No. 682,323. Patented Sept. 10, 1901.

J. P. ERIE.

APPARATUS FOR AGITATING AND HEATING AIR.

(Application filed Sept. 21, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1

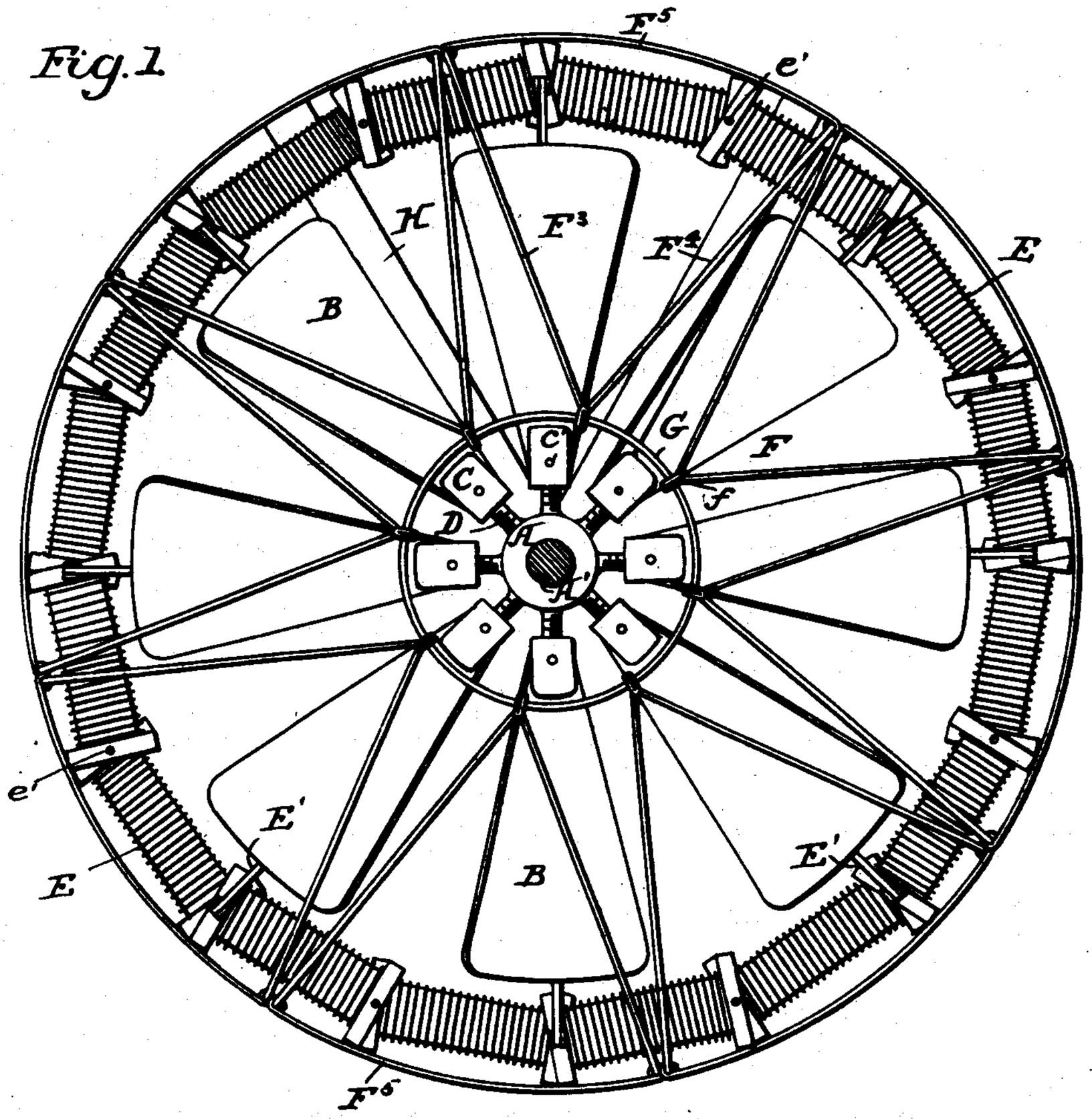

Fig. 2

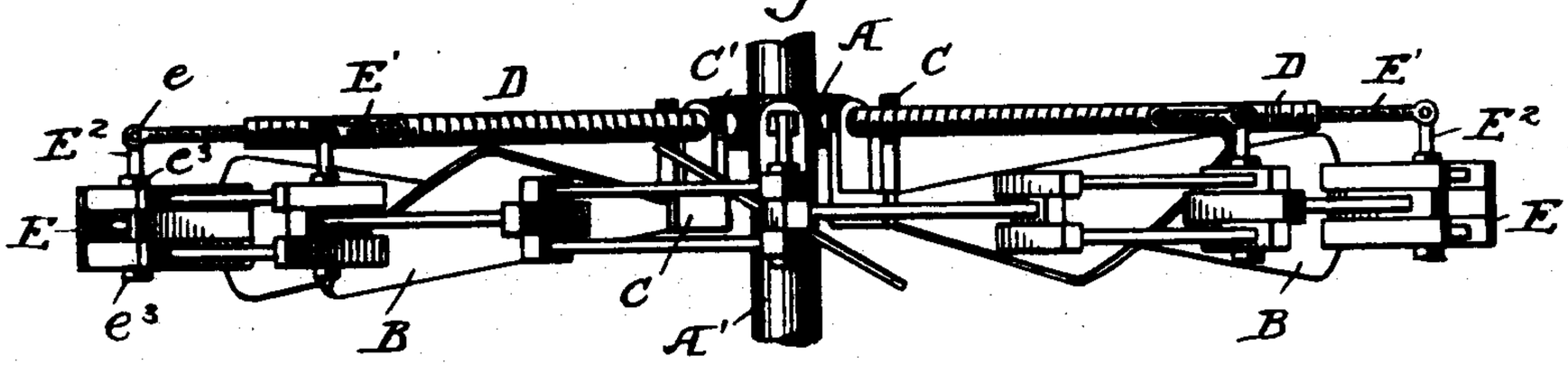

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Fig. 3.

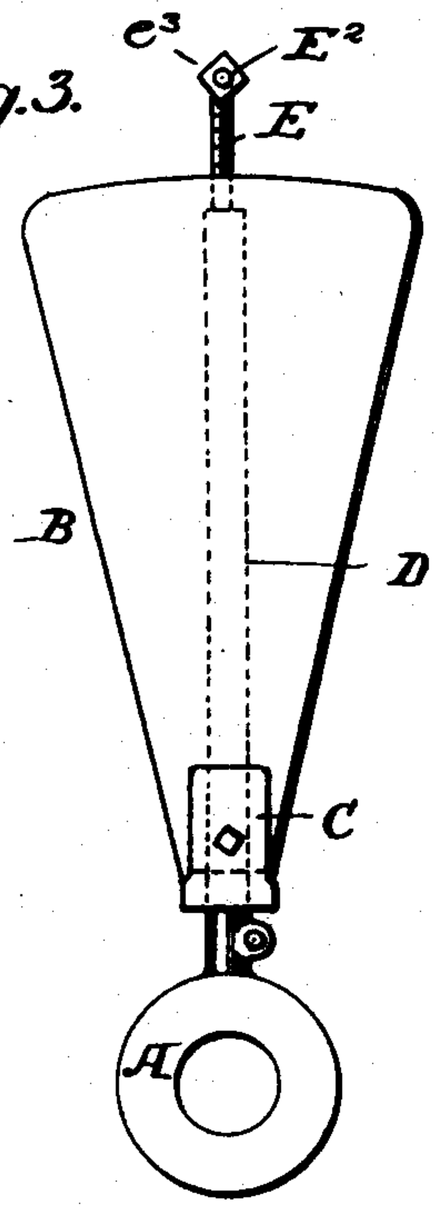


Fig. 4.

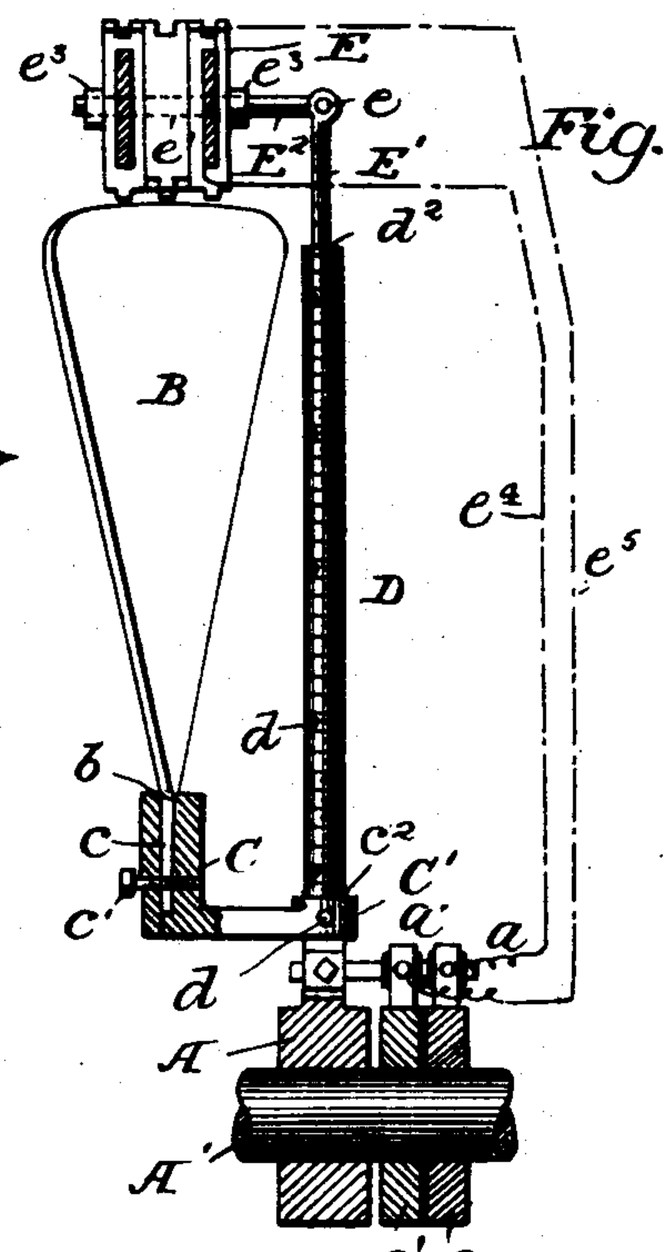
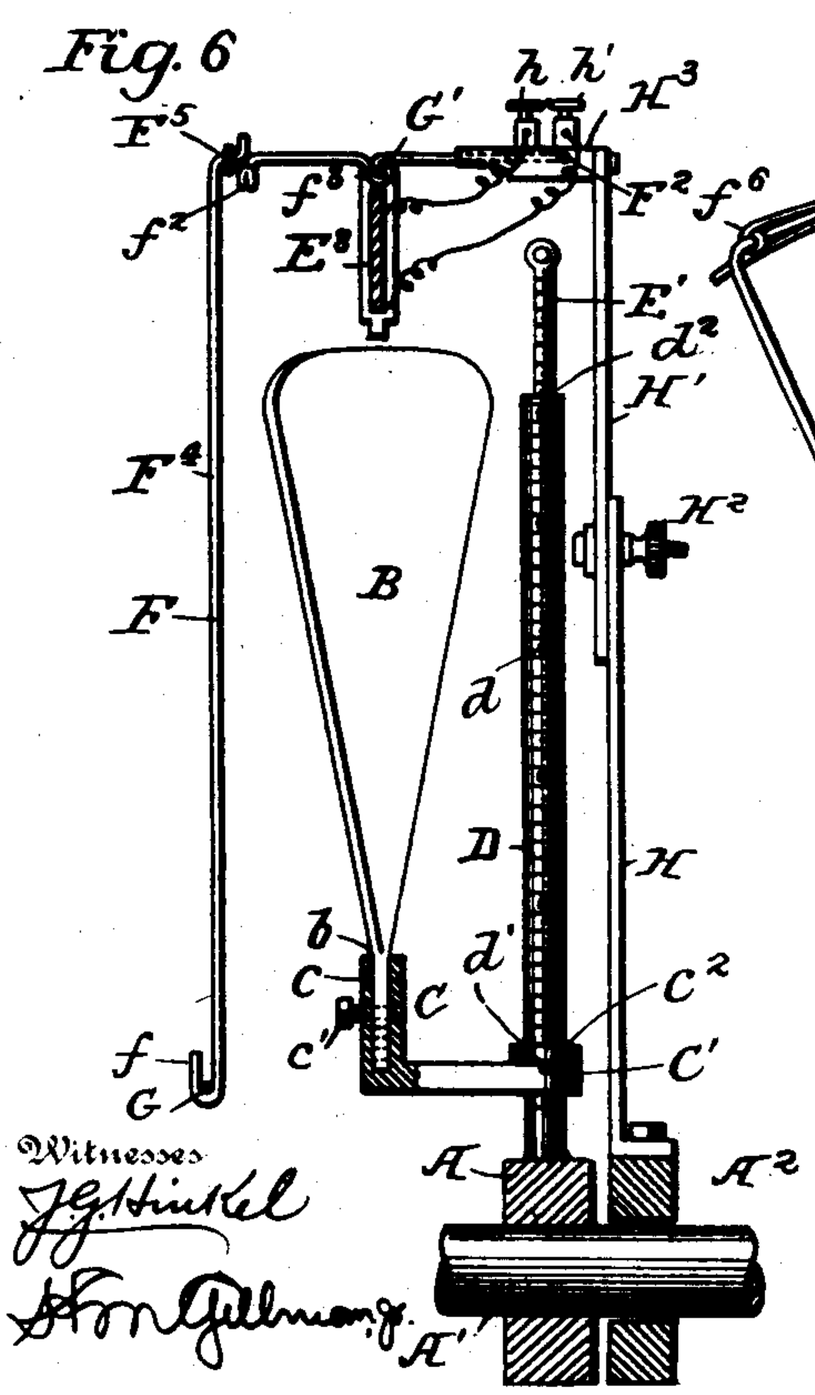


Fig. 6



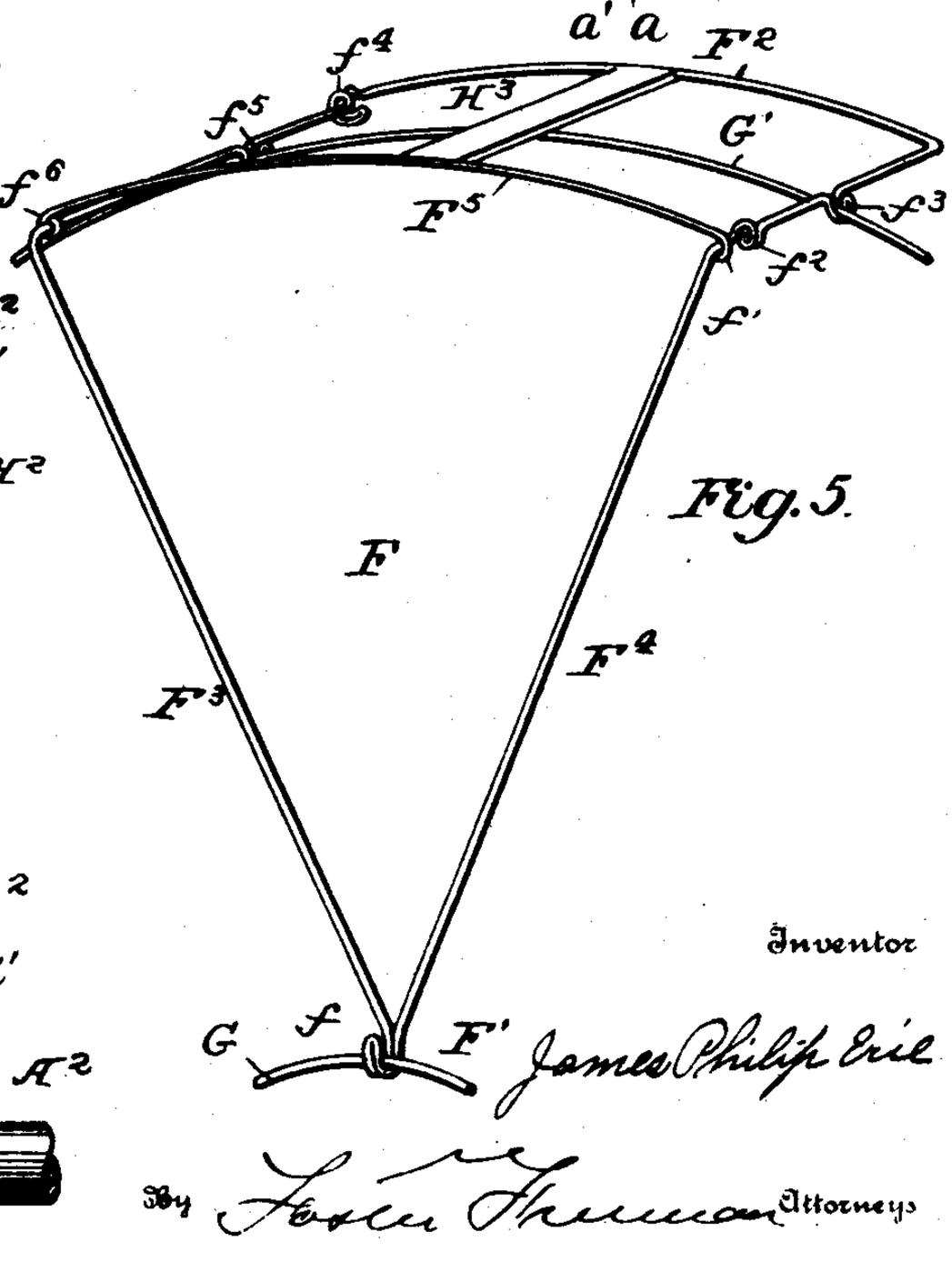


Fig. 5.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR AGITATING AND HEATING AIR.

SPECIFICATION forming part of Letters Patent No. 682,323, dated September 10, 1901.

Application filed September 21, 1900. Serial No. 30,713. (No model.)

To all whom it may concern:

Be it known that I, JAMES PHILIP ERIE, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Apparatus for Agitating and Heating Air, of which the following is a specification.

My invention relates to apparatus for agitating and heating air; and it has for its object to provide an improved apparatus of this character; and it consists in the various features of construction and arrangement of parts having the general mode of operation substantially as hereinafter more particularly set forth.

Referring to the accompanying drawings, Figure 1 is a front elevation of an apparatus or fan embodying my invention. Fig. 2 is a top plan view of the same, the guards being omitted for the sake of clearness. Fig. 3 is an enlarged detail view showing one of the fan-blades and means for mounting the same. Fig. 4 is a side view of Fig. 3, showing the heaters in section and mounted to rotate with the fan-blades. Fig. 5 is a perspective view of a guard-section; and Fig. 6 is a side view, partly in section, showing the preferred way of mounting the guard-sections in connection with the fan-blades and heaters.

One of the principal objects of my invention is to provide an apparatus for agitating and heating air which for convenience I shall herein designate a "fan" and which shall be so constructed and arranged that the parts are capable of adjustment with relation to each other, and the essential parts of the fan can be made separately and in what may be called "standard sections," which may be assembled in various ways and adjusted to make up a fan of a desired size. In other words, a different number of the elements constituting the fan may be assembled to make a fan of the desired size, the parts being so constructed and arranged that they are practically interlocking or are easily and readily connected together to constitute the whole apparatus.

With this general statement the objects of my invention will be apparent from the description which follows, and I will now set forth the construction illustrated in the accompanying drawings, it being understood that I am not limited to the details of construction and arrangement therein shown and hereinafter described, as these may be varied by those skilled in the art to suit different conditions without departing from the general principles of my invention.

In the drawings, A represents a hub of any suitable or desired construction, which may be suitably mounted on a shaft A′ to rotate therewith, and supported and mounted on this hub are a number of blades B. These blades may be of any desired shape and configuration, a conventional form being shown, and they are adapted to be adjustably mounted on the hub so as to occupy various positions or relations to the plane of rotation of the hub as well as to occupy various positions or relations to the axis of the hub by any suitable means, and I have shown in the present instance connected to each blade a bracket C, having a socket *c* to receive the end *b* of the blade, these ends being adjustable in the sockets in any suitable way, as by being screw-threaded, as indicated in Fig. 6, and preferably having set-screws or pins *c′* for the purpose of additionally securing the blades in the sockets. Each bracket is also provided with an arm C′, preferably having a screw-threaded socket c^2, by means of which the bracket is adjustably mounted on the arm or rod D, secured to the hub. These rods D are preferably screw-threaded and provided with holes *d* to receive pins *d′*, passing through the sockets in the brackets and the rods, so that when the brackets are adjusted in the desired relation to the hub they may be secured in position. It will be seen that by this construction not only can the relation of the blades themselves to the plane of rotation be independently adjusted, but they may also be adjusted at different distances from the hub, so as to make a fan of greater or less diameter, and it is evident that the blades may be arranged so as to agitate or propel the air in different directions, although preferably I arrange them so that the air will move toward or from the axis of the fan to a greater or less extent, and es-

pecially so when I use the fan in connection with the standard heaters hereinafter described.

When it is desired to agitate and heat the air, I arrange in connection with the fan proper suitable heaters, which may be of any desired construction, but which are preferably electric heaters, and such, for instance, as are more particularly described in my pending application, Serial No. 30,826, and which need not be specifically described herein, it being sufficient to state that they consist generally of a body portion of non-conducting material, as porcelain, having wound thereon an electric conductor offering the proper resistance to the current and being provided with suitable foot and head pieces, by means of which the standard heater strips or sections may be readily connected together in various relations to each other. Such heater sections or strips E are shown in the drawings, and one preferred way of mounting them with relation to the fan-blades is shown; but it is to be understood that other ways of mounting may be employed, the essential feature being that the means of mounting be of such character that a different number of standard strips or sections may be arranged around the fan in the desired positions, the object being to utilize the standard sections for making heaters of various sizes and shapes and arranging them in various positions with relation to the fan-blades. In the present illustrations the rods D are provided with screw-threaded sockets d^2, in which are mounted extension-pieces E', which are also screw-threaded, so as to be adjustable in the rods D, and connected to these extension-pieces are connecting and supporting rods E^2, the connection being in any suitable form, but preferably a detachable one, as by means of a pin *e* passing through eyes in the adjacent ends of the extension-piece and connecting-rod. These connecting-rods are adapted to pass through openings *e'* in the ends of the heater-sections, so that the ends of various sections may be mounted on each connecting-rod, and, as shown in Fig. 4, the adjacent ends of the heater-sections are so mounted, and there are clamping-nuts e^3 to hold them in position on the connecting-rod. It will thus be seen that with this arrangement an annular heater of any desired size and diameter may be mounted and adjusted with relation to the fan, so that the air going or coming from the blades will pass over the heater-sections and become heated, it being understood, of course, that the conductors of the various heater-sections are connected together in the well-known and usual way and connected to some suitable source of electric energy.

When the heaters are mounted as shown in Fig. 4, the annular heater so constituted of the different heater-sections rotates with the fan-blades and the conductors of the heater-sections may be connected by conductors e^4 e^5 with insulated rings *a* *a'*, mounted on and insulated from the hub A, upon which can bear the terminal brushes of the leading-in wire in a well-known manner. It is desirable to provide these fans with a protecting device in the form of a guard, and in order to cheapen the cost I make a guard in standard sections, the sections being so constructed that they may readily be connected together to form a guard for any desired size of fan, and this guard may or may not be utilized to support the heater. While the guard-sections may be variously formed, I have shown a simple and effective construction of guard-section in Fig. 5 of the accompanying drawings. In this the section F is shown as made up of wire and as having a front portion substantially sector-shaped and a top portion substantially arc-shaped. These two portions are preferably formed in one piece, although of course they could be made separately and properly united together. Attached to each guard-section are suitable hooks or connecting-pieces, and while these pieces may be separately made and secured to the section I preferably form them by bending the wire of the section as shown in the drawings. Thus, for instance, starting at the point F' there is a hook or loop *f*, and the wire is bent at substantially right angles at the point *f'*, where a loop or hook f^2 is formed by bending the wire back upon itself, as indicated. From this point the wire extends to a hook or loop f^3, and thence is bent at substantially right angles to form the rear portion F^2, and this at or near its end is formed into a hook or loop f^4. Thence the wire extends substantially at right angles and is bent into a hook f^5, and then being again bent at the point f^6 passes in a straight line to form the side F^3, which, together with the side F^4, forms the sector-shaped portion, and the end of the wire is bent up and forms part of the hook or loop *f*. In order to strengthen the parts, I preferably add an arc-shaped wire or piece F^5, which is connected to the portions F^3 and F^4 near their upper ends. These sector-shaped portions or standards may be joined together by bending the hooks f^2 f^4 around the adjacent sector-shaped portions—that is to say, the hook f^4 on one side of the sector-shaped portion would surround and embrace the wire of the adjacent sector portion, securing them together. A ring G of larger wire may pass through the loop *f* of each section, forming the complete guard, and another ring of wire G' can be secured to the loops f^3 f^5 of the arc-shaped portions of the sectors. In this way it will be seen that a guard can be made up of the individual guard-sections which can be quickly and readily united to form a guard of the desired size and the rings will hold them in proper relation to each other. This guard may be mounted in any suitable way with relation to the fan, and in Fig. 6 I have shown an adjustable standard H, mount-

ed on a bearing A^2 on the shaft or any other stationary portion of the fan or its driving mechanism and having a portion H′ united thereto and secured in any suitable way, as by the clamping-nut H^2, and this standard is secured to a cross-piece H^3, connecting the portions F^2 and F^5, and it will be seen that with such an arrangement the guard can be permanently mounted on the fan and be held in proper relation thereto.

In some instances when the heater is stationary, instead of mounting it as before described it can be mounted on the guard, and in Fig. 6 I have shown the heater-section E^3 as supported on and secured by the wire ring G′, and I have also shown as mounted on the cross-piece H^3 binding-screws h h', by means of which electrical connection can be made with the conductor of the heater. With this construction it will readily be seen that the heater-sections may be mounted to rotate with the fan or may be stationary and supported by the guard, as desired, and it will readily be discovered that the heater-sections may be mounted in any desired relation to the fan-blades by arranging the supports accordingly.

From the above description it will be seen that I provide an apparatus or fan for agitating and heating air which is practically made up of standard sections, so that a fan of the desired size can be made with these sections. The heater may be arranged in connection with the fan, which is also made of detachable or standard sections and can be variously mounted with relation to the fan, and the guard is also made up of standard sections or units, and it is evident that the cost of manufacturing fans of different sizes can be greatly reduced by this manner of construction. It will also be recognized that the general principles of my invention can be utilized by being embodied in different structures of standards or units, the one above described being simply illustrative.

What I claim is—

1. In an apparatus for agitating and heating air, comprising a fan, a heater and a guard, each composed of standard sections united together to form a complete apparatus, means for varying the diameter of the fan, and means for varying the dimensions of the heater and guard to correspond to variations in the dimensions of the fan, substantially as described.

2. In an apparatus for agitating and heating air, comprising a fan, a heater and a guard, each composed of standard sections united together to form a complete apparatus, means for varying the diameter of the fan, and means for simultaneously varying the dimensions of the heater and guard to correspond to variations in the dimensions of the fan, substantially as described.

3. In an apparatus for agitating and heating air, the combination with a rotary fan comprising a hub and blades supported from the hub, with means for varying the pitch of the blades and the diameter of the fan, of a sectional heater, surrounding the fan and supported from the center, a sectional guard for the fan and heater, and means for varying the diameters of the heater and guard to correspond to variations in the diameter of the fan, substantially as described.

4. In an apparatus for agitating and heating air, the combination, with a fan comprising a hub, blades supported by said hub, and means for adjusting the blades to change their relation to the hub, and to vary the diameter of the fan, of an annular heater formed of standard sections surrounding the fan, and supported from the hub, means for varying the diameter of the heater, a guard for the fan and heater, and means for varying the diameter of the guard to accommodate changes in the fan and heater, substantially as described.

5. In an apparatus for agitating and heating air, the combination with a rotary fan comprising a hub and blades supported from the hub, with means for varying the pitch of the blades and the diameter of the fan, of a sectional heater surrounding the fan and supported from the center and means for proportionately varying the diametrical and peripheral dimensions of the heater, a sectional guard for the fan and heater, and means for varying the diametrical and peripheral dimensions of the guard proportionately to variations in the dimensions of the fan and heater, substantially as described.

6. A fan comprising a hub, rods mounted thereon, blades, and brackets to which the blades are adjustably attached, said brackets being adjustably mounted on the rods, substantially as described.

7. A fan comprising a hub, screw-threaded rods mounted thereon, blades having screw-threaded ends, and brackets having sockets for the reception of the screw-threaded ends of the blades and having screw-threaded sockets engaging the rods, substantially as described.

8. A fan comprising a hub, blades mounted thereon, and heater-sections adjustably mounted with relation to the blades, substantially as described.

9. A fan comprising a hub, blades adjustably mounted thereon, and heater-sections adjustably mounted to rotate with the blades, substantially as described.

10. A fan comprising a hub, blades supported thereby, heater-sections, and means for adjustably supporting the blades and heater-sections, substantially as described.

11. A fan comprising a hub, rods mounted thereon, blades adjustably mounted on the rods, and heater-sections also mounted on said rods, substantially as described.

12. A fan comprising a hub, rods mounted thereon, blades adjustably mounted on the rods, and heater-sections also adjustably mounted on said rods, whereby the relations

of the blades and heater-sections to the hub may be changed to increase or decrease the diameter of the fan and heater, substantially as described.

13. A fan-guard comprising a number of standard sections united together, each section having a sector portion and an arc portion and provided with means for connecting the sections together to form the guard, substantially as described.

14. A fan-guard comprising a number of standard sections united together, each section being provided with connecting-pieces for uniting the sections to each other and for uniting the sections to a ring, substantially as described.

15. The combination with a fan having blades adjustable to increase or decrease the diameter of the fan, of a heater made up of sections, means for supporting the heater with relation to the fan, a guard comprising sections each section being provided with connecting-pieces for uniting the sections to each other, and means for supporting the guard with relation to the fan and heater, substantially as described.

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

JAMES PHILIP ERIE.

Witnesses:
J. J. McCARTHY,
W. CLARENCE DUVALL.