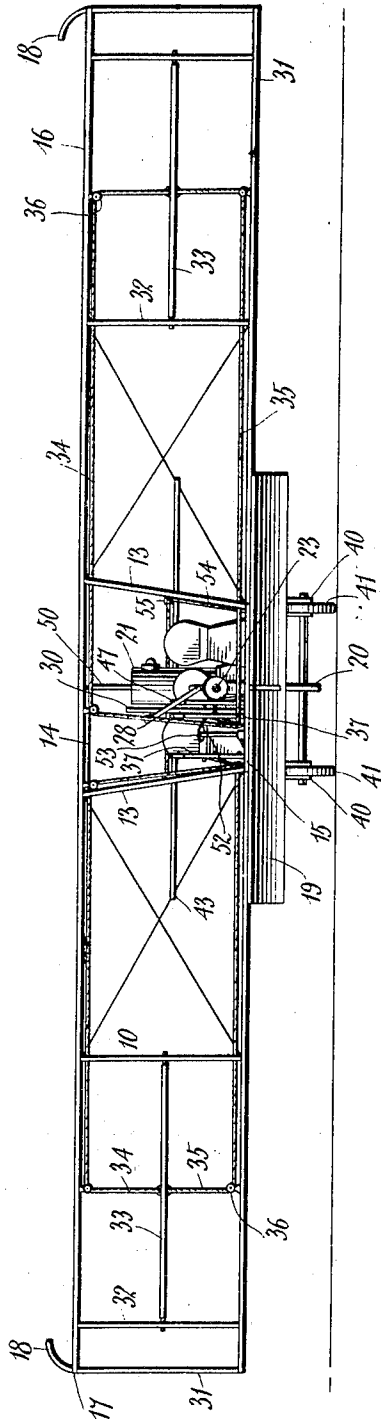


FIG. 5

Witnesses

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UNITED STATES PATENT OFFICE.

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MONOPLANE.

966,424.

Specification of Letters Patent.

Patented Aug. 9, 1910.

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To all whom it may concern:

Be it known that I, EVERARD H. BOECKH, a subject of the King of England, residing at Toronto, in the Province of Ontario and Dominion of Canada, have invented certain new and useful Improvements in Monoplanes; 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 invention relates to an aeroplane and more particularly to the class of monoplanes for aerial navigation.

The primary object of the invention is the provision of a monoplane in which the main plane thereof is formed at opposite side edges with upwardly and inwardly curved flanges which latter serve to catch the air righting the monoplane during its flight and also to overcome dipping of the same to either side while lifted in the air.

Another object of the invention is the provision of a monoplane in which there are disposed, beneath the main plane at opposite sides of the suspended main plane, side balance planes, which latter assist with the adjustable tail wing or plane in effecting the ascending or descending of the monoplane and also control the distance of flight thereof relative to the earth.

A further object of the invention is the provision of a monoplane in which there is formed at its forward end a breast plane, the same being intersected by a center board or keel which latter is acted upon by the air, during the course of flight to maintain the monoplanes steady and preventing unnecessary side dipping of the same.

A still further object of the invention is the provision of a monoplane in which the air resisting qualities have been reduced to a minimum, thus increasing the buoyancy and also enabling the attainment of high speed with the least possible motive power.

In the drawings accompanying and forming part of this specification is illustrated the preferred form of embodiment of the invention, which to enable those skilled in the art to carry the invention into practice, will be set forth at length in the following detail description, while the novelty of the invention will be pointed out in the claims succeeding the description.

It is to be understood of course that changes, variations, and modifications may

be made such as come properly within the scope of the appended claims, without departing from the spirit of the invention or sacrificing any of its advantages.

In the drawings:—Figure 1 is a side elevation of a monoplane constructed in accordance with the invention. Fig. 2 is a longitudinal sectional view through the same. Fig. 3 is a bottom plan view. Fig. 4 is a front elevation with the propeller removed. Fig. 5 is an enlarged front elevation of the side balance planes and their operating levers with the connections between the same.

Similar reference characters indicate corresponding parts throughout the several views in the drawings.

Referring to the drawings by numerals 10 designates generally a skeleton frame structure comprising upper and lower side rails 11 and 12 the latter being of greater length than the rails 11 to extend a distance rearwardly thereof and these upper and lower rails are connected by outwardly diverging spaced strips 13, while the upper rails are united by spaced cross ribs 14, and the lower rails by cross strips 15, so as to form a unitary frame structure. This frame 10, is suspended centrally from a main plane 16, the same being of substantially elliptical shape with straight opposite side edges 17, the latter having formed throughout their length with upwardly and inwardly curved converging flanges 18, the purpose of which will be hereinafter more fully described.

Fixed near the forward end and to the bottom of the main frame 10, is a breast plane 19, the same being slightly curved rearwardly and downwardly so as to cause the raising of the upper end of the frame for lifting it into the air when started in motion for the upward flight of the device.

Extending from the forward end of the frame 10 to a distance removed from its rear end and secured to the bottom thereof is a center board or fin 20, the said board being beveled toward its forward end so as not to impede the forward travel of the frame when navigating in the air.

Mounted in the frame 10 is a driving engine 21, the latter being preferably of the four cylinder type and to its driving shaft 22, is connected the main propeller shaft 23, by a knuckle or ball and socket joint 25, and this propeller shaft 23 extends forwardly a distance beyond the front of the frame and

has fixed to its outer free end a bladed propeller wheel 26 which may be of any well known type for effecting the advancement of the machine. Upon a standard 27 within the frame is pivotally mounted a raising and lowering lever 28, one end of which has suitable connection with the propeller shaft so as to enable it to be vertically adjusted. This lever 28 carries the usual spring controlled locking pawl 29 engaging a toothed segment 30, so that the said lever 28, may be locked for holding the propeller shaft in its adjusted position.

Beneath the main plane 16 and extending outwardly from opposite sides of the main frame 10 are skeleton bridge frames 31, in vertical uprights 32 of which are pivoted horizontally disposed swinging side planes 33, the latter being adapted to balance the device and also to assist in guiding it in ascending and descending courses. Centrally of and near the rear edges of the side balance planes 33 are connected cables 34, and 35, the same being trained over pulleys 36, and suitably connected to throw levers 37, the latter being pivoted to toothed segments 38, which are engaged by spring controlled locking pawls 39, carried by the throw levers 37, so as to lock the same in adjusted position and by means of these levers 37, the side planes 33, may be independently adjusted to the required degree.

Secured to the bottom of the frame 10 in suitable brackets 40, are ground or caster wheels 41, the same being adapted to travel over the ground for a distance when starting and stopping the monoplane.

At the rear of the main frame and rising from the lower side rails 12, thereof are brackets 42, to which latter is pivoted a tail plane 43, the pivot of which has connected thereto brace pieces 44 depending from the upper rails 11 of the frame and this tail plane is adapted to swing on its pivot vertically and to accomplish this there is connected to the same at opposite edges cables 45 the latter being trained over pulleys 46 and also connected to a throw lever 47 pivoted to a segment 48, which latter is engaged by a locking pawl 49 carried by the lever 47 to lock the same in adjusted position.

In rear of the tail plane is a rudder or guide plane 50 the latter mounted for horizontal swinging movement upon a vertical pivot 51, journaled in the main frame. Suitably mounted forwardly within the main frame is a steering shaft 52, having the usual steering wheel 53 fixed thereto and also connected to this steering shaft is a cable 54, which latter is trained over pulleys 55, and has connection with the forward end of the rudder or guide plane 50, so that upon manipulation of the steering wheel the said rudder or guide plane may be swung hori-

zontally on its axis to guide the device during its forward travel.

In operation presuming that the monoplane is at a standstill upon the ground and that the engine 21 has been started it will impart rotation to the propeller shaft 23, which has previously been adjusted so that the propeller wheel 26, will cause the advancement of the machine and by the breast plane 19, the forward end of the frame will be directed upward so that by the main plane 16, the machine will be lifted and held buoyant in the air. The elevation of flight of the machine will be controlled by the tail plane 43 which latter is under the control of an operator positioned within the main frame of the machine. This operator also has control of the side balance planes 33 during the flight of the machine. It being understood of course that the guide plane 50 is actuated for directing the machine in a predetermined course while suspended in the air.

A great importance is laid upon the upwardly and inwardly curved flanges at opposite end edges of the main plane 16, for the reason that these flanges serve to grip the currents of air during the travel of the machine so as to prevent side-wise dipping of the same or in other words these flanges will be acted upon by the air currents to bring the machine into what might be termed a righted position should it dip or tilt to either side. Attention will be particularly called to the disposition of the center board 20 which acts as a keel to steady the monoplane while at flight and thereby overcome wobbling or irregular movements to the same while being advanced during its suspension in the air.

What is claimed is:—

1. An air navigating machine comprising a main plane, a carrier suspended by the same, propulsion means carried by the carrier, a center board depending from the carrier and extending substantially throughout the length of the same, side balancing planes disposed beneath said main plane at opposite sides of the center board, a tail plane, a guide plane, and means independently adjusting the side, guide and tail planes.

2. In an apparatus of the class described, a main plane having straight parallel side edges provided with inturned extensions rising from and overhanging the said plane for interrupting air currents traversing the plane to transfer the force of the air to the latter for bodily lifting the same.

3. An aeroplane, comprising a main plane, upwardly converging flanges at opposite points thereof, a center board forming a keel for the aeroplane, and independently adjusting balancing planes arranged on opposite sides of the aeroplane beneath its main plane.

4. An aeroplane, comprising a main plane, upwardly converging flanges at opposite points thereof, a center board forming a keel for the aeroplane, independently adjustable balancing planes arranged on opposite sides of the aeroplane beneath its main plane, and means for holding the said side planes in adjusted position.

5. An air navigating machine comprising a main plane, a carrier suspended by the same, a propeller at the forward end of the carrier, a motor actuating the propeller, side balancing planes at opposite sides of the carrier and below the main plane, a tail plane, a guide plane in rear of the tail plane, means adjusting each of the side, guide, and tail planes, and means on the main plane to impact air currents traversing its surface.

6. An air navigating machine comprising a main plane, a carrier suspended by the same, a propeller at the forward end of the carrier, a motor actuating the propeller, side balancing planes at opposite sides of the carrier and below the main plane, a tail plane, a guide plane in rear of the tail plane, means adjusting each of the side, guide, and tail planes, means on the main plane to impact air currents traversing its surface, and a center board depending from the main frame.

7. The combination with a main plane of inwardly directed curved wings rising from opposed edges of the said plane for intersecting air currents traversing said plane to transfer the force of the currents to the plane whereby it will be bodily lifted, and a keel located medially between the said wings and depending below the under face of the said plane in parallel relation to the wings.

8. In an aeroplane, a main plane, stationary upwardly converging flanges at opposite points thereof, extending partially over the surface of the same, a center board forming a keel for the aeroplane, and independently adjustable side balance planes.

9. In an aeroplane, a main plane, upwardly converging flanges at opposite points thereof, independently adjustable balance planes beneath the main plane at opposite sides of its center and within the bounds of the marginal edge thereof, and means for holding the said balance planes in adjusted position.

10. In an aeroplane, a frame, a main plane connected above the same, a center board depending from the frame, a breast plate located at the forward end of the frame, upwardly directed flanges on said main plane for impinging air currents traversing across the said plane, a tail plane at the rear end of the frame, and adjustable side balance planes at opposite sides of the frame below the main plane.

11. In an aeroplane, a frame, a main plane

connected above the same, a center board depending from the frame, a breast plate located at the forward end of the frame, upwardly directed flanges on said main plane for impinging air currents traversing across the said plane, a tail plane, at the rear end of the frame, adjustable side balance plates at opposite sides of the frame below the main plane, and means guiding the machine.

12. In an aeroplane, a main plane, and upwardly and inwardly directed members rising from the upper face of the main plane and opposing each other, whereby air currents traversing said plane may be interrupted for transferring the force thereof to lift the said main plane bodily and gliding it at an angle.

13. In an aeroplane, a main plane, and opposed flanges rising from said main plane and having their free longitudinal edges inwardly directed toward each other, substantially as described.

14. In an aeroplane, a main plane, inwardly converging flanges at opposite points thereof, a center board forming a keel for the aeroplane, and adjustable side balance planes beneath the main planes, and means holding the side planes in adjusted position.

15. In an aeroplane, a main plane, inwardly converging flanges at opposite points thereof, a center board forming a keel for the aeroplane, adjustable side balance planes beneath the main planes, means holding the side planes in adjusted position, and means adjusting the same.

16. In an aeroplane, a main plane, stationary upward converging flanges at opposite points thereof, extending partially over the surface of the same, and a center board forming a keel for the aeroplane.

17. In an aeroplane, a main plane, and stationary opposed flanges rising from said main plane and having their free longitudinal edges inwardly directed toward each other, substantially as described.

18. An air navigating machine comprising a main plane, a carrier suspended by the same, a propeller shaft arranged on the carrier and having a propeller at its outer end, the said propeller shaft being formed of two sections, a knuckle joint connection between the adjacent ends of the sections, means for raising and lowering the outer section of the propeller shaft, a motor operating said shaft, independently adjustable balance planes arranged at opposite sides of the carrier and below the main plane, a stationary breast plane arranged beneath the bottom of the carrier at its forward end, a tail plane, a guide plane arranged at one end of the carrier and means adjusting each of the balance, guide and tail planes.

19. An aeroplane comprising a main plane, a carrier suspended thereby, a curved

breast plane secured beneath the bottom of the carrier at its forward end, a center board extending substantially throughout the length of the carrier, and independently adjustable balancing planes arranged upon opposite sides of the carrier beneath the main plane.

20. An aeroplane comprising a main plane, a carrier suspended thereby, a curved breast plane secured beneath the bottom of the carrier at its forward end, a center board extending substantially through the length

of the carrier, independently adjustable balancing planes arranged upon opposite sides of the carrier beneath the main plane, and stationary opposed flanges rising from said main plane and having inturned upper free edges directed toward each other.

In testimony whereof, I affix my signature, in presence of two witnesses.

EVERARD H. BOECKH.

Witnesses:

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GEO. H. CHANDLEE.