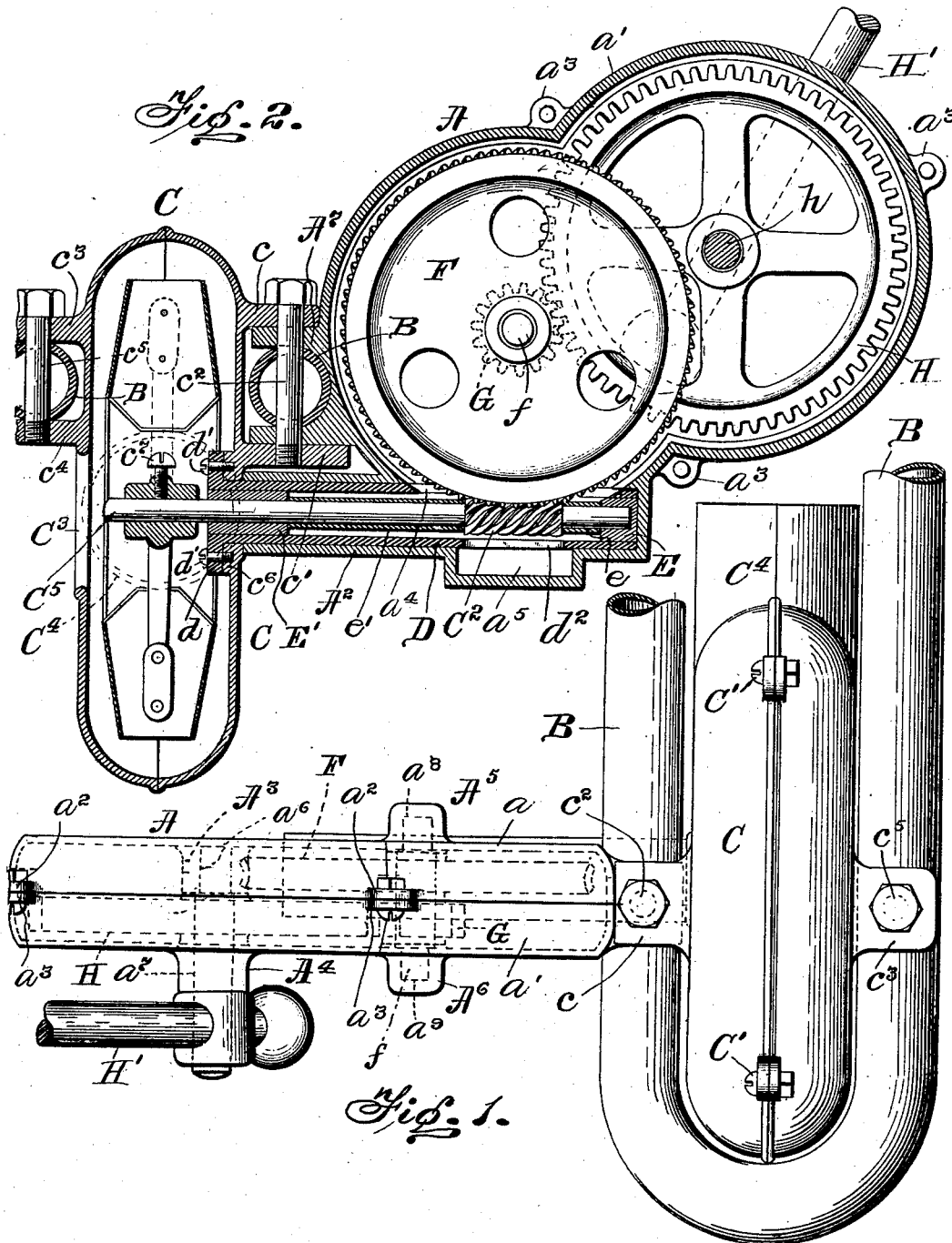


**H. B. KEIPER.**  
**ROTARY FAN BLOWER.**

(Application filed Oct. 6, 1899.)

(No Model.)



Witnesses  
 Marcus L. Byrnes.  
 Abner H. Howell.

Inventor  
Henry B. Keiper  
By William C. Small  
His Attorney

# UNITED STATES PATENT OFFICE.

HENRY B. KEIPER, OF LANCASTER, PENNSYLVANIA.

## ROTARY FAN-BLOWER.

SPECIFICATION forming part of Letters Patent No. 676,322, dated June 11, 1901.

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*To all whom it may concern:*

Be it known that I, HENRY B. KEIPER, a citizen of the United States, residing at Lancaster, in the county of Lancaster and State of Pennsylvania, have invented certain new and useful Improvements in the Driving-Gear of Rotary Fan-Blowers; 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 relates to improvements in blowers; and the primary object in view is to produce a simple, inexpensive, easy-running, and practically noiseless machine adapted to be operated by manual or hand power and composed of few parts assembled in compact form and provided with a screw-propelled mechanism adapted to impart a rapid rotary motion to the fan wheel or blades of a rotary blower, so as to produce a powerful blast with the least possible expenditure of power, the said driving mechanism and the bearings therefor being snugly housed to prevent contact therewith and protect the same against the admission of dust.

The invention comprises, essentially, a suitably-journalled driving-shaft carrying a fan-wheel or rotary vanes or beaters and having a worm thereon and a worm-wheel engaging said worm for imparting a rotary motion thereto, together with means for imparting motion to said worm-wheel, the said driving mechanism being snugly housed in an inclosing casing of peculiar construction and all the parts arranged in compact form, so as to occupy but little space and provide an efficient rotary blower capable of producing a continuous, regular, and powerful blast with a rapid, easy-running, non-vibratory movement of the fan.

The invention will first be hereinafter more particularly described with reference to the accompanying drawings, which form a part of this specification, and then pointed out in the claims at the end of the description.

In said drawings, in which similar letters of reference are used to denote similar parts in different views, Figure 1 represents a top or plan view of a rotary blower embodying my invention, indicating in dotted lines the driving mechanism housed within the inclosing

casing, and parts of the machine being broken away; and Fig. 2 is a vertical sectional elevation through the machine-casing, the machine being turned end for end in respect to the position shown in Fig. 1.

In the drawings, the letter A denotes the housing or casing for the driving mechanism of a rotary fan, which casing is made in two parts  $a$   $a'$ , fitted together and provided with suitable external lugs or ears, as  $a^2$   $a^3$ , having registering apertures to receive the fastening-bolts by which the two parts of the casing are secured together, said casing being also formed integrally with a tubular portion  $A^2$ , depending from the lower edge of the portion  $a$  and having an opening  $a^4$  therein between said parts for the engagement of the worm-wheel and worm, to be presently described. Said tubular portion is also provided with a depressed portion or recess  $a^5$  for the reception of oil or other lubricating material. As shown in the drawings, the casing is provided with an internal bearing-lug  $A^3$ , integral with the portion  $a$  and having a socket-bearing  $a^6$ , an external bearing-lug  $A^4$ , integral with the portion  $a'$  and having a bearing-orifice  $a^7$ , and an external lug  $A^5$ , integral with the portion  $a$  and having an internal bearing-socket  $a^8$ , and an external bearing-lug  $A^6$ , integral with the portion  $a'$  and having an internal bearing-socket  $a^9$ , the bearings  $a^6$  and  $a^9$  having a common axis, as also the bearings  $a^8$  and  $a^9$ . The portion  $a$  of the casing at a prescribed point is provided on its forward edge with an integrally-projecting lug or lugs  $A^7$ , adapted to embrace a tube B and fitted between lugs  $c$  and  $c'$ , projecting from the adjacent side of the blower-casing C, through which a bolt  $c^2$ , with its lower end tapped into said lug  $c'$ , serves to secure the two together and in place on said tube B, the forward end of the tubular portion  $A^2$  engaging against the blower-casing, while the other side of the blower-casing is provided with lugs  $c^3$  and  $c^4$ , embracing the return fold of the same tube B, through which a bolt  $c^5$ , with its lower end tapped into said lug  $c^4$ , serves to secure this side of the blower-casing in place, the two sides of the blower-casing having been secured together by bolts and nuts, as at  $C'$ .

Within the tubular portion  $A^2$  of the casing

and through a registering aperture surrounded by a ring flange or boss  $c^6$  in the adjacent side of the blower-casing and from within said blower is closely fitted a tube D, having  
 5 at its inner end a surrounding ring flange  $d$ , engaging against the boss  $c^6$ , with screws  $d'$  therethrough and tapped into said boss, serving to rigidly secure the two together, holding said tubular portion  $A^2$  of the casing A  
 10 in place, while the tube D has through its top an aperture conforming to or registering with the opening  $a^4$  of the gear casing or housing before mentioned and through its bottom an aperture  $d^2$ , opening into the recess  $a^5$  in said part  $A^2$ . In the rearward end  
 15 of the tubular part  $A^2$  is closely fitted a cylindrical block E, having a socket-bearing for one end of the fan-shaft  $C^5$ , and in its forward end is arranged a cylindrical block  $E'$ ,  
 20 having therethrough a bearing-aperture for said fan-shaft, and tubular sleeves  $e$  and  $e'$  of prescribed dimensions are arranged between said bearing-blocks  $E$   $E'$ , as shown, the sleeve  $e$  being between the worm  $C^2$  and block  
 25 E and the sleeve  $e'$  between the worm and block  $E'$ .

In the socket-bearing of the block E and through the bearing-aperture of the sleeve  $E'$  is journaled the shaft  $C^5$ , having rigidly secured thereto in any approved manner or integral therewith a worm  $C^2$ , with the requisite number of screw-threads or worm-teeth  
 30 of the required pitch and slope, the sleeves  $e$  and  $e'$ , engaging on the body of the shaft between said bearings and the worm, as shown, serving to keep said worm rotatably in place, while to the forward end of said shaft within  
 35 the blower-casing is rigidly secured, as by a set-screw  $c^7$ , the hub of any approved fan, paddle, or wing-wheel.  $C^3$  denotes the inlet-aperture for the ingress of air and the dotted circles the position of the outlet-nozzle  $C^4$ .

In the socket-bearings  $a^8$  and  $a^9$ , before mentioned, are journaled the spindle ends of a  
 45 shaft  $f$ , having rigidly affixed to its body in any approved manner the central hub of a worm-wheel F, with worm-teeth on the periphery thereof engaging or intermeshing with the spiral ribs or teeth forming the worm  
 50  $C^2$ , before mentioned, while adjacent to said worm-wheel and having its central hub also rigidly affixed in any approved manner to the body of said shaft is a pinion G, having in its periphery the required number of teeth  
 55 intermeshing with the teeth on the periphery of a spur-wheel H of the required diameter and having its hub rigidly secured to the body of a shaft  $h$ , with its one spindle end journaled in the socket-bearing  $a^6$ , before  
 60 mentioned, and its other end extending through and journaled in the bearing-aperture  $a^7$ , also before mentioned, said latter end outside of the casing being provided with a lever-arm H', having its hub rigidly secured  
 65 to said outer end in any approved manner, whereby motion is given to the gearing and the fan rotated. A portion of the lever-arm

H', having the crank-handle, is broken away for want of room in the drawings. I thus provide a machine consisting of few parts arranged in compact form, with the driving-  
 70 gearing and the bearings therefor housed and protected within a divided gear-casing which is adapted to be readily separated or taken apart to permit the gearing to be removed and  
 75 replaced, and, as will be seen, the worm-wheel is arranged in the plane of the worm-shaft on which the rotary fan is secured and in close proximity to said fan, while the casing of the latter is secured to the gear-casing  
 80 at an angle to the latter, thus bringing the fan and its driving-gearing into close proximity and housing the same in compact form, so that the machine may occupy but very  
 85 little space. The machine thus constructed is simple, easy-running, and practically noiseless in operation, being actuated with a small expenditure of power exerted by a man or  
 boy turning the crank-handle, secured to the axis of the spur-wheel or driving-gear, engaging  
 90 a pinion on the axis of the worm-wheel.

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

1. In a blower, a gear-casing having a communicating tubular pendent portion, a close-  
 95 fitting tube in said pendent portion also communicating with said casing, a fan-casing secured to one end of said tube, a shaft working in the tube and supporting a fan in the  
 100 fan-casing, and a train of gears in the gear-casing for operating said shaft, substantially as described.

2. In a blower, a gear-casing having a communicating tubular pendent portion, a close-  
 105 fitting tube in said pendent portion having at one end a flange, and also communicating with said casing, a fan-casing secured to said flange, a shaft working in said tube and supporting a fan in the fan-casing, and a train  
 110 of gears in the gear-casing for operating said shaft, substantially as described.

3. In a blower, a gear-casing provided with a communicating tubular pendent portion  
 115 having bearing-blocks therein, a shaft supported in said bearing-blocks and having thereon a worm, sleeves on the shaft abutting said bearing-blocks and the worm, and a train of gears in the gear-casing including  
 120 a worm-wheel engaging said worm, substantially as described.

4. In a blower, a gear-casing provided with an integral communicating tubular pendent  
 125 portion having bearing-blocks therein, a fan-casing secured in place at one end of said pendent portion, a shaft supported in said bearing-blocks and having thereon a worm, said shaft supporting a fan in the fan-casing, sleeves on the shaft abutting the ends of the worm  
 130 and the bearing-blocks, and a train of gears in said gear-casing including a worm-wheel engaging said worm, substantially as described.

5. In a blower, a gear-casing constructed in

two longitudinally-divided parts, one part having a communicating tubular pendent portion with bearing-blocks therein, a similarly-constructed fan-casing secured in place at one end of said pendent portion, a shaft supported in said bearing-blocks and having thereon a worm, said shaft supporting a fan in the fan-casing, sleeves on the shaft abutting between the said blocks and worm, and a train of gears in said gear-casing including a worm-wheel engaging said worm, substantially as described.

6. In a blower, a gear-casing having a communicating tubular pendent portion formed with an oil-receptacle, a close-fitting tube in said pendent portion also communicating with said casing, and with the said oil-receptacle, a fan-casing secured to one end of said tube, a shaft working in the tube and supporting a fan in the said fan-casing, and a train of gears in the gear-casing for operating said shaft, substantially as described.

7. In a blower, a gear-casing having a communicating tubular pendent portion formed with an oil-receptacle, a close-fitting tube in said pendent portion also communicating with said casing, and with the oil-receptacle, a fan-casing secured to one end of said tube, a worm-shaft in the tube supporting a fan in the fan-casing, and a train of gears in the gear-casing including a worm-wheel engaging said worm-shaft, substantially as described.

8. In a blower, a gear-casing constructed in two longitudinally-divided parts, one part having a communicating tubular pendent portion provided with an oil-receptacle, a close-fitting tube in said pendent portion also communicating with the casing, and with the oil-receptacle, a similarly-divided fan-casing secured to one end of said tube, a worm-shaft in the tube supporting a fan in the fan-casing, and a train of gears in the gear-casing including a worm-wheel engaging said worm-shaft, substantially as described.

9. In a blower, a gear-casing having a communicating tubular pendent portion, a close-fitting tube in said pendent portion also communicating with said casing, bearing-blocks in the tube, a fan-casing secured to one end of said tube, a shaft supported in the bearing-blocks and having a worm thereon, sleeves on the shaft abutting the bearing-blocks and the worm, and a train of gears in said gear-casing including a worm-wheel engaging said worm, substantially as described.

10. In a blower, a gear-casing constructed in two longitudinally-divided parts, one part having a communicating tubular pendent portion, a close-fitting tube in said pendent portion also communicating with said casing and having a flange at one end, a fan-casing secured to said flange, bearing-blocks in the tube, a shaft supported in said blocks and having a worm thereon, sleeves on the shaft abutting said bearing-blocks and the worm, and a train of gears in said gear-casing in-

cluding a worm-wheel for engaging said worm, substantially as described.

11. In a blower, a gear-casing constructed in two longitudinally-divided parts, one part having a communicating tubular pendent portion formed with an oil-receptacle, a close-fitting tube in said pendent portion also communicating with said casing, and with the said oil-receptacle, said tube having a flange at one end, a fan-casing secured to said flange, and also constructed in two parts, bearing-blocks in the tube, a shaft supported by said blocks and having thereon a worm, sleeves on the shaft abutting the worm and said bearing-blocks, and a train of gears in said gear-casing including a worm-wheel for engaging said worm, substantially as described.

12. In a blower, a gear-casing having a communicating tubular pendent portion, and constructed of two parts divided longitudinally, said parts having coinciding internal and external lugs, respectively, each lug having a bearing-socket, and said parts also having coinciding external lugs, each also having a bearing-socket, a close-fitting tube in said pendent portion also communicating with said gear-casing and having a flange at one end, a fan-casing secured to said flange, a shaft in said tube supporting a fan in the fan-casing, and a train of gears supported in the bearing-sockets of said gear-casing and operating said shaft, substantially as described.

13. In a blower, a gear-casing having a communicating tubular pendent portion and constructed of two parts divided longitudinally, said parts having coinciding internal and external lugs, respectively, each lug having a bearing-socket, and said parts also having coinciding external lugs each also having a bearing-socket, a close-fitting tube in said pendent portion also communicating with the gear-casing, bearing-blocks in the tube, a fan-casing secured to one end of said tube, a shaft in said bearing-blocks having thereon a worm and supporting a fan in the fan-casing, sleeves on the shaft abutting the worm and the bearing-blocks, and a train of gears supported in the bearing-sockets of said gear-casing and operating said shaft, substantially as described.

14. In a blower, a gear-casing having lugs at a suitable point of the edge thereof adapted to embrace a tube, a fan-casing secured to said gear-casing and having similar lugs on the outer side thereof, and also having additional lugs overlapping those on the gear-casing, a supporting-tube passing about said fan-casing and confined between the lugs on the outer side thereof and those on the gear-casing, and means for securing said tube in place, substantially as described.

15. In a blower, a gear-casing having lugs at a suitable point of the edge thereof adapted to embrace a tube, a fan-casing secured to said gear-casing and having similar lugs

on the outer side thereof; and also having additional lugs overlapping those on the gear-casing, a supporting-tube passing about said fan-casing and confined between the lugs on the outer side thereof and those on the gear-casing, and bolts for securing said tube in place, substantially as described.

16. In a blower, a gear-casing and a fan-casing, the two being constructed with adjacent overlapping lugs adapted to embrace a tube, said fan-casing being constructed on its opposite side also with lugs, and a supporting-tube passing about said fan-casing and confined in place between said lugs, substantially in the manner shown and described.

17. In combination with the fan and its inclosing casing, the gear-casing formed in two longitudinally-divided parts removably secured together and to said fan-casing; one of said parts having a tubular portion to receive the bearings in which the fan-driving shaft is journaled; said tubular portion having an

oil-receptacle therein and an opening above the same which communicates with the interior of the casing wherein the gearing for imparting motion to the fan is housed, substantially as described.

18. In a rotary blower, the combination with the fan-driving shaft having a worm thereon, of a train of driving-gears therefor arranged parallel therewith and with each other, including a worm-wheel engaging said worm, and a longitudinally-divided casing in separable parts in which said shaft and driving-gears have their bearings, whereby the said shaft and train of gears are coöperatively arranged and housed in compact form, substantially as described.

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

HENRY B. KEIPER.

Witnesses:

CHAS. E. LONG,  
JOHN B. HOUGH.