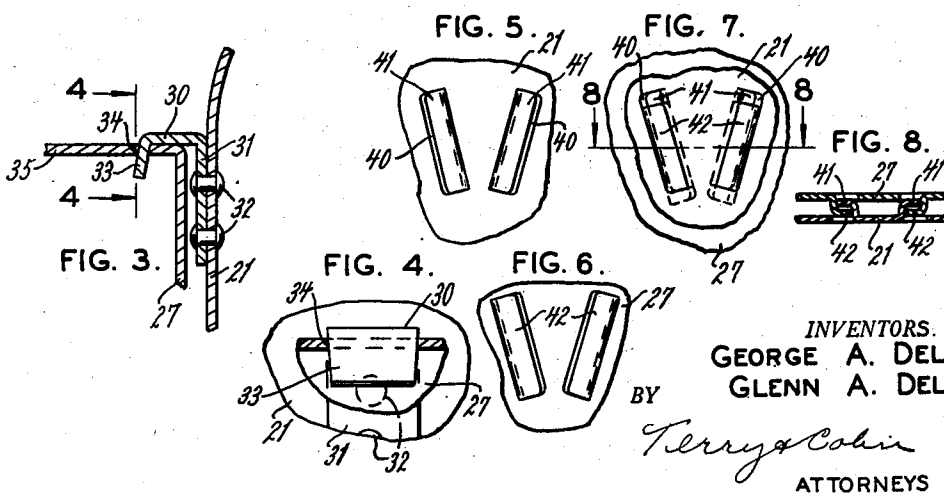
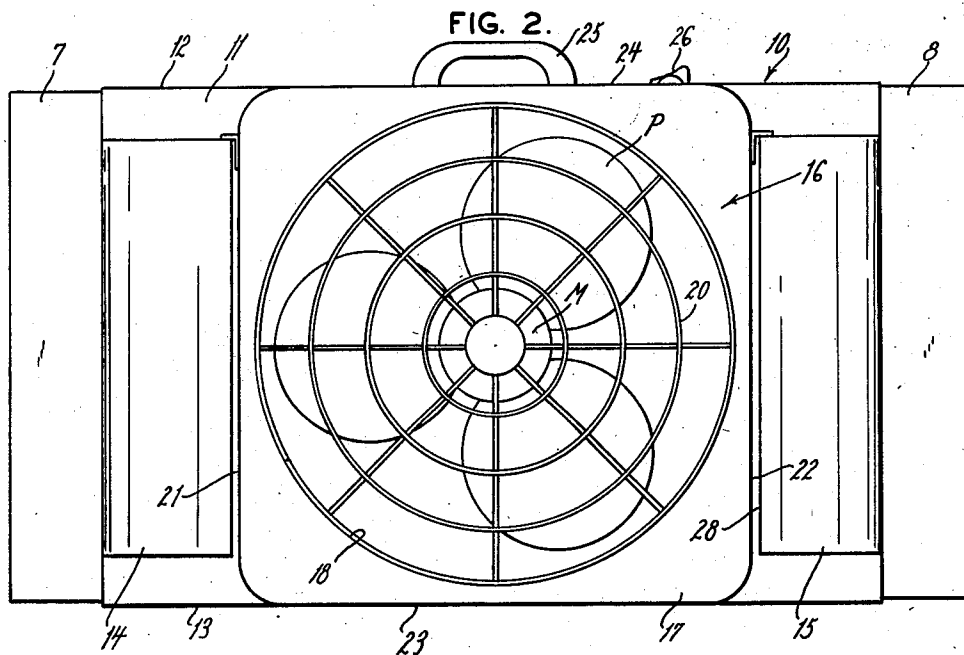
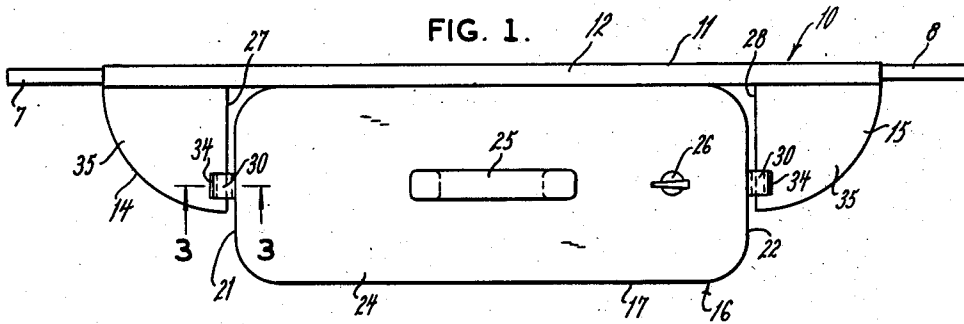


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REVERSIBLE-FLOW WINDOW FAN

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REVERSIBLE-FLOW WINDOW FAN

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This invention relates to improvements in reversible-flow window fans, and more particularly to certain improved detachable connections between a fan-motor frame or housing, and other elements normally secured in a window opening, whereby to enable, by a quick and easy translatory movement, a physical, as distinguished from an electrical, reversal of direction of air flow through the window opening.

The present designers are aware that numerous attempts have heretofore been made to attain by solely physical means, a reversibility of a window fan assembly so as to reverse the flow of air through the window served by the assembly. However, most such facilities have heretofore consisted of pivotal arrangements for rotation of the fan-motor unit about either a horizontal or a vertical axis, and by other means, all of which as far as have come to applicants' attention, result in high costs, uncertainty of final position of the fan in the window, liability to creation of shunt air paths, and other shortcomings. It is accordingly a principal objective of the present invention to provide a structurally simple, positive and low cost provision for the purpose aforesaid, such as to facilitate the physical transposition of the fan motor unit for the noted purpose, and to assure a positive and constant relation of the unit with respect to the window, in either of two positions.

The present invention may perhaps be most briefly summarized by reference to the disclosed embodiments thereof, as comprising a fixed supporting frame detachably disposed in a window opening, and by preference of adjustable width, together with a second frame which may consist of a fan-motor housing, and an improved connection between the two frames exemplified by one or more lugs and sockets at each side of the second frame, such that the latter frame may be slightly lifted for disengagement and use apart from the window if desired, or may be given a half turn and relocated in the window in constant relation in the window opening, for quickly shifting from an outflow to an inflow operation of fan.

Further objects and advantages of the present developments include a lug and socket connection of novel form, which is of general adaptation, but exemplified in use between the fan housing and a pair of brackets or side trim elements, such that the weight of the fan motor assembly and housing aids in establishing the connection and acts releasably to maintain the parts firmly in assembly.

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Yet another object and important practical advantage is realized in a novel and simple form of detachable connection such as above noted, and which will in no way interfere with the adjusting actuation of one or more variably positionable side panel elements employed to accommodate the assembly to window openings of different widths.

Still a further important object of the current improvements is realized in a novel combination and location of elements in a window fan assembly such as referred to, and consisting of a particularly advantageous location of lug and socket means for the purpose aforesaid, together with a top handle or comparable lifting means facilitating detachment of one frame structure from another frame structure, as well as a translatory movement of said one structure in its reapplication to the position of service.

The foregoing and numerous other objects will more readily appear from the following detailed description of a presently preferred embodiment of the improvements, particularly when considered in connection with the accompanying drawing, in which:

Fig. 1 is a top or plan view of a window fan assembly embodying certain of the present improvements;

Fig. 2 is a front elevational view of the assembly;

Fig. 3 is a fragmentary enlarged sectional view illustrating one form of the elements of connection between the fan motor frame, and an outer frame, Fig. 3 being located by line 3-3 of Fig. 1;

Fig. 4 is a fragmentary elevational view, partly in section, of certain of the structure shown by Fig. 3, particularly as viewed along line 4-4 thereof;

Fig. 5 is a plan view of a fragmentary portion of one of a pair of companion plate elements provided with integral outstruck flanges constituting one of the elements of a connector of modified form;

Fig. 6 is a view similar to Fig. 5, showing a connector element complementary to that of Fig. 5;

Fig. 7 is a view taken from the rear side of two plate elements connected through interengagement of flange formations such as shown by Figs. 5 and 6, and

Fig. 8 is a horizontal sectional view as taken along line 8-8 of Fig. 7.

Referring now by characters of reference to the drawing, there is illustrated generally at 10, a normally fixed frame structure for bridging a

window opening, for example between the pulley stiles. Such a mounting frame includes a normally vertical plate 11 provided along its top and bottom margins with flanges 12 and 13 respectively. Adjustable side panels or wings 7 and 8 enable an adjustment in width of the assembly, hence an adaptation thereof to window openings of variable width, so as effectively to block such opening against shunt air paths and to compel the fan stream to move entirely through the fan circle, as is well known in this art. The normally fixed or outer frame 10 includes a pair of fixed hollow side trim members 14 and 15 each usually formed of sheet metal, and each attached securely as by welding, to the vertical plate 11, but free of attachment to the panels or wings 7-8.

The fan assembly proper includes a propeller type fan P together with a driving motor M, shown as direct-connected to the fan, the motor being mounted through suitable brackets (not shown) which are assembled to the wall elements of a generally rectangular inner frame generally indicated at 16, and in the disclosed example constituting a housing about the fan and motor. The plate 11, and a vertical rear wall of the frame-housing 16, as well as the front wall 17 of structure 16, are each provided with a circular opening 18, certain of these openings being provided with a grille or guard 20 for usual protective purposes.

The inner frame or housing structure may be formed of sheet metal and is provided with vertical side walls 21 and 22 together with a bottom wall 23 and a top wall 24. Centrally of the latter is attached a lifting handle 25, and where desired, a motor control switch identified as to location, with a switch handle 26.

It will best appear from Fig. 1 that the fixed vertical side trim members 14 and 15 each includes a planar vertical wall element such as 27 on member 14 and 28 on member 15, the members 27 and 28 normally lying closely adjacent and parallel to the side wall elements 21 and 22 respectively of the fan housing or supporting frame 16.

The present invention is particularly characterized as to structure with novel provisions for detachably connecting the inner frame and contents, including the fan and motor assembly, to the outer frame 10. One highly practical embodiment of such a connection includes as seen in Figs. 3 and 4, an inverted L-shaped projection, lug or hook element 30 which includes a plate portion 31 secured as by rivets 32 or welding if desired, to the adjacent side wall 21. The horizontal arm which constitutes an outward extension of the base plate 31, is thence continued downwardly into a substantially right angled hook end, lug or tongue indicated at 33, and which extends into a socket such as slot 34 formed in the planar top surface of the adjacent side trim member such as 14, the top wall of each side trim being indicated at 35.

As will best appear from Fig. 3, the downward turned lug or tongue 33 preferably bears a slightly obtuse angled relation to the arm by which it is carried, and by further preference as will best appear from Fig. 4, the lug or terminal 33 is of tapered width, having downwardly convergent sides. It being understood that disengagement of the parts of the connection thus shown is effected by a short lifting movement imparted to the inner frame or housing 16, as through handle 25, it will appear that the effect of seating the tongue 33 incident to a subsequent downward

movement of the frame 16 and contents, will be slightly to tension the side hooks or lugs between the fixed supports containing the slots 34, thus acting to tension and tighten the inner frame assembly with minimization of vibration, etc., as the lugs or projections identified with elements 33 are firmly seated in the sockets or recesses therefor. Similarly, it will appear that the tapering width of the lug or other projections 33 results in a tightening effect depthwise of the assembly, as the inner frame is seated by downward movement in the outer frame 10.

A somewhat modified form of detachable connection between the fan assembly and elements laterally thereof, is shown by Figs. 5, 6, 7 and 8. In this form, as in the form of connection heretofore described, at least a pair of the connector assemblies are utilized, with at least one thereof on opposite sides of the inner frame assembly 16. In the form shown by Figs. 1, 2 and 3, a single such assembly is provided at each side of the inner frame or housing and each of the lug or tongue elements is centered with respect to a vertical median plane through the inner frame. From this fact it results that, as the assembly 16 is lifted, rotated a half turn about a vertical axis and replaced in constant position with respect to the outer frame, each of the members 33 will interfit one of the slots 34, although the inter-fitted lugs and slots are thus transposed. In the modified form of connection, the adjacent vertical walls or plate elements such as 21-27 and 22-28 are each provided on its outer face, with a downwardly converging arrangement of paired outstruck linear flanges each pair of which, in a given wall element, will approximate a V formation. Each such V formation results from a pair of linear slots 40, the metal from each slot being formed outwardly thereof, or otherwise stated, being outstruck, so as to result in an L-shaped flange or hook 41 projected outwardly of the element from which it is formed, the hook terminals of each flange being formed or bent in a direction opposite the other flange on the same plate. Such formations on a given plate, such as 21, will be turned away from each other, together forming a lug, while those on the adjacent plate, such as 27, will be formed or bent toward each other, constituting a socket, the latter being indicated at 42. Also, the formations on the respective adjacent plates are relatively reversed, in that they are struck out of relatively opposite faces of the plates, and so are presented in a face-to-face relation from the adjacent plates. Since it is possible to form the converging flange arrangement consisting of the paired outstruck flanges 41 or 42 by utilization of similar although slightly differing dies or other tooling, it will best appear from Fig. 8 that one pair of the resulting flanges 41 will, in assembly, fall within and be embraced by an outer pair of flanges 42 struck outwardly of the companion plate. The connecting action of the two sets of interfitting flanges takes place with a distinct wedging action, as is the preference in the principal embodiment hereinabove described. It is here noted that the flanges 41 and 42 result from displacement of the metal originally in the slotted areas 40 of the plate by which the flanges are carried.

It will be understood that each outer pair of flanges constitutes a socket for the detachable reception of the inner pair, normally nested or seated in such socket, such inner pair constituting a lug or hook. It will also now have ap-

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peared that the two detachably nested pairs of flanges constitute a connector means susceptible of usage in connecting the outside margins of the adjustable panels or wings to stationary metal plates (not shown) in the window opening along the stiles, and in other similar fields. Thus the arrangement, of general adaptation, comprises on each plate, a pair of convergent flanges, each of hook section, with the pair of flanges on each plate presented toward the other plate, and with the two sets of flanges nested.

We have heretofore referred to the desirability of centering the connector parts on the inner frame 16, depthwise of this assembly. It will of course be understood that more than one connector may be provided at each side of the inner frame, in which case if a pair be employed, the elements of the connector carried by the inner frame will be equally spaced depthwise, from the vertical median plane of the inner frame. Accordingly, wherever reference is made herein to the "centered" relation of parts, same shall be taken to include either an on-center disposition of a single lug or projection, or an equal depthwise displacement from center of a pair thereof.

The manner of manipulation incident to usage of an assembly embodying the present improvements is thought to have become apparent from the foregoing description of parts and their purposes, but it may be noted for completeness that, at the time of initial installation, the outer frame 10 is much more conveniently lifted into place and adjusted to window width before installation therein of the inner frame. Assuming the outer frame to have been thus adapted to and brought to span the particular window opening in which it is to be used, the inner frame with contents is then readily fitted into place merely by raising this assembly to a point slightly above its final seated position in the outer frame, then lowering same to an extent necessary, in the first embodiment, to seat fully the lug or tongue 33 in the slotted socket 34 bringing the horizontal portion of the lug 30 into firm abutting engagement with the top wall such as 35 of the adjacent fixed side support such as 14 or 15. If at any time it be desired to utilize the assembly 16 as a free air fan, a slight lifting movement thereof as by the handle 25, will disengage the elements of the connector, enabling the inner frame or housing to be moved to any desired place of use.

Very importantly, the improvements, in either of the described forms, enable the fan-motor assembly to be physically reversed in position in the window as is sometimes desirable, to change the fan operation and course of air flow, from outside discharge to inside discharge of the air stream. In such case as will now be obvious, the changeover may be effected merely by lifting the unit 16, for example an inch or so, to disengage the connector parts, withdrawing the inner frame from the outer, then by means of handle 25 rotating the unit a half turn about a median vertical axis, and reseating same by downward movement, to reengage the companion elements of the connector or connectors at each side of the frame 16.

It will now have appeared that the improvements as described will serve fully to realize each of the objects hereinabove stated, and others implied from the disclosure of structure. Although the invention has been described by detailed reference to alternate forms, such detail of description should be understood solely in an instructive, rather than in any limiting sense,

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inasmuch as numerous variants may be made without departure from the full intended scope of the claims hereunto appended.

We claim as our invention:

1. In a window fan assembly, a fan and driving motor therefor, a frame supporting the fan and motor in a window opening, a frame support at each side of the frame, each such support having a recessed seat formed therein, and a projection at each side of and serving to carry the weight of the frame and contents, each projection being in interfitting and wedging engagement with one of said seats, said projections being centered depthwise of the frame, whereby either projection may engage either seat, permitting inside-outside reversal of the frame incident to lifting, turning and reseating the frame, while preserving a substantially constant relation of the frame to the window opening.

2. In a portable window fan assembly, a fan and driving motor therefor, a frame supporting the fan and motor in a window opening, a frame support at each side of the frame, each such support having a socket formed therein, and a lug formation shaped for wedging action in each socket under weight of the frame, and carried by and projecting from each side of the frame, each lug formation normally being in interfitting engagement with one of said sockets, said lug formations and sockets being centered depthwise of the frame, whereby either lug formation may engage either socket, permitting inside-outside reversal of the frame, while preserving a substantially constant relation between the frame and the window opening.

3. In a window fan assembly, a fan and driving motor therefor, a frame serving to support the fan and motor in a window opening, a frame support located in fixed position at each side of the frame, each such support being provided with a socket formation adjacent the frame, downwardly-projecting wedge lugs so located on the sides of the frame as to engage said socket formations in wedging relation, the lugs being liftable from and reinsertable in the socket formation selectively thus providing for intake-delivery reversal of the fan and frame assembly, while preserving a substantially constant relation of frame, depthwise with respect to the window opening and to said supports.

4. The combination and arrangement of features as recited by claim 3, but further characterized in that the hook means consist of a plurality of L-shaped members with downwardly convergent ends, and the formation on the frame supports consists of fixed openings adapted to receive the ends of said L shaped members in wedged relation in the openings.

5. In a window fan assembly, a rotary fan and driving motor therefor, a supporting frame for said fan and motor, including at each side thereof a vertical frame plate, a support for said frame including a pair of fixed vertical plates respectively adjacent and parallel to the side plates of said frame, the adjacent plate elements comprising on each such plate element, a pair of linear convergently related flanges, the flanges on each plate being presented toward the adjacent plate, with the flanges on the one plate nested between those on the other plate.

6. In a window fan assembly of reversible-stream type, a normally vertical mounting plate proportioned and shaped to occupy at least a portion of a window opening, a rotary fan and driving motor therefor, a housing partly en-

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closing the fan and motor assembly, lifting handle means on the top of the housing, a pair of fixed side elements one at each side of the housing, and carried by said vertical plate, each of said side elements being provided with one or more top slots adjacent the fan-motor housing, one or more hook elements attached to and extended outwardly of each side of said housing, each said hook element having a downturned end and the slots in said side supports corresponding in number and location to the adjacent hooks, the arrangement of hooks and slots being such that the housing, together with the fan and motor, may be lifted to disengage the hook ends from the slots, for detachment of the housing from those elements of the assembly normally secured in place in the window opening, the arrangement of hooks and slots further being along a vertical plane medially depthwise of the housing, hence such that the housing and contents may be lifted, rotated a half turn and the housing reseated in position between the side supports, in constant relation thereto, thereby enabling a reversal of the air flow with respect to the window opening.

7. In a window fan assembly of reversible-stream type, a normally vertical mounting plate proportioned and shaped to occupy at least a portion of a window opening, a rotary fan and driving motor therefor, a housing partly enclosing the fan and motor assembly, lifting handle means on the top of the housing, a pair of fixed side elements one at each side of the housing, and carried by said vertical plate, each of said side elements being provided with one or more top slots adjacent the fan-motor housing, one or more hook elements attached to and extended outwardly of each side of said housing, each said hook element having a downturned end and being formed of a flat metal stock, the hook elements bearing a fixed centered relation to the housing, and the slots in said side supports corresponding in number and location to the adjacent hooks, each of said hooks having its downturned end formed with its margins at least slightly downwardly convergent, whereby to facilitate introduction of the hook ends to the respective slots therefor, and to result in a wedging action of the hook end in the slot therefor, the arrangement of hooks and slots being such that the housing, together with the fan and motor, may be lifted to disengage the hook ends from the slots, for detachment of the housing from those elements of the assembly normally secured in place in the window opening, the arrangement of hooks and slots further being such that the housing and contents may be lifted, rotated a half turn about a depthwise axis of the housing, and the housing reseated in position between the side supports, in constant relation thereto, thereby enabling a reversal of the air flow with respect to the window opening.

8. In an axially transposable electric power assembly, a driving motor, a rotary unit driven by the motor, a frame by which said unit and motor are carried, a frame support at each side of the frame, the supports serving to locate the power assembly in a fixed position of use, each such support having a recessed seat formed therein, a projection at each side of and serving to carry the weight of the frame and contents, each projection being normally in interfitting and wedging engagement with one of

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said seats, said projections being centered depthwise of the frame whereby either projection may engage either seat, permitting endwise reversal of the frame incident to lifting, turning and reseating the frame, while preserving a substantially constant relation of the frame to the frame supports.

9. In an axially transposable electric motor assembly, a driving motor, a unit connected in driven relation to the motor, a frame constituting a mounting for said unit and motor, a stationary frame support at each side of the frame, each such support having a socket formed therein, and a lug formation shaped for wedging action in each socket under the weight of the frame and contents, each said lug formation carried by and projecting from one side of the frame, each lug formation normally being in interfitting engagement with one of said sockets, said lug formations and sockets being centered depthwise of the frame whereby either lug formation may engage either socket, permitting an axial or endwise reversal of the frame together with the motor and unit carried thereby, while preserving a substantially constant relation between the frame and the frame supports.

10. In a window fan assembly of reversible-stream type, a vertical mounting plate proportioned and shaped to occupy at least a portion of a window opening, a rotary fan and driving motor therefor, a housing about the fan and motor assembly, a pair of fixed side elements at each side of the housing and fixedly attached to said vertical plate, each of said side elements being provided with one or more top open slots adjacent the fan-motor housing, one or more hook elements attached to and extended outwardly of each side of said housing, each said hook element having a downturned end normally extended into one of the adjacent slots, and the slots in said side supports corresponding in number and location to the adjacent hooks, the arrangement of hooks and slots being such that the housing together with the fan and motor may be lifted to disengage the hook ends from the slots for detachment of the housing from those elements of the assembly which are fixedly secured in place in the window opening, the arrangement of hooks and slots further being symmetrically located with respect to a vertical midplane of the housing, hence enabling the housing and contents to be lifted, rotated a half turn and the housing reseated in position between the side supports in constant relation thereto, thereby enabling a reversal of the air flow with respect to the window opening.

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