

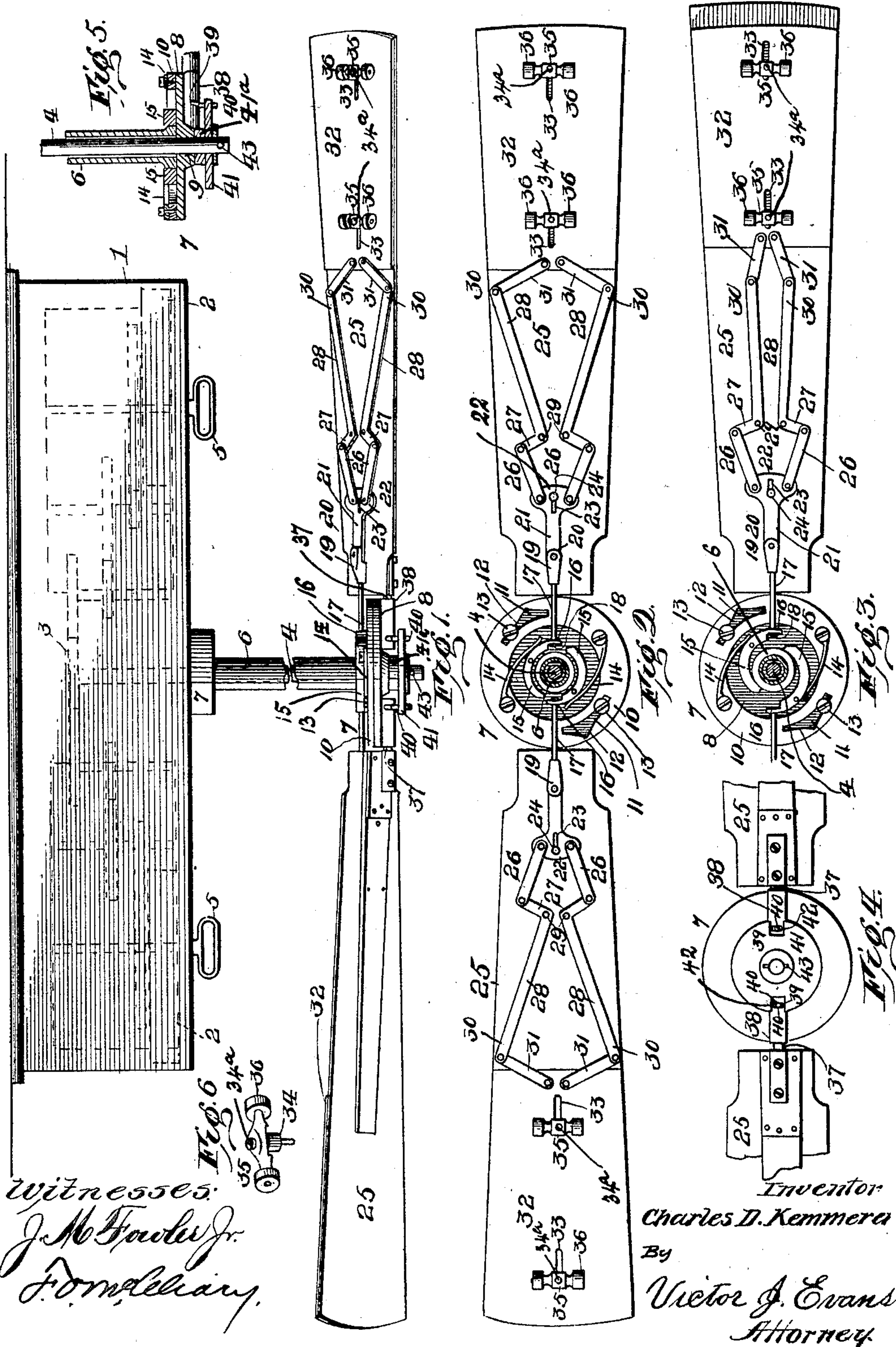
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C. D. KEMMERER.
SPEED GOVERNOR FOR FANS.

(Application filed Aug. 26, 1899.)

(No Model.)



Witnesses:
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UNITED STATES PATENT OFFICE.

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DIRECT AND MESNE ASSIGNMENTS, TO THE AUTOMATIC SPEED GOV-
ERNOR COMPANY, LIMITED, OF KENNETT SQUARE, PENNSYLVANIA.

SPEED-GOVERNOR FOR FANS.

SPECIFICATION forming part of Letters Patent No. 681,710, dated September 3, 1901.

Application filed August 26, 1899. Serial No. 728,527. (No model.)

To all whom it may concern:

Be it known that I, CHARLES D. KEMMERER, a citizen of the United States, residing at Weissport, in the county of Carbon and State of Pennsylvania, have invented certain new and useful Improvements in Speed-Governors for Fans; and I do 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, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to ventilating-fans for stores, factories, and other general purposes, and pertains more particularly to that class of such devices which are supplied with diametrically opposite blades in rotative connection with and operated by a shaft either dependent from an overhead support or ceiling or rising in vertical position from a floor or base support.

The invention comprises, essentially, a motor having an operating-shaft extending therefrom, on which is fitted a head with blades extending outward therefrom in diametrically opposite directions and loosely connected thereto, a speed governing or regulating mechanism being in part carried by the said head and the blades, which will automatically insure an equilibrium or regularity in the rotative movement within a certain rate of speed that may have been predetermined and the parts accordingly adjusted.

The invention also consists of the construction and arrangement of the several parts in detail, including subcombinations, which will be more fully hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation showing the improved fan as suspended from a motor-box in which is mounted a spring-motor, as shown by dotted lines. Fig. 2 is a top plan view of the head and fan-blades, showing the governing mechanism. Fig. 3 is a similar view of the head and one fan-blade, showing the parts in a different relation. Fig. 4 is a bottom plan view

of the head and portions of the fan-blades, showing the manner of forming the swivel connection. Fig. 5 is a transverse vertical section taken through a part of the head, shaft, and brake-shoes. Fig. 6 is a detail perspective view of one of the antifrictional connecting devices for the supplemental fan-section.

Referring to the drawings, wherein similar numerals are employed to indicate corresponding parts in the several views, the numeral 1 designates a box, casing, or other suitable inclosure, which is adapted to be secured to an overhead support or a ceiling-wall. Within this box, casing, or other inclosure 1 two independent spring-motors 2 are mounted and mechanically connected to a pinion 3 on a central shaft 4, and thereby concentrate their united energy on the said pinion and shaft. These motors are adapted to be wound by means of lower keys or analogous devices 5, and the shaft 4 loosely depends through an inclosing sleeve or guard 6, having upper and lower heads 7. The sleeve 6 extends to the lower head 7, as shown in section, Figs. 2 and 3, and performs a particular function, as will be hereinafter set forth. A head 8, attached to the shaft 4, is provided, having a central opening 9, the said head being preferably circular in form and constructed of metal. On this head an annulus 10 is adjustably mounted and has segmental angular slots 11 in diametric opposite parts thereof, said slots having inner curved walls concentric with the wall of the opening in said annulus, and the outer wall 12 constructed with an outward slope at its longer part and meeting an inner sloped portion thereof at an inward angle to the said longer part. Headed screw-studs 13 engage the said slots 11 and prevent separation of the annulus 10 from the head 8, but freely permit shifting of said annulus. The annulus also carries spring-fingers 14, which project in opposite directions inwardly and bear upon segmental brake-shoes 15 in the rear of the pivotal points of the latter. The brake-shoes 15 have their free ends extending in opposite directions, and the ends thereof in diametrical alinea-

ment in a longitudinal direction are reduced, as at 16, and have openings therethrough, in which connecting swivel-rods 17 are loosely mounted and provided with heads 18 to prevent disconnection. The outer end of each swivel-rod 17 has a head 19 secured thereto, formed with an outer shouldered end 20, pivoted to the inner end of a connecting-slide 21, having on its outer end a head 22, with a longitudinal slot 23 therein, through which extends a head-pin 24 into the main body 25 of the fan-blade. This connecting-slide has free longitudinal movement to a predetermined extent on the said main body of the fan-blade, and to opposite portions of the head 22 thereof the inner ends of links 26 are pivotally connected and have their outer ends movably attached to the laterally-projecting short arms 27 of bell-crank levers 28, which are pivoted at their elbows 29 to the said main body 25 of the fan-blade and have their longer arms 30 projected outwardly and pivotally secured to the rear ends of links 31, which are in turn attached to a supplemental fan-blade section 32, conforming in shape to that portion of the main body 25 of the fan-blade on which it bears. The supplemental section 32 has an inward and outward movement imparted thereto by the mechanism in connection therewith and controlled by the devices carried by the head 8. To retain the said supplemental section in a positive relation to the main body 25 of the fan-blade and also to permit the necessary movement of said section, the latter is formed with outer and inner longitudinal slots 33, in which are seated antifriction-rollers 34, (see Fig. 6,) on which are placed cross-heads 35, having similar rollers 36 on opposite ends, and through the said cross-heads and rollers 34 headed studs 34^a are passed into the main body 25 of the fan-blade. One roller 34 is located in each slot 33, and the rollers 36 bear on the adjacent exposed surfaces of the supplemental section 32, and thus an antifrictional connection is established between these closely-positioned parts to allow the said supplemental section 32 to have easy and unretarded movement on the main body of the fan-blade. The construction and arrangement of parts just specified is duplicated in connection with the opposite fan-blade, and the main bodies 25 of both blades are swivelly connected to the head 8 by means of trunnions 37, secured to the under sides of the said parts of the fan-blades at the inner ends and movable in diametrically-disposed sockets 38 on said head. The inner end of each socket 38 has a lower transverse slot 39 therein, and loosely projecting therethrough is a screw stud or pin 40, which is secured to the trunnion 37. These studs or pins 40 are for the purpose of regulating the pitch or feathering angle of the opposite fan-blades, which can be regulated at will and the desired adjustment retained by fitting a lower cap 41 over the end of the shaft 4 and securing it in po-

sition. This cap 41 has opposite edge slots 42 therein, which receive the heads of the screw studs or pins 40 and are sufficiently large in a transverse direction to permit a slight movement and allow the fan-blades to turn through their trunnions and automatically produce a feathering action, which is highly beneficial in this class of devices and overcomes the material resistance which is set up by a stiffly-supported blade, and also requires less power to maintain a rapid rotation of the entire fan. When the cap 41 is mounted on the lower end of the shaft 4, a suitable pin 43 is inserted through the latter and the cap bears against a collar 41^a beneath the head 8 with sufficient tension to prevent said cap from having a too free or loose movement on the shaft. When the head 8 is properly positioned on the shaft, the brake-shoes 15 are disposed on opposite sides of the enlarged portion of the sleeve 6, and in operation the motors actuate the shaft 4 and rotate the fan-blades. In the event of a sudden increase in speed owing to the fluctuation of the motors the supplemental sections 32 on the main bodies 25 of the fan-blades are thrown out by centrifugal action, thus drawing on the links 31 and longer arms 30 of the bell-crank levers 28, and these in turn pull on the links 26 and draw the connecting-slide 21 outwardly and through the connecting swivel-rods 17 force the free ends of the brake-shoes 15 inwardly against the said enlarged portion of the sleeve 6 and set up a retardation of the movement of the fan-blades, and consequently regulate the speed of rotation. As soon as the movement of the fan-blades becomes slower the spring-fingers 14 exert their influence on the brake-shoes and release them from contact with said enlarged portion of the sleeve 6 and restore all parts to normal condition. When the brake-shoes are drawn inward to clamp against the enlarged portion of the sleeve 6, the movement thereof is against the resistance of the said spring-fingers in view of the points of engagement of the latter, and to regulate the tension of said spring-fingers the annulus 10 may be shifted on the head 8, so as to tighten or loosen the fingers 11, and which is a very important auxiliary in view of the variation of the said spring-fingers, which is liable to occur, as in other spring-tension devices. In view of the swivel attachment of the connecting-rods 17 with the shoes the fan-blades are permitted to turn or swing in their feathering action without injury to the mechanism intermediate said connecting-rods and the supplemental sections 32, and said intermediate mechanism is of a lazy-tongs nature, with the addition of the bell-crank levers 28 and slides 21. At the time that the supplemental sections 32 move outwardly over the main bodies 25 of the fan-blades by centrifugal action a slight retardation is set up before the brake-shoes 15 fully act by the greater length of fan-blade and the increased

atmospheric resistance arising therefrom. This, however, is merely an incidental, and the governing or regulation of speed is mainly through the brake-shoes in the manner which has been specified. While it may be supposed that the additional mechanism to the ordinary fan of this character would so materially increase the expense that the cost of the other motive power would about balance the same in ordinary fans, it must also be favorably urged that the present form of fan can be used in places or locations where it is impossible to obtain the motive power of the various prime generators, whether they be electrical, steam, fluid, motor, or of other character. Many other advantages will appear to those using the improved fan, and it is obviously apparent that changes in the proportions, dimensions, and minor details of construction and arrangement of the several parts may be made and substituted for those shown and described without in the least departing from the nature or spirit of the invention or sacrificing any of the advantages thereof.

I claim—

1. In a fan of the character set forth, the combination of a rotatable shaft, feathering fan-blades swivelly attached thereto and having supplemental fan-blade sections movable thereon, brake-shoes adjacent said shaft and mechanism mounted on the fan-blades between the brake-shoes and said supplemental fan-blade sections for regulating the speed of rotation of said shaft.

2. In a fan of the character set forth, the combination with a rotatable shaft, a head mounted thereon, an annulus adjustably carried by said head and supporting inwardly-extending oppositely-projecting spring-fingers, brake-shoes on the heads controlled by said spring-fingers, fan-blades swivelly attached to the head and having slidable supplemental fan-blade sections thereon, and mechanism between the said slidable supplemental sections and the brake-shoes for regulating the speed of rotation of the shaft.

3. In a fan of the character set forth, the combination of a rotatable shaft, a sleeve around said shaft, a head applied to said shaft around the lower end of the sleeve, spring-actuated brake-shoes on opposite sides of the shaft and sleeve, fan-blades swivelly connected to said head and having supplemental fan-blade sections slidable thereon, and mechanism connecting the said slidable supplemental fan-blade sections and the brake-shoes for regulating the speed of the rotation of the shaft.

4. A fan comprising a shaft, a motor connected up with the shaft, a sleeve surrounding the shaft, the head supported on the shaft beneath the sleeve, an annulus mounted on the head, segmental brake-shoes, pivoted to the head, and adapted to bear against the sleeve, spring-fingers projecting in opposite directions, secured on the annulus and adapt-

ed to bear against the segmental brake-shoes, the fan-blades trunnioned to the head, the slide having slots, headed pins connecting the slides with the fan-blades, the connecting-rods having heads and swiveled to the segmental brake-shoes and pivots whereby the heads of the rods are connected with the slides.

5. A fan comprising a shaft, a motor connected up with the shaft, a sleeve surrounding the shaft, the head supported on the shaft beneath the sleeve, an annulus mounted adjustably on the head having segmental annular slots, screw-studs extending into the head through the segmental annular slots for securing the annulus, segmental brake-shoes, pivoted to the head, and adapted to bear against the sleeve, spring-fingers projecting in opposite directions, secured on the annulus and adapted to bear against the segmental brake-shoes, the fan-blades trunnioned in the head, the slides having slots, headed pins connecting the slides with the fan-blades, the connecting-rods having heads and swiveled to the segmental brake-shoes and pivots whereby the heads of the rods are connected with the slides.

6. A fan comprising a shaft, a motor connected up with the shaft, a sleeve surrounding the shaft, the head supported on the shaft beneath the sleeve, an annulus mounted on the head, segmental brake-shoes pivoted to the head, and adapted to bear against the sleeve, spring-fingers projecting in opposite directions secured on the annulus and adapted to bear against the segmental brake-shoes, the fan-blades having trunnions provided with pins, the diametrically-disposed sockets for the trunnions through which the trunnion-pins project, the cap having slots to receive the trunnion-pins and secured to the shaft, the slides having slots, headed pins connecting the slides with the fan-blades, the connecting-rods having heads and swiveled to the segmental brake-shoes and pivots whereby the heads of the rods are connected with the slides.

7. A fan comprising a shaft, a motor connected up with the shaft, a sleeve surrounding the shaft, the head supported on the shaft beneath the sleeve, an annulus mounted on the head, segmental brake-shoes pivoted to the head, and adapted to bear against the sleeve, the spring-fingers projecting in opposite directions, secured on the annulus and adapted to bear against the segmental brake-shoes, the fan-blades trunnioned to the head, the slides having heads provided with slots, headed pins connecting the slides with the fan-blades, the connecting-rods having heads and swiveled to the segmental brake-shoes, pivots whereby the heads are connected with the slides, the supplemental fan-blade sections having slots, headed studs connecting the supplemental fan-blade sections through their slots with the fan-blades, bell-crank levers pivoted to the fan-blades, links connect-

ing the bell-crank levers with the heads of the slides, and links connecting the bell-crank levers with the supplemental blade-sections.

- 5 8. A fan comprising a shaft, a motor connected up with the shaft, a sleeve surrounding the shaft, the head supported on the shaft beneath the sleeve, an annulus mounted on the head, segmental brake-shoes pivoted to the head, and adapted to bear against the sleeve, the spring-fingers projecting in opposite directions, secured on the annulus and adapted to bear against the segmental brake-shoes, the fan-blades trunnioned to the head, 10 the slides having heads provided with slots, headed pins connecting the slides with the fan-blades, the connecting-rods having heads and swiveled to the segmental brake-shoes,

pivots whereby the heads are connected with the slides, the supplemental fan-blade sections having slots, headed studs connecting the supplemental fan-blades through the slots with the fan-blades having antifriction-rollers, the cross-heads having antifriction-rollers and secured to the headed studs, bell-crank levers pivoted to the fan-blades, links connecting the bell-crank levers with the heads of the slides, and links connecting the bell-crank levers with the supplemental fan-blade sections. 20 25 30

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

CHARLES D. KEMMERER.

Witnesses:

JOHN A. HANSMAN,
OLIVER TRINE.