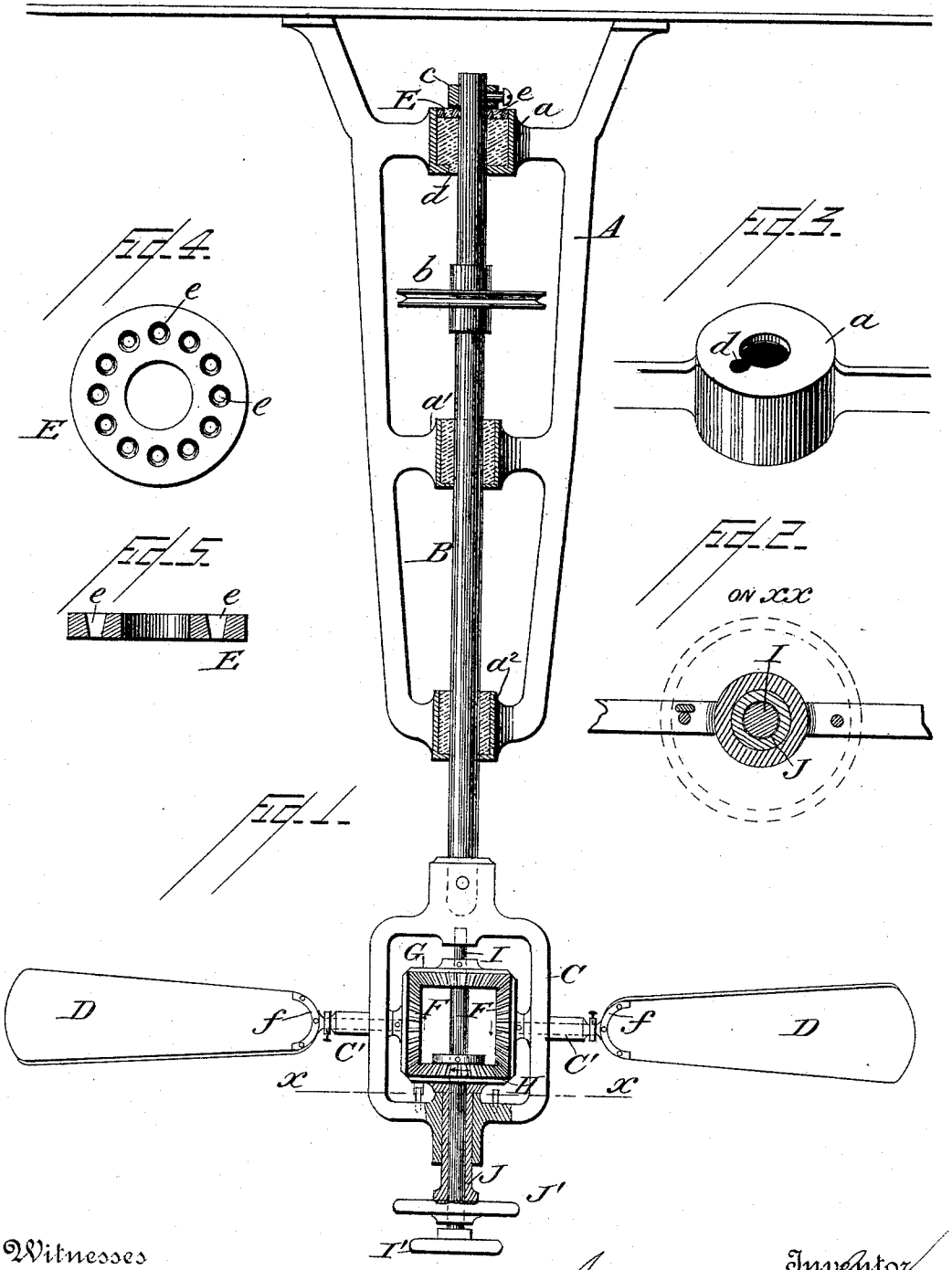
(No Model.) 2 Sheets—Sheet 1.

J. M. SEYMOUR.

ROTARY FAN.

No. 495,525. Patented Apr. 18, 1893.



Witnesses

F. H. Schott

Fred E. Tasker

Inventor

James M. Seymour

By his Attorney John C. Tasker

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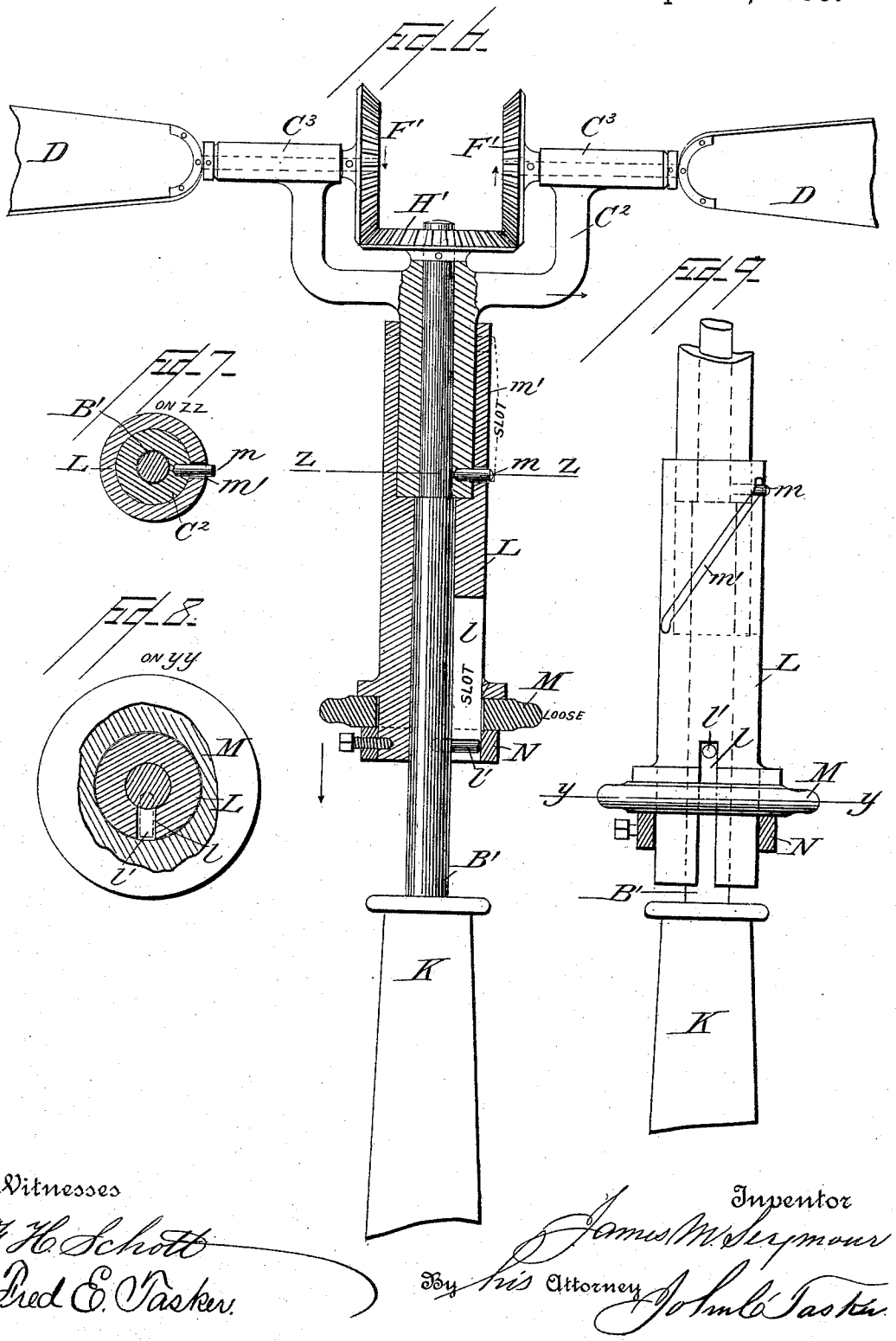

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UNITED STATES PATENT OFFICE.

JAMES M. SEYMOUR, OF NEWARK, NEW JERSEY.

ROTARY FAN.

SPECIFICATION forming part of Letters Patent No. 495,525, dated April 18, 1893.

Application filed December 18, 1888. Serial No. 293,953. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. SEYMOUR, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Rotary Fans; 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.

This invention refers to that class of machinery known as rotary fans and used for the purpose of cooling and purifying the air of buildings of all kinds, such for instance as dwellings, offices, counting rooms, hotels, &c.; and the present improvements refer particularly to the means for adjusting the inclination of the fan blades while the fan is in motion, and also to the means for promoting ease and avoiding friction in the rotation of the fan shaft.

The invention consists essentially in special devices for accomplishing the adjustment of the obliquity of the fan blades; in the improved structure of bearings for the fan shaft whereby friction is obviated; and in details and peculiarities in the structure, combination and arrangement of the parts of the invention, substantially as will be hereinafter described and claimed.

In my previous patent No 325,453, granted to me September 1, 1885, I have already secured broad claims to the idea of a pendent hand piece whereby, without stopping the revolution of the fan, the vanes thereof may be rotated to adjust their obliquity to their planes of motion as may be desired. These claims of course may be construed expansively to cover many ways of exemplifying the invention in practice, and very likely other parties besides myself may claim special mechanism for carrying the invention into effect, although of course all of such claims must be tributary to my former patent. It is not my intention therefore in this case to seek after claims coextensive in scope with those in the patent referred to but merely to illustrate, describe and claim, other special means for applying in actual practice the same principles which are covered in their fullness and breadth in the claims of Patent No. 325,453.

In the accompanying drawings illustrating my invention: Figure 1 is a side elevation in partial section of a suspended fan, provided with my improved means for adjusting the obliquity of the vanes during the revolution of the fan. Fig. 2 is a cross section on line $x\ x$ of Fig. 1. Fig. 3 is an enlarged perspective view of the upper bearing for the fan shaft said bearing being shown in a reverse position to indicate the opening in the bottom thereof. Fig. 4 is a plan view of the perforated cover for the top of the bearing. Fig. 5 is a cross section of the same. Fig. 6 is a sectional elevation of a column fan, showing a modification in the means for adjusting the obliquity of the fan blades, said modification being essential for applying my invention to the columnar fan. Fig. 7 is a cross section on line $z\ z$ of Fig. 6. Fig. 8 is a cross section on line $y\ y$ of Fig. 9. Fig. 9 is a side elevation of a portion of the fan shown in Fig. 6 viewing it from another side.

Like letters of reference designate corresponding parts throughout all the different figures.

A denotes a long hanger fastened to the ceiling, and provided with upper bearing a, lower bearing a^2 and intermediate bearing a' for the vertical fan shaft B, having a pulley b adapted to receive a driving belt or cord.

On the upper end of the fan shaft B is a collar c, held in place by means of a set screw. This collar holds the shaft in place and keeps it from falling out of its bearings when the parts are in the position shown in Fig. 1, and hence there is usually a great amount of friction between the collar and the face of the upper bearing. My present invention aims to reduce this friction to the minimum. The construction of the upper bearing a has therefore certain peculiarities whereby the fan may be made to run with greater ease and speed, and this the more especially since motive power to drive the fan is often furnished by a dynamo-electric machine. In Fig. 3 the reverse position of bearing a is shown in perspective. The bottom thereof is seen to have not only the circular opening through which the fan shaft passes, but also a small aperture d alongside of and communicating with said circular opening. The top plate or covering E for the bearing, shown in

enlarged detail in Figs. 4 and 5, has, in addition to the circular opening for the shaft, a circular series of small perforations *e e* which are preferably inclined or tapered upwardly so that the perforations are longest on the upper face of the plate. The shaft B will be fixed in bearing *a* before the hanger is affixed to the ceiling, and when it can easily be reversed to permit the bearing to occupy the position in Fig. 3. When in this position the shaft can be passed through the bottom of the bearing; also through cover E and then provided with a temporary collar large enough to cover the mouths of perforations *e e* and press close up against the face of the cover. Babbitt metal may now be poured into the bearing through opening *d* until it is completely filled, including the perforations *e*. The hanger may now be reversed into its normal position and the collar removed, and replaced by the permanent collar *c*. It will be noted that with this construction of the bearing *a*, the collar *c* will rest in part upon and thus revolve upon the Babbitt metal in the perforations, while the solid hard metal of the cover E will furnish a rigid support for the collar. Thus friction on the collar will be reduced by placing it in contact with Babbitt metal in the same manner that friction on the shaft is avoided by filling the bearing with said metal. It is not necessary to explain here the detailed construction of bearings *a'* and a^2 as they are filled with Babbitt metal in the ordinary way, but my peculiar construction of the upper bearings which support the collar is an important feature.

The lower end of the fan shaft is securely fastened to the frame C of the fan hub, which in this instance has a quadrangular form, as shown, furnished with horizontal bearings C' C' for receiving the ends of the metal forks that are fastened to the blades D D, said forks having collars thereon near the bearings, and having their inner extremities within the hub frame securely attached to vertical bevel gears F F. These gears engage the horizontal bevel gears G and H, the former of which is fastened to a vertical spindle I, held at its upper end in the hub frame and extending down through the gear H, and also through a vertical sleeve or tube J secured to said gear, the lower end of the spindle having a head or handle I' adapted to be grasped by the hand. The sleeve or tube J which is rigid with gear H, has a bearing in the lower portion of the hub frame and carries a head or handle J' adapted to be grasped by the hand. The tube J revolves freely about spindle I. Said spindle has a collar that rests on gear H for preventing the spindle from dropping so as to bring gear G into such close engagement with the vertical gears that the free working of the series of gears would be interrupted.

The operation of the mechanism just described, for the purpose of adjusting the obliquity of the fan blades or vanes to the planes of their motion without stopping their revolution may be briefly described as follows: When it is desired to adjust their obliquity in one direction the operator will grasp one of the heads and hold it firmly for a moment, and then upon releasing his hold the obliquity of the vanes will be found to have been changed, said change having been caused by the interaction of the rotary hub, gears and other parts. When it is desired to adjust the obliquity of the vanes in another direction the operator will similarly grasp the other head for a moment. It is found convenient to provide the lower part of the hub frame with stops (see Figs. 1 and 2) and the gear H with a pin adapted to encounter said stops, and thus the operator can tell the more easily when a certain amount of adjustment has been effected. Suppose the head I' be grasped and held. The rotation of the fan hub will cause the gears to move in unison and the fan blades will in consequence be adjusted to a certain obliquity, it being remembered that gear G is fast on spindle I. Suppose next that the head J' is grasped and held. Gear H is the one fast to tube J that carries head J', and gear H revolves in a direction reverse to that of gear G. Hence the blades will be adjusted as to their obliquity in the other direction. In Figs. 6, 7, 8 and 9 is shown a modification of this adjusting mechanism to adapt it for use with a fan of the columnar kind. K denotes the pillar or column and B' the vertical fan shaft upheld by said column. The fan shaft is surrounded by a long sleeve L which has a vertical slot *l* extending from the lower edge of the sleeve part way of its length and entered by a pin *l'* projecting from shaft B'. Thus the sleeve will be caused to rotate with the shaft at all times, the slot *l* permitting it to have a certain range of vertical movement without losing its connection with the shaft. The upper portion of the sleeve is bored out more in diameter than the lower part, this increased bore being to enable the sleeve to receive the fan hub C^2, the lower end of which rests upon the ledge within the sleeve where the bore widens. That portion of the fan shaft within the hub is preferably smaller than that in the lower part of the sleeve. The hub C^2 has a horizontal pin *m* that enters another slot *m'* in the sleeve L, said slot being inclined as shown in Fig. 9, and having a suitable length to allow the sleeve to have a certain amount of vertical movement when desired. The fan hub C^2 has bearings C^3 for holding the ends of the vanes D, these ends being provided within the hub with bevel gears F' F' that mesh with the horizontal bevel gear H' fastened to the extremity of the fan shaft. The sleeve L is encircled near its lower end with a loose ring M adapted to be grasped by the hand for the purpose of moving the sleeve up or down while the fan is rapidly rotating. The ring M is kept in place by a collar N fastened by a set screw.

I will now describe the mode of operating

this modified arrangement, the construction of whose parts I have just described. When the shaft B′ rotates, the vanes of the fan will be driven in the usual manner. This is obvious from the fact that pin *l′* forms such a connection with sleeve L that the latter will revolve with the shaft, and further, pin *m* so connects the hub and sleeve that the movements of the latter will rotate the former and thus the fan will be driven. When it is desired to adjust the obliquity of the vanes to the plane of their motion without stopping the rotation of the fan, all that the operator needs to do is to lay hold of the loose ring M and push the sleeve L up or down according to circumstances. The vertical movement of the sleeve will cause the pin *m* that projects through slot *m′* to ride upon the edges of the slot, thus changing position and imparting a rotary movement to the fan hub relatively to the fan shaft thus actuating the gears and changing the obliquity of the vanes. The slot *m′* may be of greater or less length. The degree of obliquity of the fan blades will of course be regulated by the extent of movement of the sleeve. The loose ring M is rendered necessary for the easy adjustment of the sleeve during the rapid revolution of the fan.

I have thus described special means in a rotary fan whereof each vane is capable of rotation on its own axis, for adjusting the obliquity of the vanes to the plane of their motion, without stopping the fan, said means having a hand piece adapted to be grasped by the operator; and I have shown and described the special means of my present invention as applied to pendent or suspended, and also to column fans.

It will be evident that the gear G, spindle I, to which it is fastened, and the head or handle I′ on said spindle may be omitted from the construction of my improved fan if desired as these parts are not really necessary to the successful operation of the fan. I prefer to employ them of course because when I have both the handles I′ and J′ I can deflect the blades easily in one direction or the other according as I grasp one or the other handle, but the same object can be accomplished with the handle J′ alone by holding this handle for a longer period when it is grasped by the hand and thus allowing the blades to make larger revolution.

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

1. In a rotary fan, the combination of the fan shaft, the fan hub carried thereby, the vanes, each of which is capable of rotation on its own axis to adjust its obliquity to the plane of its motion, bevel gears on the ends of the vanes, horizontal bevel gears meshing therewith and two pendent hand pieces, one connected to the upper horizontal gear and the other to the lower horizontal gear, substantially as described.

2. The combination of fan shaft B, hanger A having suitable bearings, the fan hub frame C having bearings C′ C′, the vanes D D, the gears F F on the inner ends of the vanes, gears G and H, intermeshing with gears F, spindle I having hand piece I′ and connected to gear G and sleeve J surrounding spindle I having hand piece J′ and connected to gear H, all substantially as described.

3. The combination with the hub and the vanes of the bevel gears on the ends of the vanes, the horizontal bevel gears meshing therewith, and two pendent hand pieces, one connected to the upper horizontal gear and the other to the lower horizontal gear, substantially as and for the purpose described.

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

JAMES M. SEYMOUR.

Witnesses:
S. HERBERT GIESY,
FRED E. TASKER.