T. SHEPHERD & J. S. HAYES.

FAN OR AIR PROPELLER.

APPLICATION FILED JUNE 16, 1913.

1,143,082. Patented June 15, 1915.

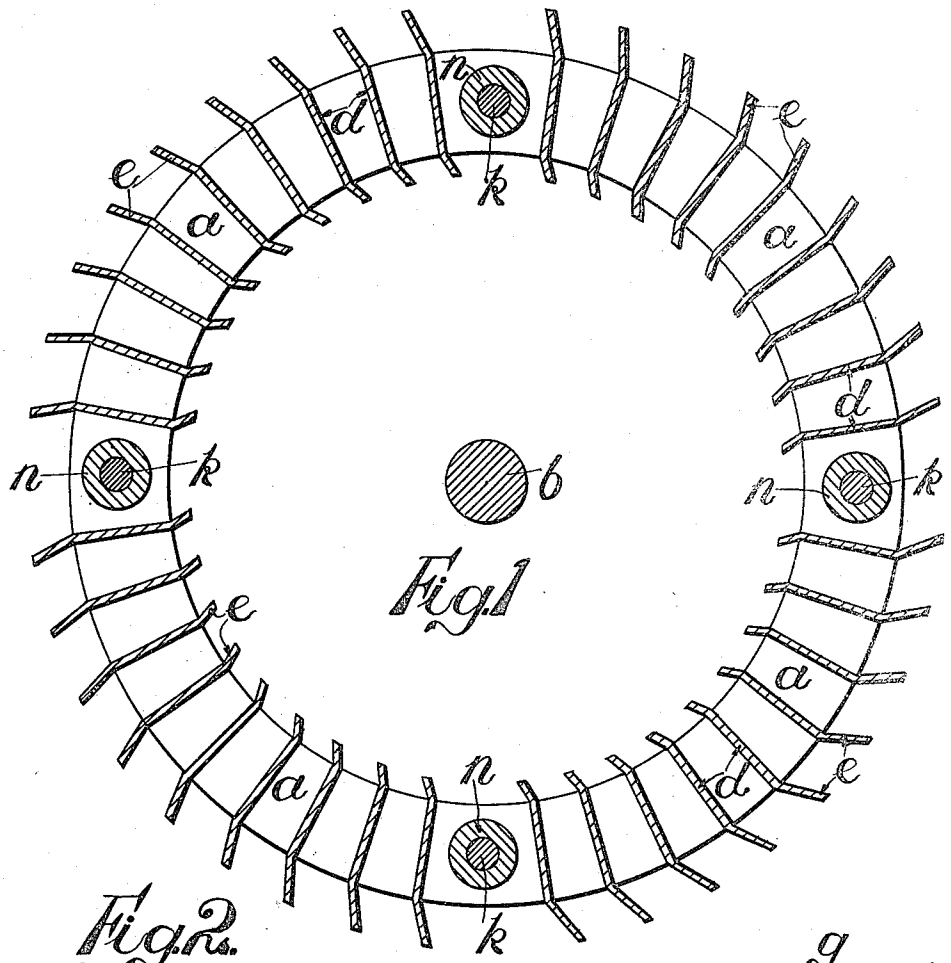
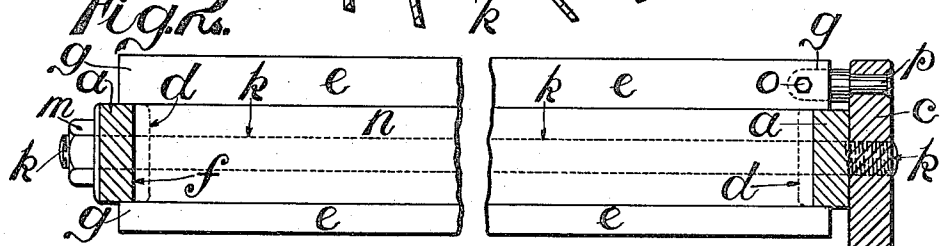


Fig. 1

Fig. 2.



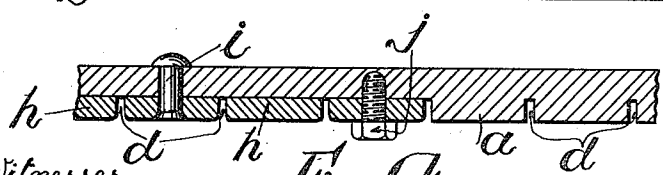


Fig. 4.

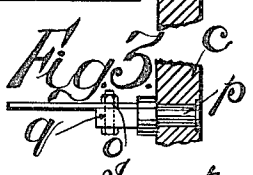


Fig. 3.

Witnesses.

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UNITED STATES PATENT OFFICE.

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FAN OR AIR-PROPELLER.

1,143,082. Specification of Letters Patent. Patented June 15, 1915.

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To all whom it may concern:

Be it known that we, THOMAS SHEPHERD and JOSEPH STANLEY HAYES, subjects of the King of Great Britain and Ireland, and residents of Chorlton-on-Medlock, Manchester, and Moss Side, Manchester, respectively, in the county of Lancaster, England, have invented certain new and useful Improvements in Fans or Air-Propellers, of which the following is a specification.

Our invention relates to improvements in fans of the centrifugal type for moving air and is particularly applicable to such as are used for industrial purposes though the invention is equally applicable to fans of the smaller type used for creating currents of air for cooling purposes, the object being to provide means whereby the fan blades can be readily interchanged for others when broken or otherwise damaged or when it is desired to increase or reduce the number of blades in use or to replace such by blades of a different shape, the improvements enabling the replacement or interchange of the blades to be carried out by unskilled labor if necessary, a further object of the interchangeability being to enable the fans as regards their blades to be altered in order to conform to the varying requirements of service under different conditions of working either in cool or temperate or hot climates. All these objects are to avoid the defects present in fans as constructed and now in use and wherein the blades are permanently fixed to their supporting arms or frame.

Our invention consists essentially in the provision of slotted rings or slotted disks or frames adapted to be clamped in a direction of the axis of the fan so as to grip and hold the fan blades between them and hold them securely in position endwise and so as to prevent their displacement centrifugally, further details being the provision of simple means for holding the separate blades in position during assembling or in their interchange.

Our invention will be fully described with reference to the accompanying drawings in which,

Figure 1 is a sectional end elevation of a centrifugal fan constructed with the improvements hereinbefore referred to, Fig. 2 front elevation of one of the blades showing the means for securing it in position, to an enlarged scale, Fig. 3 partial sectional plan of same, Fig. 4 sectional plan of one of the slotted side rings in the centrifugal form of fan showing modified means of forming the slots.

In accordance with our invention we provide rings *a* to the extent of two or more, usually two, which are supported from the central fan shaft *b* as to one or more of them, usually one where two rings are employed by a driving plate *c* fixed on the shaft *b*. Each of the rings is provided with grooves *d* of suitable depth, each adapted to receive one end of each of the blades *e*. The fan blades *e* are recessed at their ends at *f* so as to leave projecting portions *g* to embrace the inner and outer edges of the rings *a*, this arrangement holding the blades in position against centrifugal force should the rings not be quite clamped up. The grooves may be placed at any suitable angle and in Figs. 1 and 2 and part of Fig. 4 are made in the material composing the rings *a*. On the other hand we may secure to the rings separate pieces *h* as shown in Fig. 4 by riveting as at *i* or by set screws as at *j*, the pieces or plates leaving grooves *d* between them. The grooves shown in Figs. 1 and 2 made directly in the rings may be machined therein or where the rings are of cast malleable iron they may be cast therein. The rings *a* are adapted to be clamped together by means of bolts *k* one end of each of which is screwed into a tapped hole in the driving plate *c* although it may be otherwise secured therein or thereto while the other end is provided with a clamping nut *m*. The bolts are surrounded by distance tubes *n* which are preferably slightly shorter than the distance between the recessed portions of the fan blades *e*. The bolts are for the purpose of enabling the blades to be clamped tightly in an endwise direction between the rings *a*, all the blades being of standard length.

To assist in assembling the blades in position we may provide each of them at one end with a hole *o* and use in conjunction therewith studs *p* riveted or otherwise fixed in the driving plate *c* either permanently or with capability of easy removal, such studs having a corresponding hole *p* through which a bolt *q* is passed. Or the studs may have a tapped hole and a set-screw be passed freely through the hole in the blade into the stud. By the device described the right hand ends of the blades may be assembled in position

in the grooves of the right hand ring *a* and so enable the left hand ends of the blades to be guided into the grooves of the left hand ring *a* and allow of the bolts being tightened up to clamp the blades endwise as previously described. The arrangement also enables any of the blades to be readily interchanged for others of different shape. The fan blades may be made of any approved shape and cross-section.

What we claim is:

In a fan or propeller, the combination, with a driving shaft, of two rings arranged concentric with the driving shaft and parallel to each other and having substantially radial slots in their opposed faces, a support secured to one of the rings and the driving shaft, blades having the middle parts of their ends inserted in the said slots, said blades projecting beyond the inner and outer peripheries of the rings and forming an annular series of blades, and clamping bolts extending between the two rings and securing them and the blades to the said support.

In testimony whereof we have hereunto set our hands in the presence of two witnesses.

THOMAS SHEPHERD.
JOSEPH STANLEY HAYES.

Witnesses:
WILLIAM H. TAYLOR,
AMY EVELINE EVINS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."