

W. SPARKS.  
FAN.  
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1,255,346.

Patented Feb. 5, 1918.

FIG. 1.

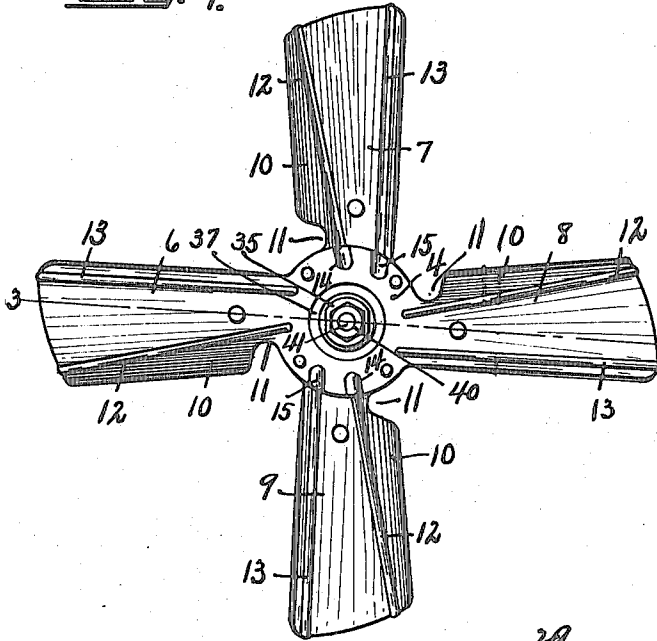


FIG. 2.

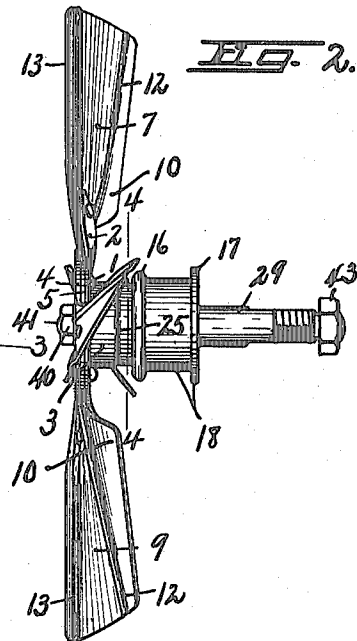


FIG. 3.

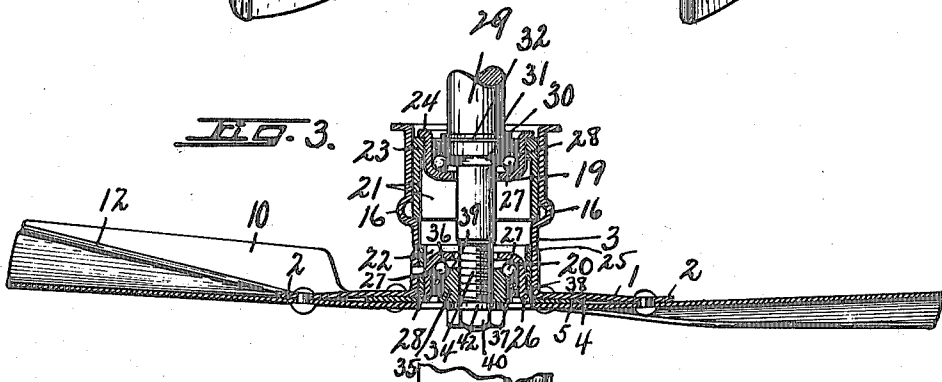
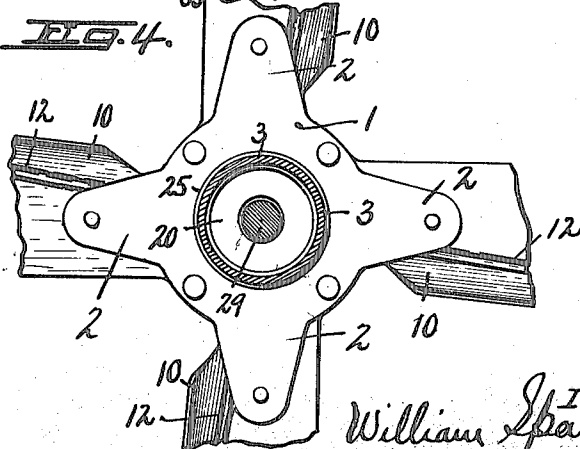


FIG. 4.



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# UNITED STATES PATENT OFFICE.

WILLIAM SPARKS, OF JACKSON, MICHIGAN, ASSIGNOR TO THE SPARKS-WITHINGTON COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

FAN.

1,255,346.

Specification of Letters Patent.

Patented Feb. 5, 1918.

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*To all whom it may concern:*

Be it known that I, WILLIAM SPARKS, a citizen of the United States of America, and resident of Jackson, in the county of Jackson, in the State of Michigan, have invented new and useful Improvements in Fans, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in radiator fans, and more particularly to pulley-driven radiator fans in which the entire structure constitutes a unitary article of manufacture and sale.

The object of the invention is to increase the efficiency of such apparatus in its adaptation to various uses, such as the cooling of automobile or other engines either directly or by water circulation through radiators or the like, and at the same time to produce a unitary structure made compactly and preferably of comparatively thin sheet metal and assembled in such a manner as to be at once light, strong, durable and capable of being manufactured at a reasonable cost.

Other objects and advantages relate to the specific details of construction, as will more fully appear from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of the fan.

Fig. 2 is a side elevation of the same.

Fig. 3 is a cross section on line 3—3,

Fig. 1.

Fig. 4 is a cross section on line 4—4,

Fig. 2.

The invention, as shown, embodies a unitary structure adapted to be mounted in any suitable manner, as the one hereinafter described, and comprises a web —1— formed with a series of radiating arms —2— and a centrally axially extending tubular flange —3— constituting a hub.

A fan further comprising a pair of similar crossed members having central web portions —4— and —5—, respectively, secured in any suitable manner to the web —1— and opposite end portions —6— and —7— and —8— and —9—, respectively, projecting radially from the central web and constituting blades, the arms —2— extending outwardly along the respective end portions or blades and secured to such blades in any suitable manner, as by rivets or the like.

The blades —6—, —7—, —8— and —9— are deflected so as to lie at an angle to the plane of rotation of the fan for the usual purpose. The central web of each of the cross members is preferably substantially circular in form, as shown, and provided with a central opening through the tubular flange —3—, thereby constituting a ring-shaped web from which the blades radiate.

The blades do not radiate symmetrically from the central web, one edge-portion —10— of each blade being separated from the central web by a recess —11— while the opposite edge of the blade merges directly into the central web in substantially a straight line.

The free edge portion —10— is deflected laterally with respect to the main body of the blade so as to lie almost at right angles to the plane of rotation of the fan. Preferably, the blades are provided with reinforcing ribs —12— and —13— extending longitudinally of the blades, the inner ends of the flanges —12— and —13— formed upon blades —8— and —9— lying in seats —14— and —15—, formed by striking up portions of the central web —4— to assist in interlocking the parts together.

The formation and deflection of the blades as described produces a fan of high efficiency.

As stated, the central webs —4— and —5— are rigidly secured to the web —1—, as by rivets shown. The hub —3— is preferably provided intermediate its length with a radially and outwardly extending circumferential bead or flange —16—, and spaced from the flange —16— is a second flange —17— which may, as shown, be formed by pressing outwardly the edge-portion of the hub.

The flanges —16— and —17—, together with the portion of the hub disposed between them, constitute a pulley —18— of slightly greater internal diameter than the body of the hub —3— for receiving any suitable driving means, such as a belt.

Disposed within the hub —3— are a pair of oppositely arranged bearing cups —19— and —20—, respectively, the bearing cup —19— arranged adjacent the pulley —18— and the bearing cup —20— arranged adjacent the radiation of the web —1—, and preferably the hub —3— is reinforced adjacent the respective bearing cups by sleeves

—21— and —22— fitted within the hub, and the sleeve —22— preferably secured thereto in any suitable manner.

As shown, the sleeves are of sufficient diameter to fit tightly within the hub —3—, and the sleeve —21— has its inner edge in substantial contact with the wall of bead —16— and its outer portion —23— enlarged or flanged inwardly for engagement with a radially and outwardly extending flange —24— formed upon the bearing cup —19—.

The sleeve —22— has its inner edge terminating adjacent a stepped portion —25— formed upon the hub —3—, and its outer edge in contact with a radially and outwardly extending flange —26— formed upon the bearing cup —20—.

Each of the bearing cups —19— and —20— is adapted to receive a suitable anti-friction bearing comprising, as shown, balls —27— and a ball-retainer —28—, the shaft —29— being mounted in said bearings and provided adjacent the bearing cup —19— with a tapered portion —30— for contact with the balls —27—.

The shaft —29— is further provided with a flange —31— and washer —32— spaced some distance from the ball-retainer —28— and adapted to confine a packing —33— positioned between the washer —32— and the ball-retainer —28—.

The other end of shaft —29— is preferably reduced and threaded at —34— and is provided with a bearing nut —35— mounted upon the threaded portion of the shaft and having a tapered portion —36— for contact with the adjacent balls —27—, and an enlarged radially extending portion —37— adapted to confine a washer —38— for holding a suitable packing —39— in proper position between the ball-retainer and the washer.

The bearing nut —35— is locked in proper position by a second nut —40— threaded in an opposite direction and mounted upon a further reduced portion —41— of shaft —29—. A suitable split spring washer —42— may be positioned between the bearing nut —35— and locking nut —40—.

It will be noted that the free edge-portion —10— of the blades is deflected rearwardly of shaft —29— and to that side of their respective webs upon which pulley —18— is positioned, and that all of the blades are largely deflected entirely to the pulley side of the fan.

The shaft —29— may, as shown, extend some distance rearwardly of pulley —18— for engagement with any suitable supporting means, a suitable nut —43— being provided in combination with a threaded end of the shaft for holding the shaft to its mounting means.

Although I have shown and described one specific construction, combination and form

of elements, as perhaps preferable, I do not desire to limit myself to the details of any of the same, as various changes may be made without departing from the spirit of this invention, as set forth in the appended 70 claims.

What I claim is:

1. In a fan, the combination with a web having a radiating blade of a second web secured to the first-named web, one of said webs having a tubular and axially extending flange constituting a hub, spaced flanges formed integrally with said hub and radiating outwardly therefrom to constitute a driving pulley, antifriction bearings within the hub, and a shaft mounted in the bearings.

2. In a fan, the combination with a web having a radiating blade of a second web secured to the first-named web, one of said webs having a tubular and axially extending flange constituting a hub, antifriction bearings within the hub, a shaft mounted in the bearings, and spaced flanges formed on said hub and radiating outwardly therefrom to constitute a driving pulley, the diameter of the base of the pulley being greater than the diameter of the remaining portions of the hub.

3. A fan comprising radiating blades, a central tubular and axially extending hub secured thereto and having an intermediate radially and outwardly extending bead and a radially and outwardly extending flange spaced from the bead, the portion of the hub between the bead and the flange being of greater internal diameter than the body of the hub to form an outwardly stepped portion at the bead, a sleeve fitted within the portion between the hub and bead and abutting against said stepped portion, a bearing cup mounted within the sleeve, a second bearing cup mounted within the body of the hub, a shaft extending through the bearing cups and anti-friction bearings separating the shaft from the bearing cups.

4. A fan comprising radiating blades, a central tubular and axially extending hub secured thereto and having an intermediate radially and outwardly extending bead and a radially and outwardly extending flange spaced from the bead, the portion of the hub between the bead and the flange being of greater internal diameter than the body of the hub to form an outwardly stepped portion at the bead, a sleeve fitted within the portion between the hub and bead and abutting against said stepped portion, a bearing cup mounted within the sleeve, a second sleeve within the body of the hub adjacent the radiation of the blades, a bearing cup within said sleeve, a shaft extending through the bearing cups and anti-friction bearings separating the shaft from the bearing cups.

5. A fan comprising radiating blades, a central tubular and axially extending hub secured thereto and having an intermediate radially and outwardly extending bead and a radially and outwardly extending flange spaced from the bead, the portion of the hub between the bead and the flange being of greater internal diameter than the body of the hub to form an outwardly stepped portion at the bead, a sleeve fitted within the portion between the hub and the bead and abutting against said stepped portion, a bearing cup mounted within a sleeve and provided with a radially and outwardly extending flange engaging the sleeve, a second sleeve within the body of the hub adjacent the radiation of the blades, a second bearing cup within said sleeve and having a radially and outwardly extending flange engaging the sleeve, a shaft extending through the bearing cups and anti-friction bearings separating the shaft from the bearing cups.
6. A fan comprising radiating blades, a central tubular axially extending hub secured to the blades, a dished shaped bearing cup in each end of the hub, said bearing cups having radially and outwardly extending flanges at their edges engaged with the hub and having alined openings in their bases, balls within the cups, a shaft extending through the openings in the bearing cups, said shaft having radially projecting portions engaged with the balls in said cups.
7. A fan comprising radiating blades, a central tubular axially extending hub secured to the blades, a dished shaped bearing cup in each end of the hub, said bearing cups having radially and outwardly extending flanges at their edges engaged with the hub and having alined openings in their bases, balls within the cups, a shaft extending through the openings in the bearing cups, said shaft having radially projecting portions engaged with the balls in said cups, and a lock nut mounted on the shaft to lock the parts in predetermined position.
8. A fan comprising radiating blades, a central tubular axially extending hub secured to the blades, a dished shaped bearing cup in each end of the hub, said bearing cups disposed in opposite directions and having radially and outwardly extending flanges at their edges engaged with the hub and limiting movement of the bearing cups toward each other and having alined openings in their bases, balls within the cups, a shaft extending through the openings in the bearing cups, said shaft having radially projecting portions engaged with the balls in said cups.
9. A fan comprising radiating blades, a central tubular axially extending hub secured to the blades, a dished shaped bearing cup in each end of the hub, said bearing cups disposed in opposite directions and having radially and outwardly extending flanges at their edges engaged with the hub and limiting movement of the bearing cups toward each other and having alined openings in their bases, balls within the cups, a shaft extending through the openings in the bearing cups, said shaft having radially projecting portions engaged with the balls in said cups, one of said portions being adjustable on said shaft, and means for locking the adjustable portion in predetermined position.
10. In a fan a pair of crossed members having central portions lying in contact with each other and a web secured to the contacting portion of said crossed members and having a tubular and axially extending flange constituting the hub.
11. In a fan, a central web and a blade radiating therefrom, the blade having one of its longitudinal edges merging into and connected to the web, the opposite longitudinal edge being separated from the web, the entire blade being deflected with respect to the plane of rotation of the blade, the free edge portion of the blade being further deflected relatively to the portion of the blade directly connected to the web.
12. In a fan a pair of crossed blade forming members having ring-shaped hubs, a web secured to said hubs and having a tubular axially extending integral flange, a shaft within the hub and anti-friction bearings between the shaft and hub.
13. In a fan, a pair of crossed blade-forming members having ring shaped hubs, a web secured to said hubs and having a tubular axially extending hub, spaced flanges formed integrally with said hub and radiating outwardly therefrom to constitute a driving pulley, a shaft within said hub, and anti-friction bearings between the shaft and hub.
14. In a fan, the combination with a series of radiating blades of a web secured to the blades, said web having a tubular and axially extending flange constituting a hub, said tubular flange provided with a pair of spaced substantially radially extending flanges forming an intervening channel extending around the hub.
15. A fan comprising radiating blades, a central tubular axially extending hub secured to the blades, said hub having an intermediate radially and outwardly extending bead, and a radially and outwardly extending flange spaced from the bead, the portion of the hub between the bead and the flange being of greater diameter than the body of the hub to form an outwardly stepped portion at the bead, a sleeve fitted within the portion between the hub and the bead, a second sleeve fitted within the opposite end of the hub and secured thereto, a dished shaped bearing cup within each

sleeve, said bearing cups disposed in opposite directions and having radially and outwardly extending flanges at their edges engaged with the sleeves and limiting movement of the bearing cups toward each other and having alined openings in their bases, balls within the cups, a shaft extending through the openings in the bearing cups, said shaft having radially projecting portions engaged with the balls in said cups.

16. A fan comprising radiating blades, a central tubular axially extending hub secured to the blades, said hub having an intermediate radially and outwardly extending bead and a radially and outwardly extending flange spaced from the bead, the portion of the hub between the bead and the flange being of greater diameter than the body of the hub to form an outwardly stepped portion at the bead, a sleeve fitted within the portion between the hub and the bead, a second sleeve fitted within the opposite end of the hub and secured thereto, a dished shaped bearing cup within each sleeve, said bearing cups disposed in opposite directions and having radially and outwardly extending flanges at their edges engaged with the sleeves and limiting movement of the bearing cups toward each other and having alined openings in their bases, balls within the cups, a shaft extending through the openings in the bearing cups, said shaft having radially projecting portions engaged with the balls in said cups, one of said portions being adjustable on said shaft, and means for locking the adjustable portion in predetermined position.

17. In a fan, the combination with a web having a series of radiating blades of a second web lying in substantial contact with the first-named web and secured thereto, said second web having a tubular and axially extending flange constituting a hub, said tubular flange provided with a pair of spaced substantially radially extending flanges forming an intervening channel extending around the hub.

18. In a fan, the combination with a pair of crossed blade-forming members having ring-shaped hubs of a web secured to said hubs and having a tubular axially extending flange, said tubular flange provided with a pair of spaced substantially radially extending flanges forming an intervening channel

extending around the hub, a shaft within the hub, and antifricition bearings between the shaft and hub.

19. A fan comprising radiating blades, a central tubular axially extending hub secured to the blades, said hub having a pair of spaced radially and outwardly extending flanges disposed at the same side of the blades and forming an intervening channel extending around the hub, a bearing cup in each end of the hub, one of the same being adjacent the radiation of the blades and the other adjacent the radiation of said flanges, said bearing cups having radially and outwardly extending flanges at their edges engaged with the hub and having alined openings in their bases, balls within the cups, a shaft extending through the openings in the bearing cup and having radially projecting portions engaged with the balls in said cups.

20. A fan comprising radiating blades, a central tubular axially extending hub secured to the blades, said hub having a radially enlarged portion and spaced radially and outwardly extending flanges forming an intervening channel at the radially enlarged portion, a bearing cup in each end of the hub, one of the same being adjacent the radiation of the blades and the other adjacent the radiation of said flanges, said bearing cups having radially and outwardly extending flanges at their edges engaged with the hub and having alined openings in their bases, balls within the cups, a shaft extending through the openings in the bearing cup and having radially projecting portions engaged with the balls in said cups.

21. In a fan, the combination with a series of radiating blades, of a web secured to the blades, said web having an elongated tubular and axially extending flange constituting a hub, said hub having a radially enlarged portion and spaced radially and outwardly extending flanges forming an intervening channel at the radially enlarged portion of the hub, ball bearings within the hub, and a shaft mounted in said bearings.

In witness whereof I have hereunto set my hand this 18th day of November, 1916.

WILLIAM SPARKS.

Witnesses:

LILLIAN E. WUNDERLICH,  
HENRY C. MENKE.