

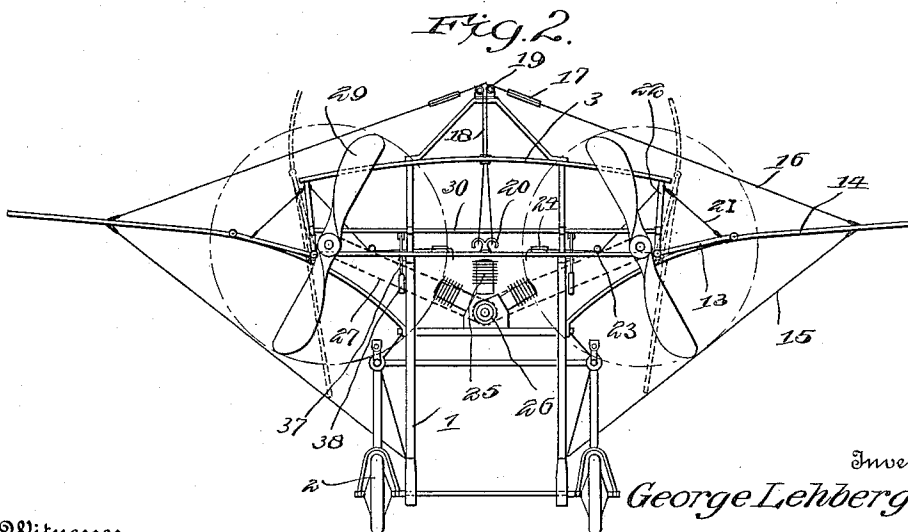
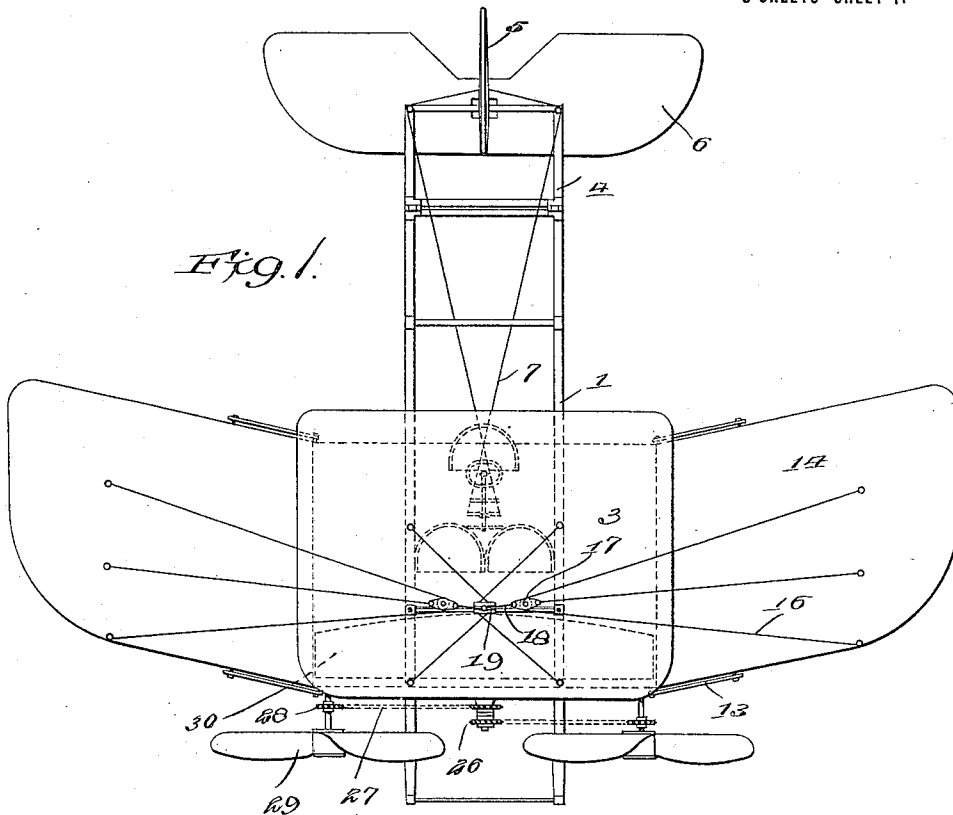
G. LEHBERGER.
AEROPLANE.

APPLICATION FILED NOV. 27, 1914. RENEWED NOV. 19, 1915.

1,166,061.

Patented Dec. 28, 1915.

3 SHEETS—SHEET 1.



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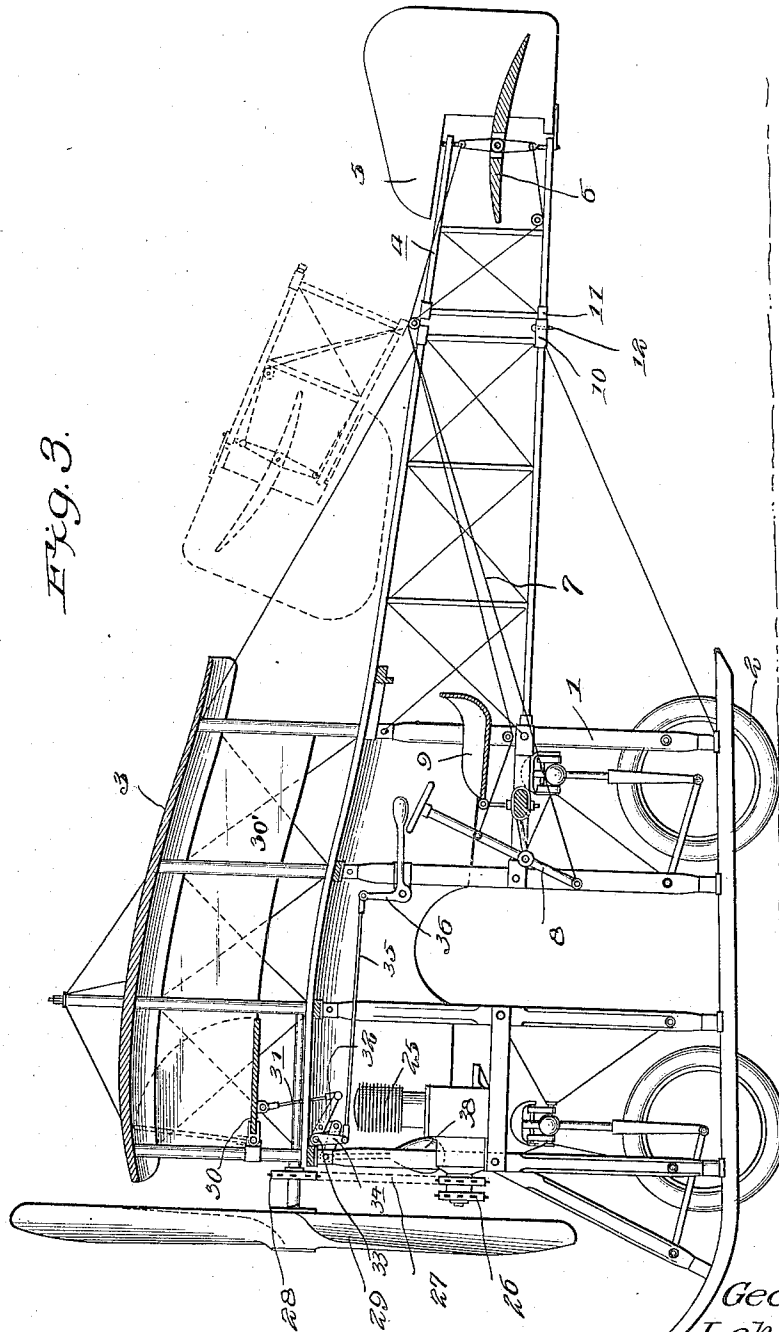


Fig. 3.

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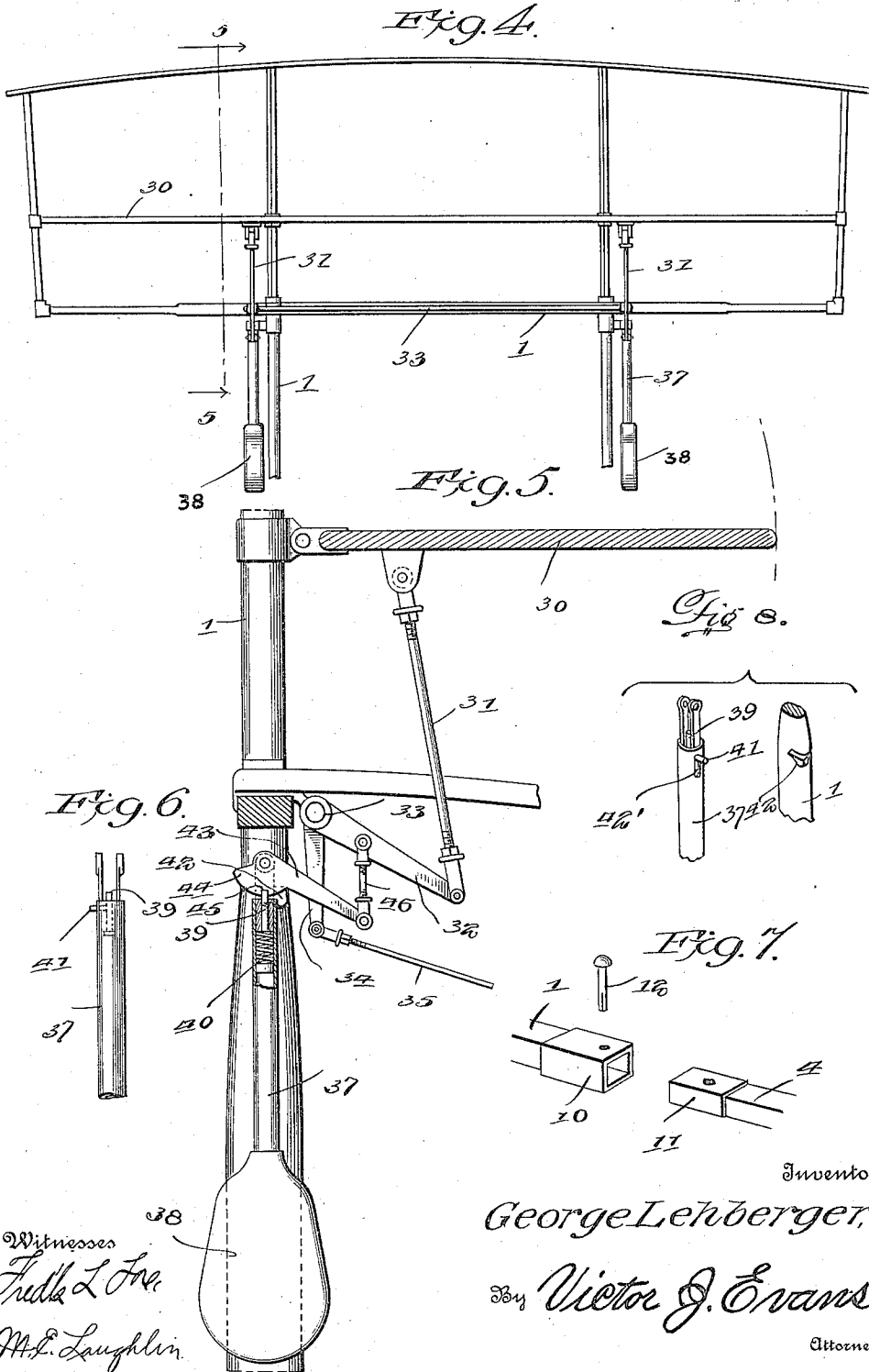
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UNITED STATES PATENT OFFICE.

GEORGE LEHBERGER, OF BROOKLYN, NEW YORK.

AEROPLANE.

1,166,061.

Specification of Letters Patent.

Patented Dec. 28, 1915.

Application filed November 27, 1914, Serial No. 874,329. Renewed November 19, 1915. Serial No. 62,438.

To all whom it may concern:

Be it known that I, GEORGE LEHBERGER, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Aeroplanes, of which the following is a specification.

This invention relates to aeroplanes and it consists in the novel features hereinafter described and claimed.

An object of the invention is to provide an aeroplane having its parts arranged that it may be easily and quickly folded or collapsed for storage, transportation or other purposes.

With this object in view the machine includes a main frame having a plane fixed thereon and planes pivotally mounted upon the frame at the side edges of the fixed plane and adapted to be positioned approximately horizontal or vertical. The frame includes a tail piece or frame hingedly connected with the main frame and which is adapted to be folded or swung over the main frame when the parts of the machine are collapsed.

Another object of the invention is to provide in an aeroplane means for locating the center of gravity at a relatively low point with relation to the frame of the machine. This means also includes a stabilizing means which in part is automatically operated by the tilting of the main frame and which when desired may be manually operated to preserve the proper stabilization of the main frame of the machine.

In the accompanying drawings:—Figure 1 is a top plan view of the aeroplane. Fig. 2 is a front elevation of the same. Fig. 3 is a longitudinal sectional view of the same. Fig. 4 is a detailed edge elevation of the upper forward part of the machine. Fig. 5 is an enlarged elevation of the stabilizing means with parts in section. Fig. 6 is a detailed view of a part of the stabilizing means. Fig. 7 is a perspective view of means for securing the tail frame in fixed relation with respect to the main frame of the machine. Fig. 8 is a perspective view of parts of the stabilizing means.

The aeroplane includes a frame 1 having ground wheels 2 suitably journaled at the lower portion thereof. A fixed plane 3 is mounted at the top of the frame 1 and a tail frame 4 is hingedly connected with the rear part of the frame 1. The frame 4 is

provided with a rudder 5 and an oscillating plane 6. Cables 7 are suitably connected with the oscillating plane 6 at their rear ends and are connected at their forward ends with a shaft 8 pivotally mounted upon the frame 1 in the vicinity of the operator's seat 9. The frame 1 is provided at its rear end with sleeves 10 adapted to receive studs 11 carried by the lower portion of the frame 4 and pins 12 are adapted to be passed transversely through the sleeves 10 and studs 11 whereby the frame 4 is held in alinement with the rear part of the frame 1 as indicated in heavy lines in Fig. 3. When it is desired to swing the frame 4 in an upward direction with relation to the frame 1 the pins 12 are removed from the sleeves 10 and studs 11 and then the frame 4 may be swung up and over the rear portion of the frame 1 as indicated in dotted lines in Fig. 3.

Links 13 are pivotally connected at the sides of the forward portion of the frame 1 and planes 14 are pivotally connected with the outer or free ends of the links 13 located at the same side of the frame 1. Cables 15 are connected at one end with the outer portions of the planes 14 and at their other ends with the forward portions of the frame 1 and serve as means for limiting the upward movement of the outer portions of the planes 14 when the said planes are in the positions shown in Figs. 1 and 2 of the drawing. Cables 16 are connected at their outer ends with the outer portions of the planes 14 and at their inner ends are connected with blocks 17 which in turn are connected with cables 18. The cables 18 are trained over pulleys 19 journaled at the upper part of the frame 1 and then extend down and are adapted to be connected at their lower ends with hooks 20 mounted upon the frame 1. Cables 21 are connected with the outer portions of the links 13 and are trained over pulleys 22 journaled at the sides of the frame 1 and then under pulleys 23 journaled upon the frame 1 and the free ends of the cables 21 are adapted to be connected with cleats 24 mounted upon the frame 1 as best shown in Fig. 2 of the drawing.

Presuming that the parts are in the positions shown in heavy lines in Fig. 2 and it is desired to bring the planes 14 to the positions shown in dotted lines in said figure the cables 21 are disconnected from the cleats 24 and are permitted to slacken while the

outer ends of the links 13 move in a downward direction and the inner ends of the planes 14 are carried beyond the sides of the frame 1. The cables 21 are then drawn in and secured to the cleats 24 and at the same time the cables 18 are disconnected from the hooks 20 and the outer portions of the planes 14 swing down while the inner portions of the said planes 14 swing in upward positions as shown in dotted lines in Fig. 2. Thus the planes may be collapsed with relation to each other and the machine may be readily collapsed.

An engine 25 is mounted upon the frame 1 and sprocket wheels 26 are mounted upon the shaft of the engine. Sprocket chains indicated at 27 pass around the sprocket wheels 26 and around sprocket wheels 28 mounted upon the shafts of propellers journaled upon the frame. Therefore it will be seen that when the engine 25 is in operation means is provided for driving the propellers 29 and thus the machine may make headway through the air.

A panel 30 is hingedly connected with the forward upper portion of the frame 1 for vertical swinging movement. Fixed vertical panels 30' are located at the sides of the frame 1 beyond the ends of the panel 30. The said panel 30 when in a horizontal position as indicated in solid lines in Fig. 3 is approximately parallel with the forward portion of the plane 3 and when the panel 30 is swung to a vertical position substantially as indicated by the dotted lines in Fig. 3 it is of such dimensions as to close the space at the upper forward portion of the frame 1 immediately below the forward end of the plane 3 and between the forward ends of the panels 30' thereby forming an air pocket or parachute. Rods 31 are connected at their upper ends with the underside of the panel 30 and at their lower ends are pivotally connected with arms 32 fixed to a shaft 33 journaled for turning movement at the upper forward portion of the frame 1. An arm 34 is also fixed to the shaft 33 and the forward end of a rod 35 is pivotally connected with the arm 34 and the rear end of the said rod 35 is pivotally connected with one arm of a bell crank lever 36 fulcrumed upon the frame 1. The other arm of the bell crank lever 36 is disposed toward the seat 9. Therefore it will be seen that by swinging the bell crank lever 36 the rod 35 will be moved longitudinally whereby the arm 34 will be swung and the shaft 33 turned. The turning movement on the part of the shaft 33 swings the arms 32 which in turn moves the rods 31 longitudinally and the panel 30 may be swung from a horizontal to a vertical position and vice versa. When the panel 30 is in a vertical position it substantially closes the space immediately below the plane 3 and consequently the air

is prevented from entering under the forward portion of the plane 3. This forms an air pocket immediately behind the panel which may serve as a parachute and stabilize the machine during its descent. When the panel 30 is moved to any position between a horizontal and vertical position it will have a tendency to direct some of the air up against the under surface of the plane 3 and its inclined position will also have a tendency to direct the forward end of the frame 1 in a downward direction when the machine is in flight.

Hangers 37 are pivotally connected at their upper ends with the forward uprights of the frame 1 and carry at their lower ends weights 38. The hangers 37 are provided at their upper ends with spring pressed pins 39 which are normally in upper or projected positions by means of springs 40 located within the hangers and bearing at their upper ends against the lower ends of the pins 39. The pins 39 are provided at their sides with studs 41 which extend through slots 42' provided at the sides of the hangers 37. Cams 42 are located at the sides of the uprights of the frame 1 to which the hangers 37 are pivoted and the said cams 42 project into the paths of movement of the studs 41 provided upon the pins 39. Levers 43 are pivoted upon the uprights of the frame 1 to which the hangers 37 are attached and the said levers are provided with arcuate end portions 44 having notches 45 which normally receive the upper ends of the pins 39. The ends of the levers 43 are pivotally connected by means of links 46 with the arms 32 hereinbefore described.

The hangers 37 and the weights 38 carried at the lower ends thereof normally hang vertically with relation to the frame 1 and serve as stabilizing means for the frame and the machine and also serve as means for positioning the center of gravity of the machine relatively low. When the shaft 33 is turned in order to move the panel 30 in an upward direction the arm 32 is moved in an upward direction and consequently the links 46 are moved upwardly and the adjacent end of the lever 43 is also moved in an upward direction. When this takes place the hangers 37 are partially turned and the studs 41 are carried along the cams 42 whereby the pins 39 are moved downwardly along the hangers 37 against the tension of the springs 40 and the upper ends of the said pins disengage the notches 45. Consequently the panel 30 may be swung in an upward direction without swinging the hangers 37 and the weights 38. However when the panel 30 is brought to a horizontal position as shown in Fig. 5 the notches 45 are immediately above the upper ends of the pins 39 and the springs 40 force the upper ends of the said pins into engagement with

the said notches. If the rear portion of the frame of the machine should dip in a downward direction while the panel 30 is horizontal the hangers 37 and weights 38 will swing rearwardly and the pins 29 will disengage the notches 45 as hereinbefore described. If however the rear of the frame 1 swings in an upward direction the hangers 37 and weight 38 swing in a forward direction and the arms 43 are turned whereby the panel 30 is moved from a horizontal to an angular position. This will have a tendency to stabilize the machine when in flight and inasmuch as the hangers 37 and weights 38 will tend to maintain true vertical position should the forward portion of the frame 1 dip in a downward direction the panel 30 is swung in a downward direction from the position as shown in Fig. 5 and consequently greater surface is presented to the air below, which will have a tendency to raise the forward portion of the frame 1. If the machine while in the air starts to slide downwardly and rearwardly the closing of the panel 30 will operate to counteract this movement and the low center of gravity of the machine will bring the frame to a horizontal position. If the machine starts to plunge downwardly and forwardly the closing of the panel 30 effects the same results.

Therefore it will be seen that an aeroplane of simple and durable structure is provided and that the parts are so assembled as to be easily and quickly collapsed for transportation and other purposes, also a shiftable panel is provided at the forward portion of the frame of the machine and it may be readily adjusted to control the movement of the machine and a stabilizing device is provided for maintaining the machine in proper position during flight.

Having described the invention what is claimed is:—

1. An aeroplane comprising a main frame, a plane fixed upon the main frame, planes pivotally connected with the main frame and located at the side edges of the fixed plane and adapted to be moved on their pivots from positions approximately vertical at the side edges of the main frame to positions approximately horizontal with relation to the same and also movable bodily toward and away from the main frame.

2. An aeroplane comprising a main frame, a plane fixed to the main frame, links pivotally connected to the main frame, planes pivotally connected with the outer ends of the links, means for swinging the links inwardly with relation to the frame, and supporting cables connected with the outer portions of the pivoted planes.

3. An aeroplane comprising a frame, a plane carried by the frame, a panel hingedly

connected with the frame for vertical swinging movement, means for swinging the panel, hangers pivotally connected with the frame, weights carried by the hangers, means for locking the hangers in engagement with the panel operating means and means for releasing the said hanger locking means.

4. An aeroplane comprising a frame, a plane mounted upon the frame, a panel hingedly connected with the frame, means for manually moving the panel, hangers pivotally connected with the frame, spring pressed pins carried by the hangers, weights carried by the hangers, levers fulcrumed upon the frame and provided with notches adapted to receive the pins, said pins having outstanding studs, cams located upon the frame in the paths of movement of the studs and means operatively connecting the levers with the panel operating means.

5. An aeroplane comprising a frame, a fixed plane mounted thereon, fixed panels located below the fixed plane and at the sides of the frame, a panel pivotally mounted upon the frame below the fixed plane and between the fixed panels, a weighted standard pivoted to the frame, means normally connecting the standard with the pivoted panel to cause the standard and pivoted panel to swing simultaneously, means for swinging the pivoted panel manually and means for interrupting the connection between the standard and pivoted panel when the pivoted panel is swung manually.

6. An aeroplane comprising a frame, a plane carried by the frame, a panel hingedly connected with the frame at a point under said plane, a hanger pivotally connected with the frame and means for locking the hanger with relation to the panel.

7. An aeroplane comprising a frame, a plane carried by the frame, a panel hingedly connected with the frame, manually operable means for swinging the panel, a hanger pivotally connected with the frame and means for locking the hanger with relation to the panel.

8. An aeroplane comprising a frame, a plane carried by the frame, a panel hingedly connected with the frame at a point under said plane, manually operable means for swinging the panel, a hanger pivotally connected with the frame, means for locking the hanger with relation to the panel, and means operable by the swinging movement of the hanger for releasing the locking means.

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

GEORGE LEHBERGER.

Witnesses:

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GEO. A. BYRNE.