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E. A. FRENCH

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FAN FOR SUCTION CLEANERS

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Fig. 2.

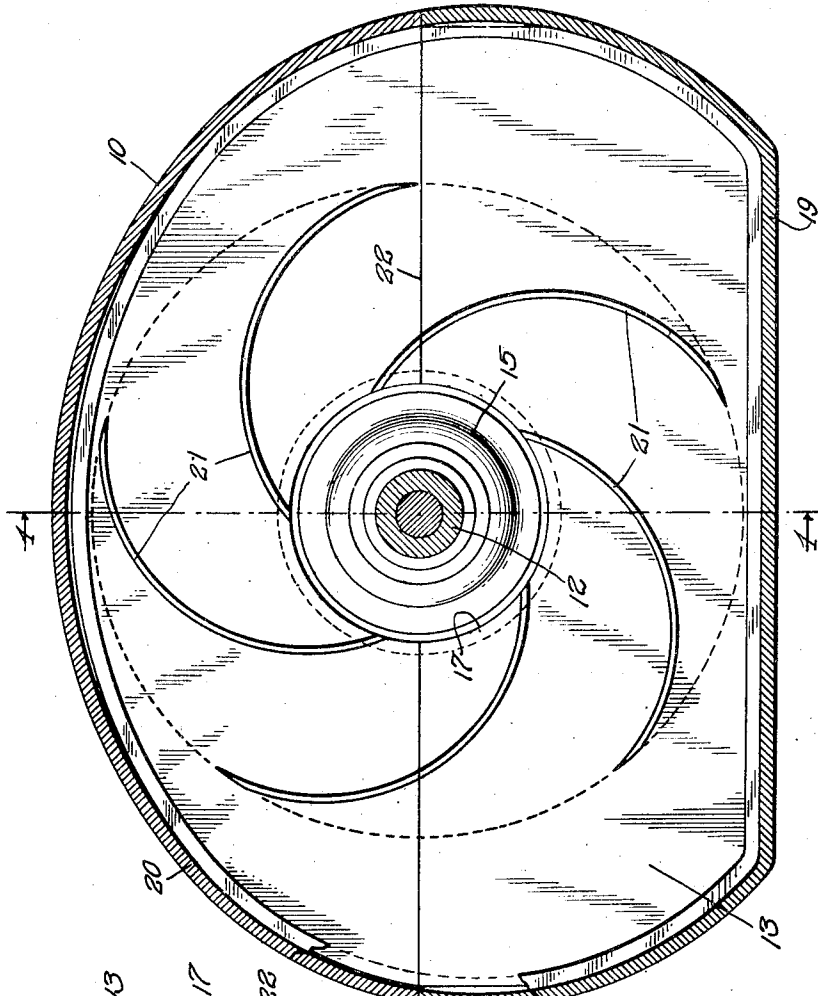
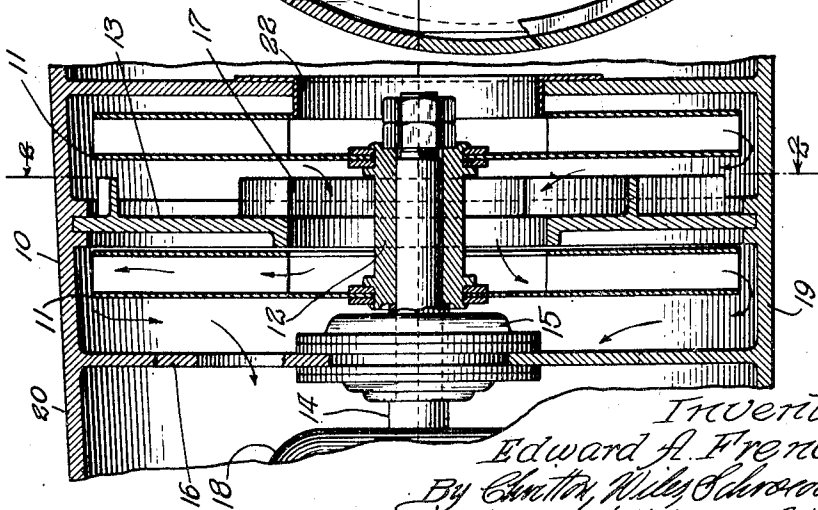


Fig. 1.



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FAN FOR SUCTION CLEANERS

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15 Claims. (Cl. 230—130)

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This invention relates to an improved fan for use in suction cleaners or the like, and relates particularly to such a fan that is simple in construction, efficient in operation, and cheap to build.

In the ordinary suction cleaner the suction is maintained by means of a motor driven fan that draws the air through the article to be cleaned and directs the dust-laden air into a dust collector. These fans must be light in weight but are also required to be of sturdy construction and to be capable of supplying a strong, steady current of air without excessive attention. In the past such fans have ordinarily been of rather complicated structure, having sets of rotatable plates and fixed blades that were oftentimes difficult to assemble and maintain in trouble-free operation. I have invented a fan that is of much simpler construction than the previous ones and that can be manufactured efficiently under mass production methods. This fan, although of relatively simple construction, is very efficient and is practically trouble-free.

The invention will be described as related to the typical embodiment shown in the accompanying drawings. Fig. 1 is a longitudinal vertical section taken through the center of the fan, and is specifically a section along line 1—1 of Fig. 2. Fig. 2 is a transverse vertical section through the fan, and specifically is a section taken along the line 2—2 of Fig. 1.

The fan illustrated comprises a housing 10, a motor 18, two sets of rotatable blade assemblies 11 mounted on a single unitary hub 12 affixed to the shaft, and a fixed blade assembly 13 positioned between the rotatable blade assemblies. The shaft 14 of the motor 18 is held in substantially vibrationless position by means of a bushing 15 fastened to a partition 16 extending across the fan housing 10. In order to provide for the free flow of air, the fixed blade assembly 13 has a central opening 17 through which the unitary hub 12 extends.

The hub of this fan, being of one piece construction, has a decided advantage over those made in two or more assembled sections. The new hub is much lighter in weight and is more economical to construct.

The fan has an inclosing housing 10 of generally oval shape in transverse section, as shown in Fig. 2. This oval housing has the major axis of the oval substantially parallel to the floor and the oval is truncated at the bottom. The truncated portion is designed to provide a flat base 19 for the fan housing. The rotatable blade assemblies 11 have diameters slightly less than the shortest

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transverse internal dimension of the housing. This provides reduced air space at top and bottom, but because of the oval shape of the housing sufficient space for free circulation of air is provided at the sides of the housing. Such an arrangement produces a more compact structure and one that is more pleasing to the eye without reducing the fan's efficiency.

The fixed blade assembly 13 consists of a partition extending transversely from wall to wall of the housing, and upon which the blades 21 are mounted. The fixed blade assembly is arranged so that there is one between each two consecutive rotatable blade assemblies. In the embodiment shown there are only two rotatable blade assemblies 11 and one fixed blade assembly 13, but more of both could be provided if required. Both the rotatable blades and the fixed blades have each blade of an arcuate shape, and curved in a direction opposite to the direction of intended rotation.

The fan housing and fixed blade assembly which is attached to the housing are split in a horizontal plane passing substantially through the center of the motor shaft (indicated at 22). This split divides not only the housing and the partition upon which the fixed blades are mounted, but also divides two of the five fixed blades. Therefore, where there are five blades three of them will have inner ends on one side of the split, while the other two inner ends of the blades will be on the other side of the split. Such a construction is shown in Fig. 2. Because of this split construction the housing may be made in two pieces, the split fixed blade assemblies fastened in proper arrangement to these two pieces, and then the housing and blade assemblies are brought together around the rotatable blade assemblies. This simplifies construction and makes it much easier and simpler to assemble the fan.

When the rotatable blades of the fan are rotated air is drawn through a front opening 22, is forced out toward the periphery of the first set of curved blades, and is there guided back toward the center by the fixed blades 21. The air then progresses through the opening 17 in the fixed blade plate, where it is seized by the second rotatable blade assembly and again forced out toward the periphery. The air then flows through holes provided in the partition 16 that supports the bushing and on out around the motor. Thus it can be seen that although the fan is of quite simple construction it is capable of providing a steady, efficient, and strong current of air.

Having described my invention in relation to

one embodiment, it is to be understood that the invention is not to be limited to this embodiment, but rather is to be construed broadly within its spirit and scope as set out in the accompanying claims.

I claim:

1. A fan of the type used in suction cleaners comprising a generally oval-shaped housing with the long axis of the oval arranged in horizontal position, a plurality of rotatable blade assemblies, a fixed blade assembly between each two consecutive rotatable blade assemblies and held by said housing, and a single unitary hub connected to a motor shaft and upon which the rotatable blade assemblies are mounted.

2. A fan of the type used in suction cleaners comprising a generally oval-shaped housing with the long axis of the oval arranged substantially in horizontal position, a plurality of rotatable blade assemblies with each blade of arcuate shape and curved in a direction opposite to the direction of intended rotation, a fixed blade assembly between each two consecutive rotatable blade assemblies with each fixed blade having substantially the same curvature as the rotatable blades, and a single unitary hub connected to a motor shaft and upon which the rotatable blade assemblies are mounted, said oval-shaped housing being truncated on the lower side substantially parallel to the major axis of said oval and with the blade assemblies being slightly smaller in diameter than the shortest internal lateral dimension of said oval housing.

3. A fan of the type used in suction cleaners comprising a housing, a plurality of rotatable blade assemblies, a fixed blade assembly between each two consecutive rotatable blade assemblies and held by said housing, and a single unitary one-piece hub connected to a motor shaft and upon which the rotatable blade assemblies are mounted, said housing and each of said fixed blade assemblies being split in one continuous flat plane.

4. A fan of the type used in suction cleaners comprising a housing, a plurality of rotatable blade assemblies, a fixed blade assembly between each two consecutive rotatable blade assemblies and held by said housing, and a single unitary one-piece hub connected to a motor shaft and upon which the rotatable blade assemblies are mounted, said housing and each of said fixed blade assemblies being split in one continuous flat plane with the plane passing substantially through the center of said hub.

5. A fan of the type used in suction cleaners comprising a housing, a plurality to rotatable blade assemblies, a fixed blade assembly between each two consecutive rotatable blade assemblies held by said housing and comprising a partition extending across the fan chamber with blades mounted thereon and having a center air passage opening, and a single unitary hub connected to a motor shaft upon which the rotatable blade assemblies are mounted with the hub extending through the center opening of each of the fixed blade assemblies, said housing and each of said fixed blade assemblies being split in one continuous flat plane with the plane passing substantially through the center of said hub.

6. A fan of the type used in suction cleaners comprising a housing, a plurality of rotatable blade assemblies, a fixed blade assembly between each two consecutive rotatable blade assemblies held by said housing and comprising a partition extending across the fan chamber with blades

mounted thereon and having a center air passage opening, and a single unitary hub connected to a motor shaft upon which the rotatable blade assemblies are mounted with the hub extending through the center opening of each of the fixed blade assemblies, said housing and each of said fixed blade assemblies being split in a continuous flat horizontal plane passing substantially through the center of said hub.

7. A fan of the type used in suction cleaners comprising a generally oval-shaped housing with the long axis of the oval arranged in horizontal position, a plurality of rotatable blade assemblies, a fixed blade assembly between each two consecutive rotatable blade assemblies, and a single unitary hub connected to a motor shaft and upon which the rotatable blade assemblies are mounted, said oval-shaped housing being truncated on one side substantially parallel to the major axis of said oval and the rotatable blade assemblies being slightly smaller in diameter than the shortest internal lateral dimension of the oval housing.

8. A fan of the type used in suction cleaners comprising a generally oval-shaped housing, a plurality of rotatable blade assemblies, a fixed blade assembly between each two consecutive rotatable blade assemblies, and a single unitary hub connected to a motor shaft and upon which the rotatable blade assemblies are mounted, said oval being truncated on one side substantially parallel to the major axis of the said oval and the rotatable blade assemblies each being slightly smaller in diameter than the shortest internal lateral dimension of the oval housing opposite the said rotatable blade assembly.

9. A fan of the type used in suction cleaners comprising a housing having the shape in transverse cross-section of a closed curve flattened on one side with the shortest internal dimension being from the flattened side to the opposite side, a plurality of rotatable blade assemblies within the housing, a fixed blade assembly between each two adjacent rotatable blade assemblies, and hub means upon which the rotatable blade assemblies are mounted, each of said rotatable blade assemblies being slightly smaller in diameter than the shortest internal lateral dimension of the housing opposite said rotatable blade assembly.

10. A fan of the character set out in claim 9 wherein the housing and each of said fixed blade assemblies are split in one plane.

11. A fan of the character set out in claim 9 wherein the housing and each of said fixed blade assemblies are split in one plane with the plane passing substantially through the center of said hub means.

12. A fan of the type used in suction cleaners comprising a housing, a plurality to rotatable blade assemblies, a fixed blade assembly between each two consecutive rotatable blade assemblies held by said housing and comprising a partition extending across the fan chamber with blades mounted thereon and having a center air passage opening, and a single unitary hub connected to a motor shaft upon which the rotatable blade assemblies are mounted with the hub extending through the center opening of each of the fixed blade assemblies, said housing and each of said fixed blade assemblies being split in one continuous flat plane with the plane passing substantially through said center opening.

13. A fan of the type used in suction cleaners comprising a housing, a plurality of rotatable blade assemblies, a fixed blade assembly between each two consecutive rotatable blade assemblies

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held by said housing and comprising a partition extending across the fan chamber with blades mounted thereon and having a center air passage opening, and a single unitary hub connected to a motor shaft upon which the rotatable blade assemblies are mounted with the hub extending through the center opening of each of the fixed blade assemblies, said housing and each of said fixed blade assemblies being split in a continuous flat horizontal plane passing substantially through said center opening.

14. A fan of the type used in suction cleaners comprising a housing, a plurality of rotatable blade assemblies, a single unitary hub upon which the rotatable blade assemblies are mounted, and a fixed blade assembly between each two consecutive rotatable blade assemblies and held by said housing, said housing and fixed blade assembly being split in a plane passing through the hub to permit arranging the housing and fixed blade assembly around said hub in assembling the fan.

15. A fan of the type used in suction cleaners comprising a housing, a plurality of rotatable blade assemblies, a single unitary hub upon which the rotatable blade assemblies are mounted, and a fixed blade assembly between each two consecutive rotatable blade assemblies, and held by

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said housing, with the fixed blade assembly being provided with an opening around said hub for the passage of air, said housing and fixed blade assembly being split in a plane passing through the opening to permit arranging the housing and fixed blade assembly around said hub in assembling the fan.

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