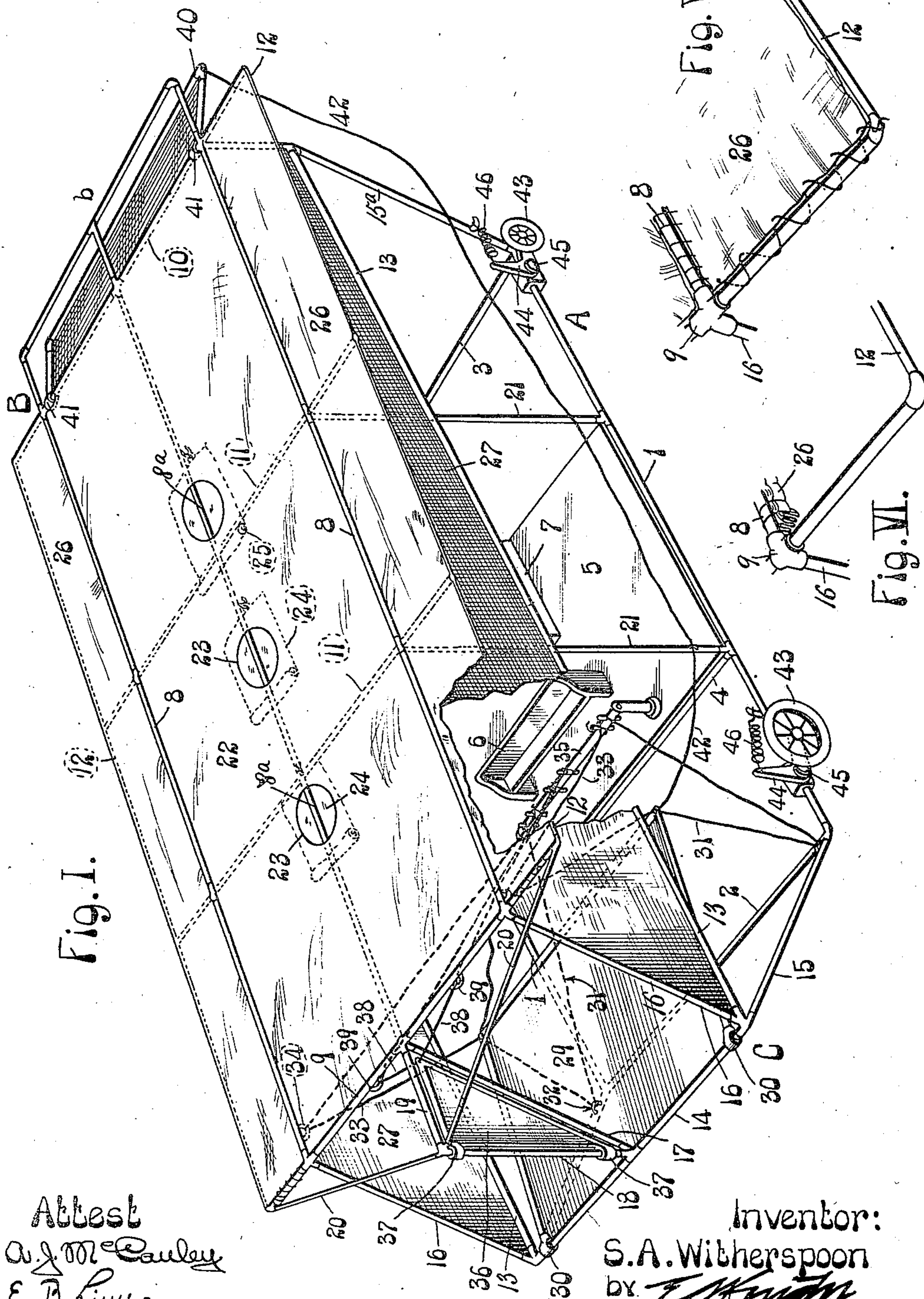


S. A. WITHERSPOON.
FLYING MACHINE.
APPLICATION FILED JAN. 26, 1910.

991,811.

Patented May 9, 1911.

2 SHEETS—SHEET 1.



Attest
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2 SHEETS—SHEET 2.

Fig. II.

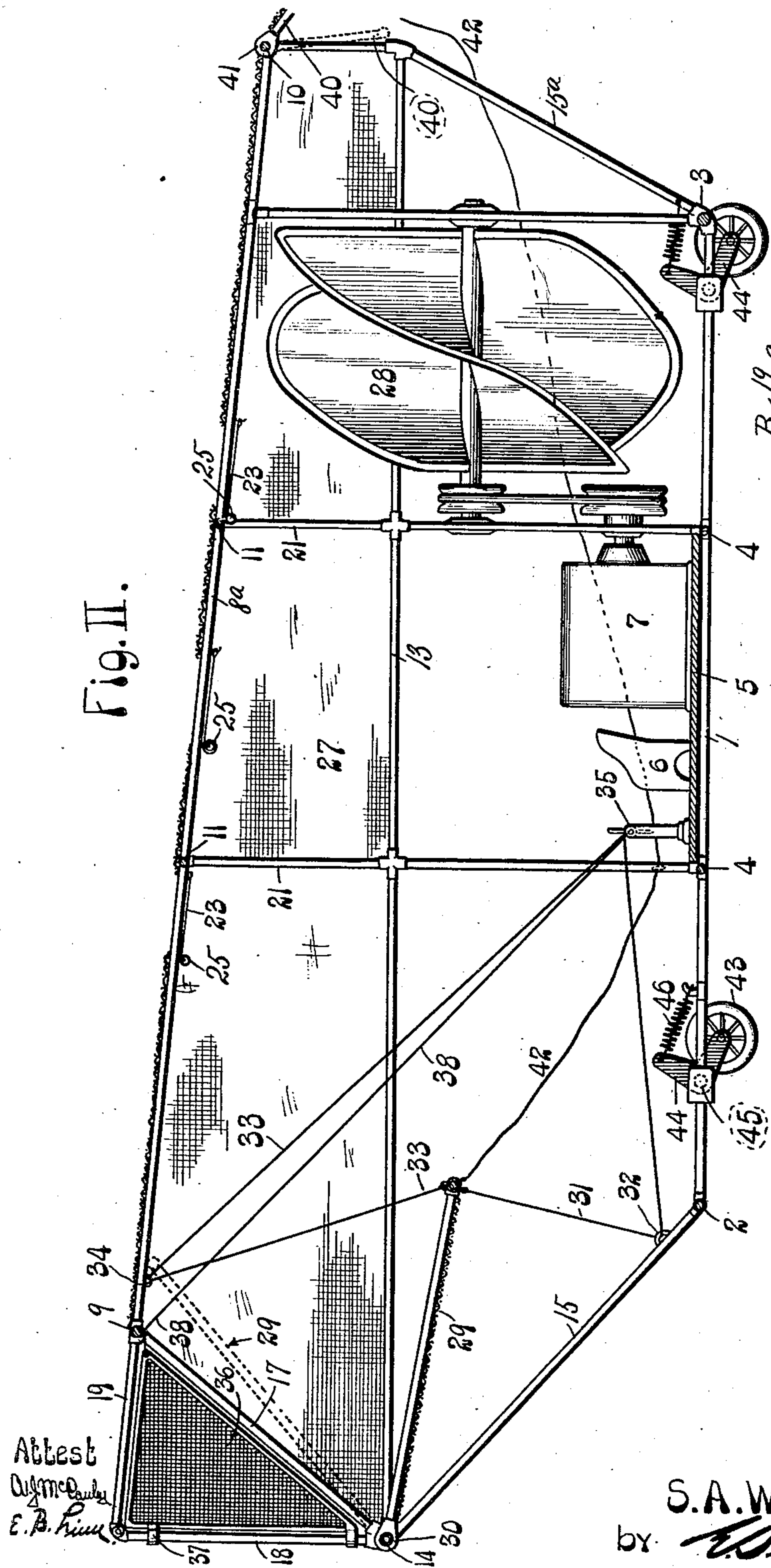


Fig. III.

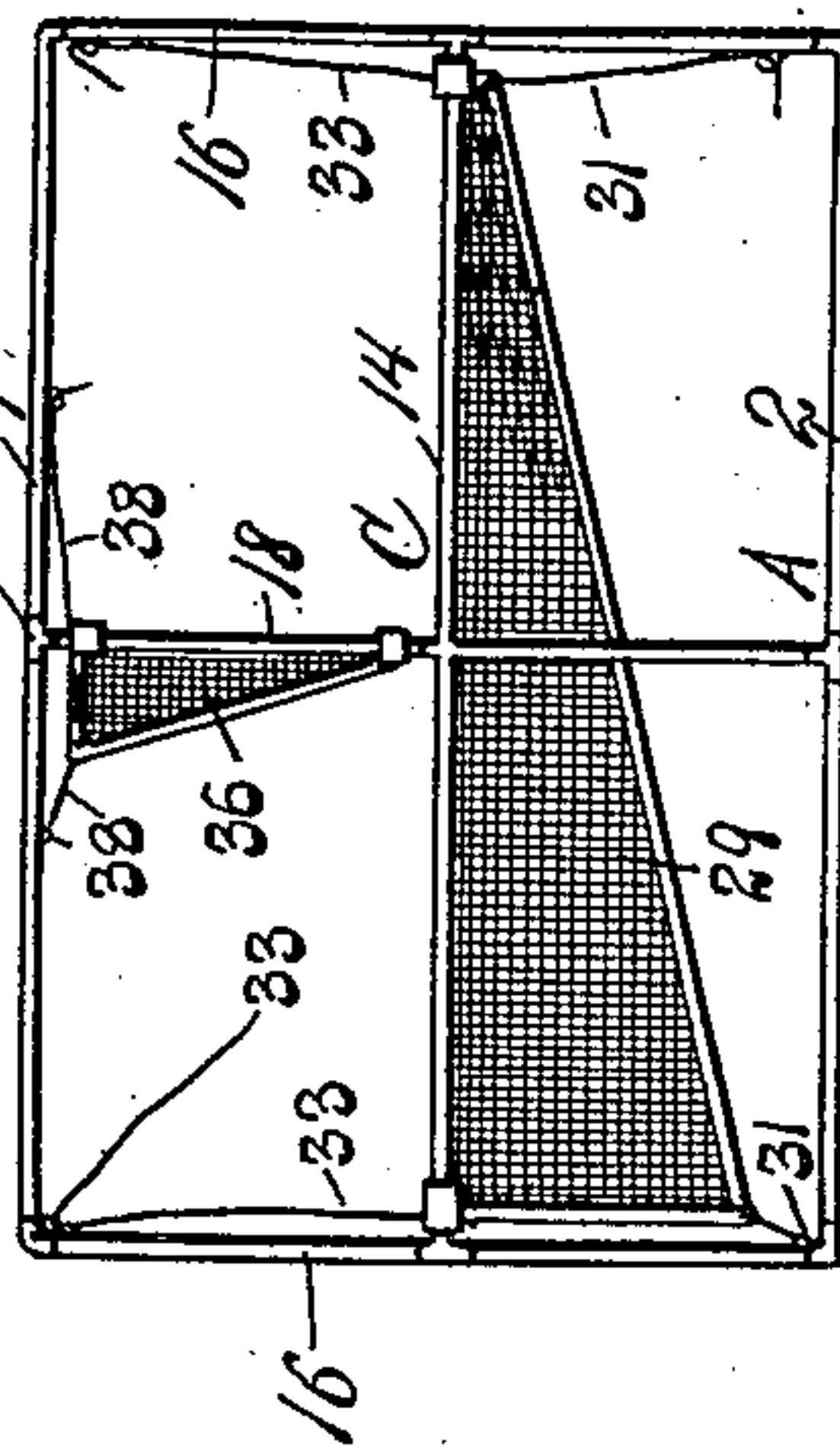
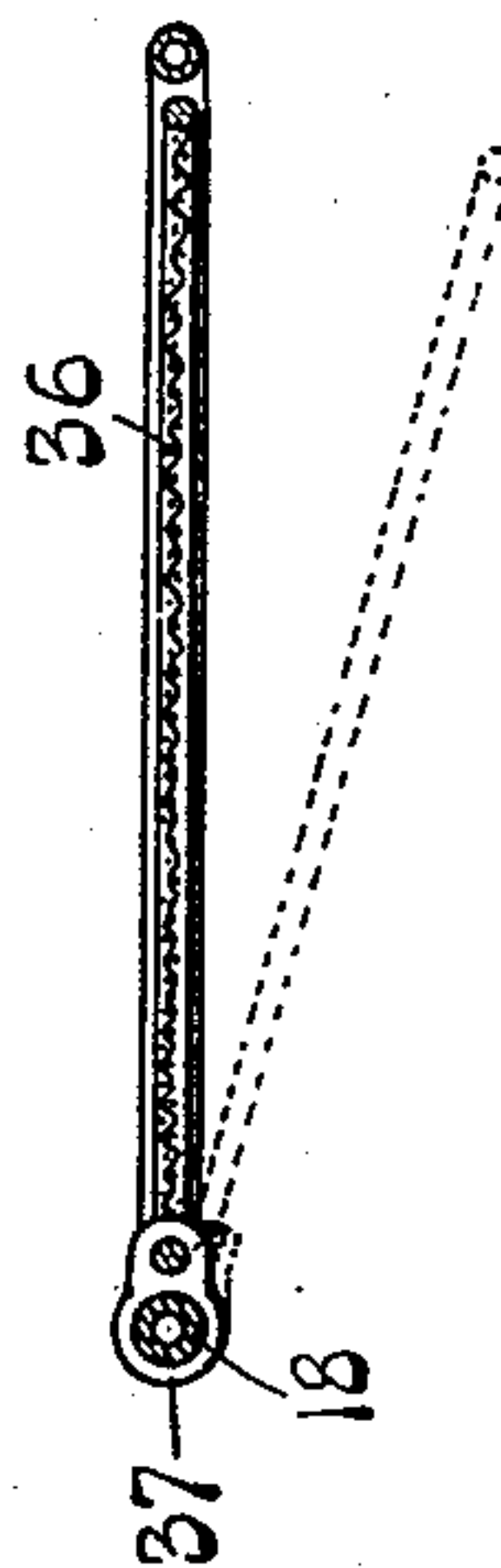


Fig. IV.



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UNITED STATES PATENT OFFICE.

SEWALL A. WITHERSPOON, OF ST. LOUIS, MISSOURI.

FLYING-MACHINE.

991,811.

Specification of Letters Patent.

Patented May 9, 1911.

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To all whom it may concern:

Be it known that I, SEWALL A. WITHERSPOON, a citizen of the United States of America, residing at the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Flying-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to a flying machine of the aeroplane type, and it has for its object the production of a flying machine of this description by which the air may be navigated without liability of inversion of the machine, which has heretofore been a source of danger in the operation of flying machines; also to provide in a flying machine a construction that may perform the office of a parachute in order that a safe landing may be possible in the event of the failure of the means for operating the propeller; and also to provide a construction that will permit of the flying machine being utilized under various atmospheric conditions.

Figure I is a perspective view of my flying machine with the movable parts in the positions assumed when the machine is in flight in a straight or forward course. Fig. II is a longitudinal section through the machine. Fig. III is a front elevation of the rudder part of the machine with the horizontal or main rudder shown in the position assumed when the horizontal or main rudder is used in changing the course of the machine, and the auxiliary or vertical rudder in a deflected position. Fig. IV is a horizontal section through the auxiliary or vertical rudder and its support. Fig. V is a perspective view of a fragment of one of the side extension wings with the auxiliary plane thereon in stretched condition. Fig. VI is a similar view to Fig. V with the auxiliary plane reefed.

In the accompanying drawings:—A designates the bottom frame of my flying machine by which the platform for a passenger, or passengers, and the propelling mechanism are supported.

B is the top frame by which the main plane, the lateral extension plane, and the movable rear plane and end gate of the flying machine are supported.

C is an intermediate frame that serves in

conjunction with the bottom and top frames as a support for the rudders and the side curtains.

The bottom frame A comprises side bars 1, a front cross bar 2, a rear cross bar 3, and intermediate cross bars 4. The latter, or intermediate, cross bars serve in conjunction with the side bars as supports for a platform 5 on which is located an operator's or passenger's seat 6 and a motor 7, of any desirable description, by which the propeller of the flying machine is driven.

The top frame B comprises side bars 8, an intermediate longitudinal bar 8^a, a front cross bar 9, a rear cross bar 10, and intermediate cross bars 11, the various cross bars being extended beyond the sides of the main portion of the top frame to furnish lateral extensions, with an object in view to be hereinafter made clear, and these cross bars have secured to them at their ends auxiliary side bars 12.

The intermediate frame C comprises side bars 13, a front cross bar 14, and a rear cross bar that is arranged parallel with the front cross bar and is interposed between and connects the rear ends of the side bars 13. The intermediate frame C is of greater length than either the bottom frame A or the top frame B and juts forwardly beyond said frames, as seen in Figs. I and II, and said intermediate frame is connected to the bottom and top frames by lower side braces 15 extending upwardly and forwardly and lower side brace 15^a extending upwardly and forwardly from the bottom frame to the front cross bar 14 of the intermediate frame, upper side braces 16 extending downwardly and forwardly from the top frame to the cross bar 14, and a central upper brace 17 that is parallel with the braces 16 and connects the top frame and intermediate frame at their forward ends.

18 is a vertical pivot rod located in front of the central brace 17 and extending upwardly from the center of the forward cross bar 14, this pivot rod being connected at its upper end to the front cross bar 9 of the top frame B at a central location by a horizontal arm 19, and also connected to the top frame at its sides by braces 20 extending to the upper end of the pivot rod.

It should be here noted that the bottom and intermediate frames A and C are arranged horizontally and parallel with each

other, while the top frame is inclined upwardly and forwardly from its rear end relative to the frames beneath it.

21 designates side uprights interposed between the top and bottom frames and to which the side bars of the intermediate frame C are connected, these uprights being introduced into the framework of my flying machine for the purpose of affording rigidity therein.

22 designates the main sustaining plane of my flying machine, which is carried by the top frame B, and is of sufficient expanse to extend from one side bar 8 of the frame to the opposite side bar 8 and from the front cross bar 9 to the rear cross bar 10. This sustaining plane is preferably of canvas, or other suitable fabric, but may be of any desirable material, and I preferably provide the plane with a plurality of apertures 23 through which air may pass to escape from points beneath the plane when it is desired to permit such passage. Inasmuch, however, as it is sometimes desirable to close or control these apertures, I provide as closing or controlling means therefor curtains 24 that are located beneath the main plane and are adapted to be drawn into positions beneath the apertures to prevent or restrict passage of air therethrough and which are preferably mounted upon rollers 25, (see Fig. II), on which the curtains may be wound when the apertures are to remain open.

26 designates auxiliary sustaining planes that are supported by the lateral extensions at the sides of the top frame B and which are slidably fitted to the extensions of the cross bars that enter into the construction of the top frame B. These auxiliary planes are intended to afford plane surfaces in addition to the main plane 22 to assist in sustaining the flying machine in flight and greater expanse of aeroplane surface to prevent toppling of the flying machine in flight. Inasmuch, however, as their use would not be practical under certain atmospheric conditions, such as during high winds, I so apply them to the extensions of the main top frame as to permit of their being reefed, when desired. In Figs. I and V the auxiliary planes are shown in spread condition, and in Fig. VI one of said planes is illustrated as it appears when it has been reefed and lies against one of the side bars of the top frame.

27 designates side curtains that extend vertically from the side bars 8 of the top frame B to the side bars 13 of the intermediate frame C and the upper edges of which are inclined upwardly and forwardly from the rear end of the flying machine to its front end, the incline being similar to that of the top frame and with the result that the curtains are widest at their forward

ends where they are connected to the upper side braces 16. These curtains serve to confine the air that passes under the main sustaining plane 22 and, as the air passes rearwardly under said plane, it becomes somewhat compressed and, as a consequence, has greater lifting power in sustaining the flying machine by pressure against the main plane and, inasmuch as the propeller 28 is located beneath the plane near its rear end, the action of the propeller in the compressed air is such as to afford a greater impetus in the flight of the flying machine.

29 designates a main rudder or guiding plane that is located at the front end of my flying machine and the frame of which is pivotally connected at 30 to the front cross bar 14 of the intermediate frame C from which the rudder extends rearwardly in order that it may be swung vertically at a level lower than that occupied by the sustaining plane of the machine. The frame of the rudder 29 is so constructed as to permit of the rudder being warped from the flat condition in which it is shown in Figs. I and II to the condition in which it is shown in Fig. III. By warping the rudder in the proper direction, it is made to present to the air through which flight is being made a surface of such nature as to provide for a turn of the flying machine to guide it either to the right or left; whereas, when a direct course is to be maintained, the rudder is held in a horizontal position; or, when there is to be upward or downward flight, the rudder is lowered or elevated relative to a horizontal line to provide for, respectively, ascent in flight and the descent in flight. The rudder 29 is operable by a controlling cord 31 extending downwardly therefrom to suitable guides 32 and then rearwardly to the platform 5, and also by controlling cords 33 extending upwardly from the rudder to suitable guides 34 and then downwardly to the platform. The lower controlling cords serve as a means for moving the rudder downwardly, and the upper controlling cords serve as a means for elevating the rudders; and it will be apparent that by proper manipulation of the lower and upper controlling cords, the desired warping of the rudder for the guidance of the flying machine may be accomplished. The controlling cords all lead to a rack 35 on the platform having members to which the cords may be tied, or around which they may be wrapped for the purpose of holding them in convenient reach of the operator stationed on the platform 5.

36 designates an auxiliary rudder, the frame of which is pivotally fitted at 37 to the pivot rod 18. This rudder is vertically disposed and extends rearwardly from said pivot rod at a point above the main rudder 29, and it has connected to it a pair of con-

trolling cords 38 that lead through guides 39 supported by the top frame B, the controlling cords leading from said guides to the rack 35 providing means by which the rudder 36 may be swung to one side or the other to assist in guiding the flying machine in its flight.

40 designates an end gate at the rear of the flying machine which is of service, when in a lowered position, to partially close the rear end of the space beneath the main sustaining plane 22 and between the rear ends of the curtains 27; and also, when in an elevated position, to serve as an additional sustaining plane surface. The end gate is pivoted at 41 to the rear cross bar of the top frame B and is prevented from moving upwardly beyond a horizontal plane by an extension *b* of the top frame. The end gate 40 is connected to the main rudder 29 by controlling cords 42, which provide for the end gate being lowered to a vertical or substantially vertical position when the rear free end of the rudder 29 is elevated to the front end of the top frame B, and permitted to retain its elevated position when the rudder is in its normal lowered position.

43 designates land wheels upon which the flying machine may travel, either preceding or following an ascent. To provide for an easy landing of the flying machine after flight, these wheels are journaled to spindles that are carried by bell cranks 44 pivoted to the bottom frame A at 45, one arm of each bell crank having attached to it a spring 46 that is connected to the framework of the flying machine, and provides for yielding upward movement of the land wheels when they strike the ground, in order that there may be no breakage of the machine, or injurious shock to the operator or passengers incident to the landing.

In the use of my flying machine for straight way flight, the movable parts are intended to occupy the positions seen in Figs. I and II, with the exceptions that during flight, the end gate 40 is sustained at its limit of upward movement against the top frame extension *b*, and if the course of the flight is to be a rising one or a descending one, the main rudder 29 is lowered or elevated from the position seen in the drawings to a degree that will provide for the proper directing of the flying machine in its upward or downward flight. As previously stated, the change in course of flight of the machine in a horizontal direction is governed by warping of the main rudder 29 and turning of the auxiliary rudder 36.

In the event of failure of operation of the motor utilized in the machine to drive the propeller 28, I convert the upper portion of my machine into a parachute and this is readily accomplished by elevating the main rudder 29 so that its rear end is carried to

the top frame B and the main sustaining plane 22 carried thereby, and also lower the end gate 40 to close the rear end of the space beneath the main sustaining plane and between the side curtains 27. The lowering of the end gate, as mentioned, is accomplished simultaneously with the elevating of the main rudder through the medium of the controlling cords 42 connecting these members. It will be readily appreciated that when the main rudder and the end gate have been moved to the positions stated, an inclosure open at its bottom only is provided beneath the main sustaining plane 22, and that the walls constituting this inclosure in connection with the main plane furnish a parachute that will prevent sudden or dangerous descent of the flying machine.

The apertures 23 are provided in the main plane 22 of my flying machine to permit constant escape, by upward passage through the plane, of dead air from beneath the plane during descent when the propeller is not in operation, in order that live air will constantly pass beneath the plane and upwardly through it. The curtains 24 provide for the closing of these apertures during flight of the machine.

I claim:—

1. In a flying machine, the combination with a top plane, of a bottom frame suspended therefrom, a propeller mounted under said top plane and between it and said bottom frame, a pair of side curtains or planes extending downwardly from said top plane on either side of said propeller, said side planes being increased in depth forwardly, and a rudder plane swingingly mounted on a horizontal axis adjacent the forward ends of said side planes.

2. In a flying machine, a combination with the main frame of a top frame inclined downwardly and rearwardly from its forward end, a pair of side curtains extending downwardly from said top frame and providing an inverted channel decreasing in depth from the front toward the rear, and a propeller rotatably mounted under said top frame and within said channel.

3. In a flying machine, the combination of a plurality of planes forming a wedge shaped space decreasing in cross sectional area rearwardly, and a propeller rotatably mounted within said wedge shaped space and adjacent its narrowest point.

4. In a flying machine, the combination with a top plane, of a bottom frame suspended therefrom, an intermediate frame having one end projecting forwardly beyond said top plane and bottom frame, planes extending from the top plane to said intermediate frame, a rudder plane swingingly mounted on the forward end of said intermediate frame and extending rearwardly, and a vertically disposed rudder plane ex-

tending above said horizontal rudder plane, said horizontal rudder being capable of being warped to vary its angular disposition with respect to said vertically disposed rudder plane.

5. In a flying machine, the combination with a top plane of a pair of side curtains extending downwardly therefrom within the outer edges of said top plane, said curtains forming an inverted channel with said top plane, and a propeller mounted between said curtains and beneath said top plane, the portions of said top plane on the outside of said curtains being foldable laterally toward the central longitudinal plane of the machine.

6. In a flying machine, a combination of a top plane inclined backwardly and downwardly, said top plane being provided with a movable portion, a pair of side curtains extending downwardly from said top plane, and a rudder plane mounted at the forward end of the machine beneath the top plane and intermediate of said curtains, said rudder plane being adapted to be moved upwardly against the top plane, and said movable portion of the top plane being movable downwardly against the ends of the side curtains, whereby said top plane, rudder plane, side curtains, and movable portion of the top plane are converted into a parachute.

7. In a flying machine, the combination with the top frame, of a bottom frame, an intermediate frame, a plane carried by said top frame, a pair of planes or curtains mounted between the top frame and intermediate frame, and a rudder plane pivotally mounted on the forward end of said intermediate frame and reaching, in raised position, to said top frame.

8. In a flying machine, the combination with a sustaining plane of a pair of downwardly extending lateral planes forming an inverted channel therewith, a rudder plane swingingly mounted upon a horizontal axis

and between said lateral planes, means for swinging said rudder plane forwardly against the top plane to close the forward end of the space between said side planes, said top plane being provided with a movable portion adapted to close the rear end of the space between said side planes, and means operatively connecting said rudder plane and movable portion of said top plane, whereby they are moved together upwardly and downwardly, respectively, to form a parachute.

9. In a flying machine, the combination with a sustaining plane of a pair of downwardly extending lateral planes forming an inverted channel therewith, a rudder plane swingingly mounted upon a horizontal axis and between said lateral planes, means for swinging said rudder plane forwardly against the top plane to close the forward end of the space between said side planes, said top plane being provided with a movable portion adapted to close the rear end of the space between said side planes, and means operatively connecting said rudder plane and movable portion of said top plane, whereby they are moved together upwardly and downwardly, respectively, to form a parachute; said top plane being provided with apertures for releasing the dead air beneath said top plane.

10. A flying machine comprising a bottom frame, a top frame having a central horizontal arm, an intermediate frame, uprights connecting the frames, a vertical pivot rod, mounted in the horizontal arm and in the front bar of the intermediate frame, an auxiliary rudder hinged to the pivot rod and means for controlling the auxiliary rudder.

SEWALL A. WITHERSPOON.

In the presence of—

EDNA B. LINN,

HOWARD G. COOK.