J. RUSSEL.

FAN.

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925,031.

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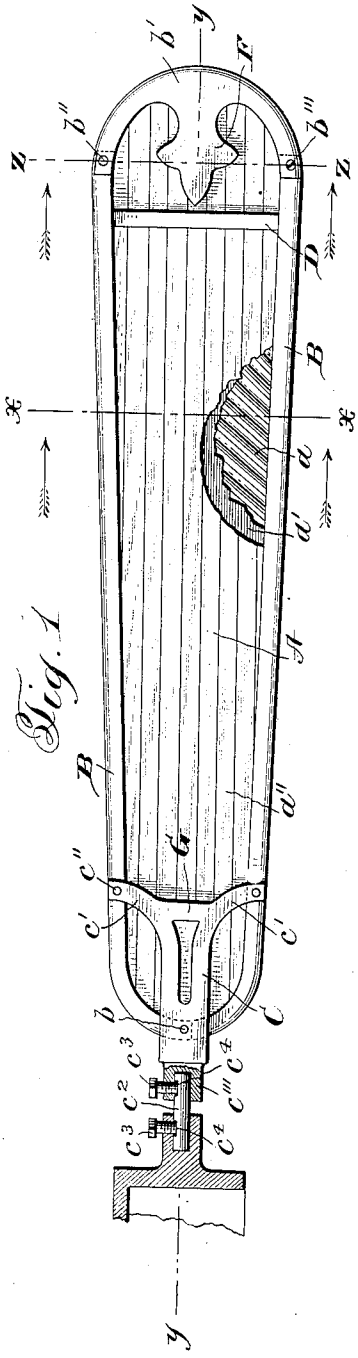


Fig. 1.



Fig. 2.



Fig. 3.

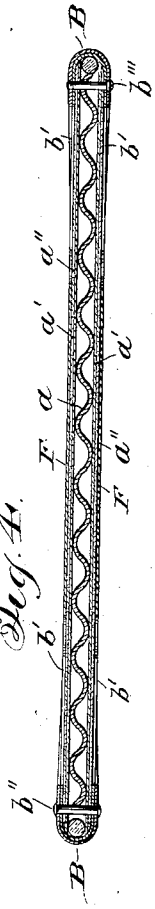


Fig. 4.

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UNITED STATES PATENT OFFICE.

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FAN.

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To all whom it may concern:

Be it known that I, JOSEPH RUSSEL, a citizen of the United States, residing at St. Louis, in the county of St. Louis City and State of Missouri, have invented certain new and useful Improvements in Fans, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in fans and more particularly to that type of fans known as overhanging rotary or motor fans, and has for its primary object the provision of a light, inexpensive and durable blade which not only possesses its highly desirable inherent characteristics, as will more fully hereinafter appear, but effectively overcomes the objections to even the better class of fan blades now in ordinary use.

As is recognized by those skilled in the art, the usual fan arm or blade is of an elongated flat formation constructed of wood. Now the use of wood is objectionable for many reasons, notable among which may be mentioned the fact that it is susceptible to the undue influences incident to changes in temperature, and cracks or warps, whereby to impair it not only from a service standpoint but also in the matter of appearance; a fan blade when made of wood alone must be stout and rigid whereby it is relatively heavy, not only initially comparatively expensive, but requiring excessive power, electrical energy for instance, to carry and rotate the same; and even when the blades are thus heavily formed, it is not infrequent that the edges thereof when brought into contact with extraneous objects, when rotating in normal operation or otherwise, split off at the edges, or break in other respects.

My present improvements, as illustrated in a convenient embodiment of the invention, may be said to comprise a fan blade, the body of which is of minimum weight and cost, for instance, paper, reinforced or strengthened to impart thereto the proper firmness or rigidity, and to protect the edges thereof against breakage when brought into contact with any obstruction in its path of movement.

The convenient embodiment of the invention above referred to is illustrated in the accompanying drawings forming a part hereof, and the novel features of the invention already outlined, and also others, will be apparent from said drawings when inspected in connection with the detailed description hereinafter contained. It is here mentioned, however, that the structure comprises an elongated body portion formed of corrugated or ribbed paper with the corrugations or ribs thereof running diagonally of the blade, whereby to assist in overcoming any tendency of the material to bend out of shape, the edge of the body portion being surrounded by a folded strip of suitable material overlapping the sides thereof, and said strip carrying the means for attachment to the operating motor. Ancillary features embrace the joining of the ends of the reinforcing or marginal strip at the inner end of the blade, whereby such joint will be at a point not to weaken the margin of the blade; means, including in part the marginal strip, permitting the removal and insertion of the body portion of the blade at will; and a bead or wire bordering the said body portion and inclosed within the folded strip to further strengthen the device. This wire enables the use of a relatively light material, such as celluloid, for the reinforcing strip, but may be dispensed with when the strip is of metal alone of sufficient strength for the purposes desired.

In the drawings, Figure 1 is an elevation,—parts being broken away,—of a fan blade designed for attachment to a motor, whereby the same may be rotated in any desired manner, it being unnecessary to herein show the said motor in detail, Fig. 2 is a transverse sectional view on the line X—X of Fig. 1, looking toward the outer end of the blade, Fig. 3 is a longitudinal sectional view on the line Y—Y of Fig. 1, and Fig. 4 is another transverse sectional view on the line Z—Z of Fig. 1.

Referring more specifically to the drawings, wherein like reference characters refer to corresponding portions in the several views, A designates the body portion of the fan which is of light relatively frail material,—and by frail I mean a substance which of itself alone would hardly stand rough or long usage required of a device of this character,—given the proper strength and durability by the reinforcing marginal strip B.

The body A is conveniently formed of a central layer *a* of corrugated paper or equivalent substance provided with top and bottom layers of thin paper *a'* and bearing a veneer facing *a''* preferably of wood provided chiefly

to give the desired finish or appearance to the blade. The several layers just referred to as comprising the body A are preferably secured together by paste or the like. Instead of using the wood veneer facing a'', I may employ simply the sheets a' decorated as desired or treated to have the appearance of wood. I have found that maximum strength is secured by cutting the body A in such a manner that when in use the corrugations will preferably extend across the shorter dimension or diagonally of the blade rather than longitudinally thereof, in which latter arrangement there is the tendency to bend or bulge. The arrangement employed by me is clearly represented in the first figure of the drawings. While experience has demonstrated that the corrugated paper is probably the most efficient material for my purposes, I do not desire to be restricted to the employment of the same because it is obvious that other papers, etc. will suffice to a marked degree of efficiency. It may also be noted that the strength of the device is further increased, when the veneer facing is utilized, by running the grain of the latter lengthwise of the blade whereby the lines thereof will intersect or cross those of the diagonal corrugations.

The body carrier and reinforcing strip B preferably comprises a folded strip of sheet metal shaped to receive the edges of the body A and overlie the faces thereof, and either formed endless, or continuous whereby to be secured at one point only, or sectionally as illustrated. The sides of the frame extend from points near the outer end of the blade around the inner end thereof and are connected together by a rivet b at said inner end approximately on the longitudinal axis of the blade, whereby to relieve the sides or edges of any possible weakness which might be created by having the joint thereat. The rivet b also serves to help secure in place the carrying or connecting member C which secures the fan to the fan-motor. This member is conveniently a casting having branches separated to provide a space c therebetween for the reception of the inner end of the blade, and on each surface of the blade has a pair of diverging arms c' extending to opposite sides or edges of the blade whereby to be secured at c'' by rivets or otherwise to the side members of the reinforcing strip B. This constitutes a firm, permanent connection between the members C and the fan blade, as is obvious. The extreme end of the member C is formed into a socket c''' adapted to receive a separately formed detachable frangible pin c^2 adapted to break under abnormal or excess strains or shock to save the motor, fan, and member C from harm. The pin is secured in place by a screw c^3 fitting a grooved portion c^4 thereof, its connection with the motor being the same. The end walls of the grooves prevent axial separation of the pin and its associated parts under the centrifugal force to which the fan is subjected in operation.

The frangible pin coupling just described will not be claimed herein inasmuch as the same constitutes the subject matter of my co-pending application Serial No. 411,836, filed January 20, 1908.

At the outer end of the blade, the side members of the reinforcing strip B are connected by a portion b', pivoted at one end as at b'', and detachably connected at its opposite end as at b''', whereby said portion b' may be opened, should occasion demand, for the removal of the body A and substitution of another therefor, either for purposes of repair or for changing the style of said body portion to render the same more harmonious with the surroundings attending the particular use of the fan. Although at times probably unnecessary, I may provide connecting strips D bridging the surfaces of the body A to retain the side members of the reinforcing strip in permanent relation, and this will also prevent undue separation or bending thereof when the end portion b' is open.

The reinforcing strip as above defined is usually formed of folded metal of sufficient rigidity and strength to alone serve the purpose desired, but in some instances it may be desired to have even greater strength, or to use a very thin light metal, or other substance, such as celluloid, and to enable this I provide a marginal wire E surrounding the corrugated paper sheet a and fitting the interior contour of the strip B. The edges of the paper body preferably overlie the wire, and are made hard and rigid therewith by saturating the same with cement or glue, in which way it is clear that the edges of the body will be firm, not easily torn, and capable of being slipped into or removed from the reinforcing frame with great facility.

The member b' has central extending portions F overlying the surfaces of the body A, and the member C has somewhat similar portions G which as also the strips D will hold the ends of the body A firmly in place and effectually resist any tendency of said ends to slip out under the pressure exerted against the fan blade in its rotation.

While I have shown and described a convenient embodiment of the invention, I desire it understood that many changes in the form and construction can be made and substituted for those herein shown and described without in the least departing from the nature and principle of the invention.

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

1. A fan blade made of light material such as paper, a reinforcing frame therefor, in-

cluding oppositely disposed members, a detachable connecting member therefor formed to permit insertion and removal of the blade, and means for retaining said oppositely disposed members against separation when disconnected by the opening of said connecting member.

2. A fan blade made of light material such as paper, a reinforcing frame surrounding the same, and means on said frame for operatively securing the fan blade to its driving means, in combination with a transversely disposed device crossing the surface of the fan blade and tying the oppositely disposed members of the reinforcing frame together, and means independent of the securing means for permitting the removal of the blade from the frame.

3. A fan blade made of light material such as paper, a reinforcing frame surrounding the same, and means on said frame for operatively securing the fan blade to its driving means, in combination with a transversely disposed device crossing the surface of the blade and tying the oppositely disposed members of the reinforcing frame together, and means permitting the removal of the blade from the frame.

4. A fan blade made of light material such as paper, a reinforcing frame surrounding the same, and means on said frame for operatively securing the fan blade to its driving means, in combination with a transversely disposed device crossing the surface of the blade and tying the oppositely disposed members of the reinforcing frame together.

5. A fan blade of the character described comprising a light body portion such as paper, and a marginal reinforce for said body portion comprising a wire surrounding the edge thereof, and a bent reinforcing strip housing the surrounding edge of said body portion and said wire.

6. A fan blade of the character described comprising a light body portion such as paper, and a marginal reinforce for said body portion comprising a wire surrounding the edge thereof, and a bent reinforcing strip housing the surrounding edge of said body portion and said wire, the edge of the body portion adjoining the wire being saturated with cement or the like to harden and stiffen the same.

7. As an article of manufacture, a fan blade consisting in part of at least three superposed layers of relatively light material such as paper united to constitute a unit, the intermediate layer being of corrugated material, and means for reinforcing the surrounding edge of the same comprising a wire insert confined between the edges of the outer layers of the blade and bordering the edge of the corrugated layer.

8. As an article of manufacture, a fan blade comprising a body portion composed of light material such as paper, means surrounding the margin of the body for stiffening the same to a substantial extent relative to the interior thereof, and a U shaped sheet metal reinforce inclosing the body and engaging over the stiffened margin of the same.

9. As an article of manufacture, a fan blade comprising an elongated body of light material such as paper, formed in part of corrugated material, a reinforcing binding surrounding the blade to stiffen the same and protect the edges thereof, the corrugations of the body extending in a direction transverse to the longitudinal axis of the blade, in combination with facing sheets on the opposite sides of the corrugated sheet.

10. A fan blade having a body portion of light material such as paper, a reinforcing frame surrounding the same to strengthen and protect the edges of said body portion, and a member carried by one end of the device for attachment to an operating motor, said member extending inwardly a substantial distance from the edge of the blade, overlying the opposite surfaces thereof, and secured to the end of the frame and also to the opposite side members of the frame at points substantially distant from said end.

11. A fan blade for power driven fans comprising an elongated body part of relatively light material incapable of self-support and of resisting the lateral air pressure caused by rotation, a surrounding supporting frame connected with the edges of said body part and serving as a carrier therefor, means located at the end of the blade for connecting the same to a power driven mechanism, said means extending from the end of the blade a substantial distance and terminating at the opposite sides of the frame.

12. As an article of manufacture, a fan blade for power driven fans comprising a body portion formed of fibrous material having a series of alternating depressions and ridges, and flat facing material on the sides of the body forming a finish therefor, a protecting and carrying metal frame for the body overlapping the edges thereof, and a rigid connecting supporting extension secured at different points to and projecting from the said frame.

13. As an article of manufacture, a fan blade for power driven fans comprising an elongated body formed of relatively light material such as paper, a protecting and carrying metal frame for said body overlapping the edges thereof, and a rigid supporting connecting device secured to and carried by the frame, said device extending inwardly a substantial distance from said end and connected at opposite points to the sides of the frame.

14. As an article of manufacture, a fan blade having a body portion of light material such as paper, a reinforcing frame adapted to carry and strengthen said body and overlap-

ping the edges thereof, and a supporting connecting member arranged at one end of the device for attachment to an operating motor, said member extending inwardly a substantial distance from the end of the body to overlie the surface thereof and secured to the side members of the frame at points substantially distant from the end of the blade.

15. As an article of manufacture, a fan blade for power driven fans comprising an elongated partially hollow body portion formed of fibrous material having a series of depressions and ridges and finished exterior surfaces, a substantially rigid U-shaped protecting and carrying frame embracing the edges of the body part, and means located at the end of the blade for supporting and for resisting the independent lateral movement of the blade, and to thereby prevent the breaking of the relatively light body part at the point of connection, said means being connected to said frame.

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

JOSEPH RUSSEL.

Witnesses:
JOS. H. MILANS,
GEO. D. RILEY.