June 20, 1950 G. H. KOCH 2,512,159

AIR TRANSLATING APPARATUS

Filed March 13, 1947 3 Sheets-Sheet 1

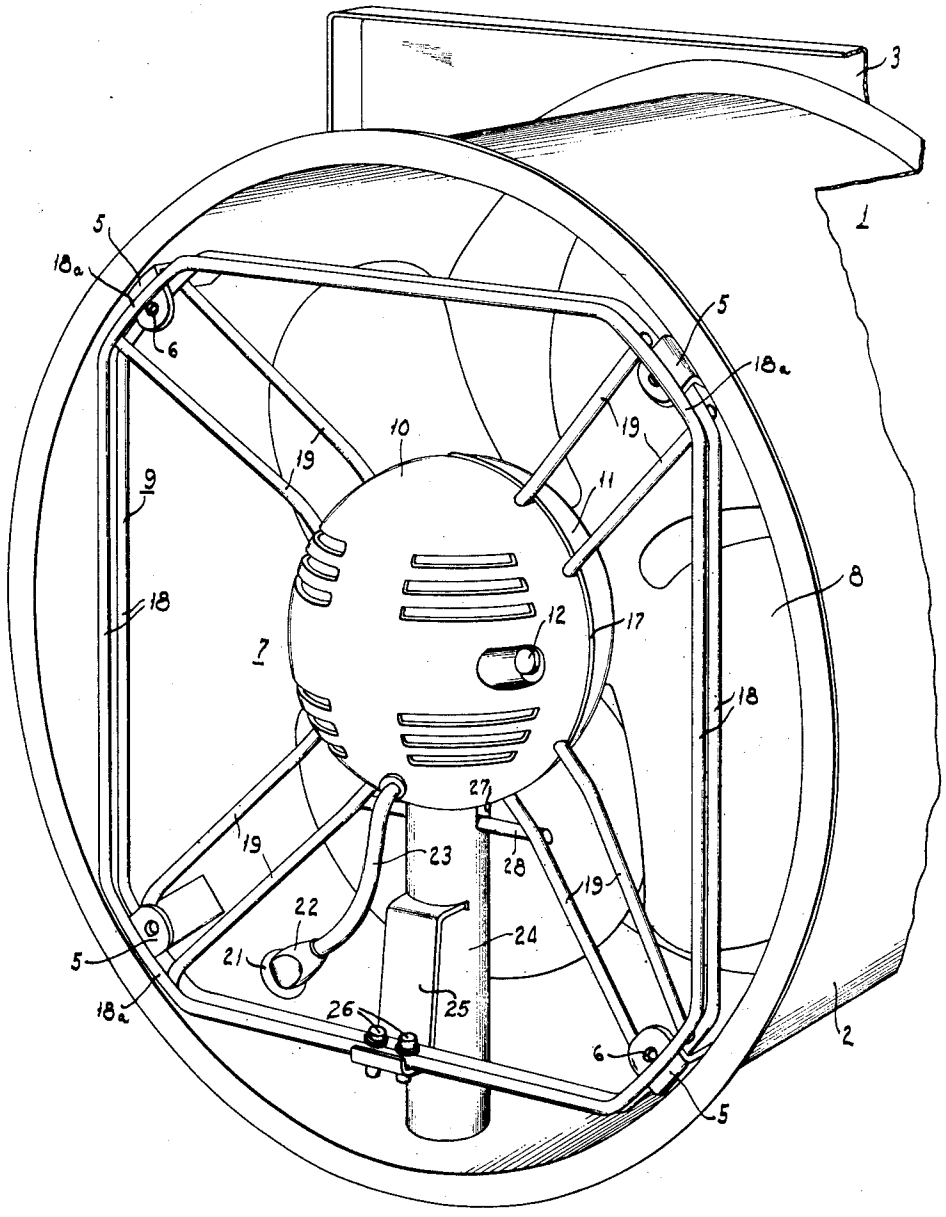


FIG. 1.

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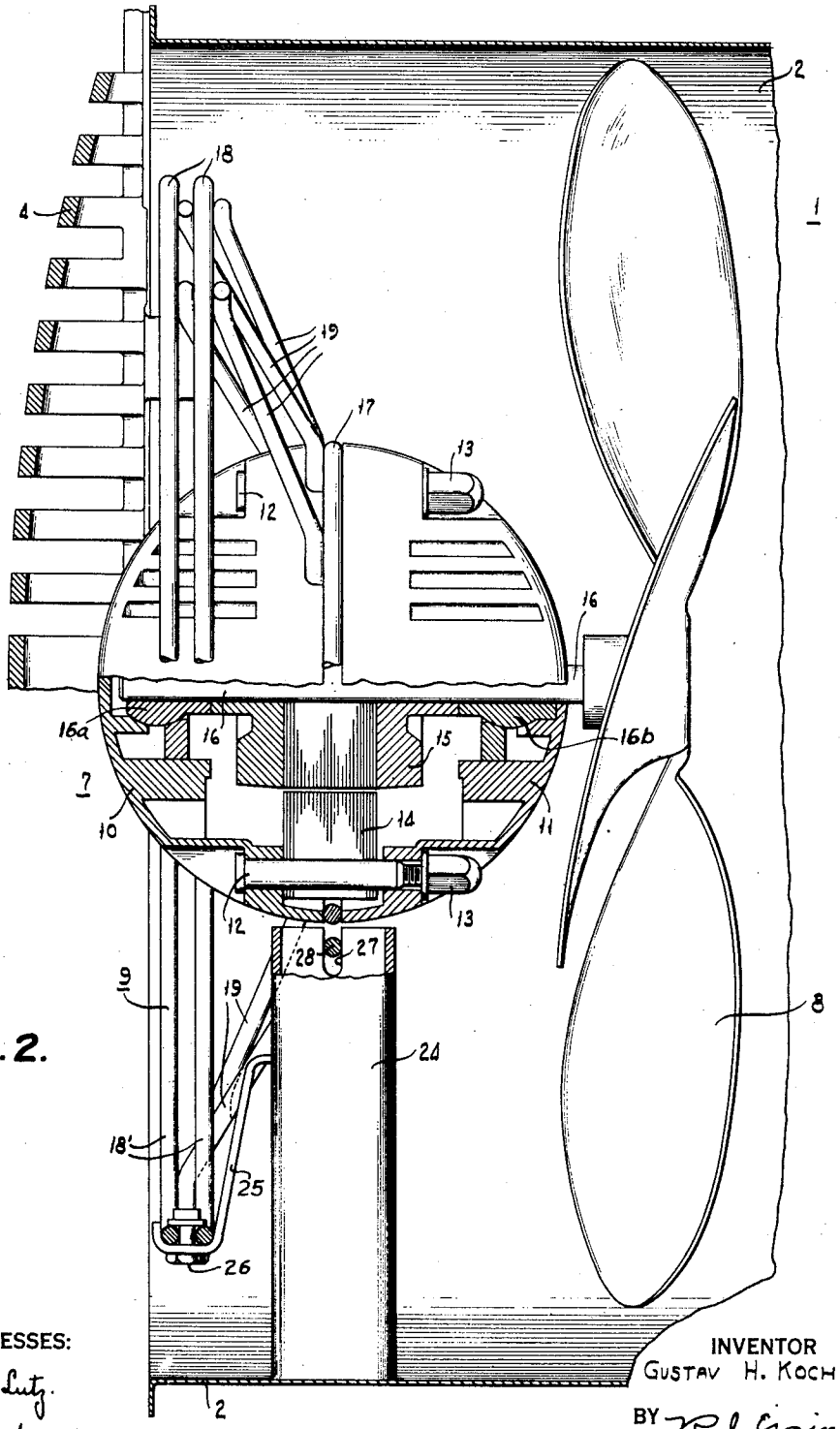


FIG. 2.

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FIG. 3.

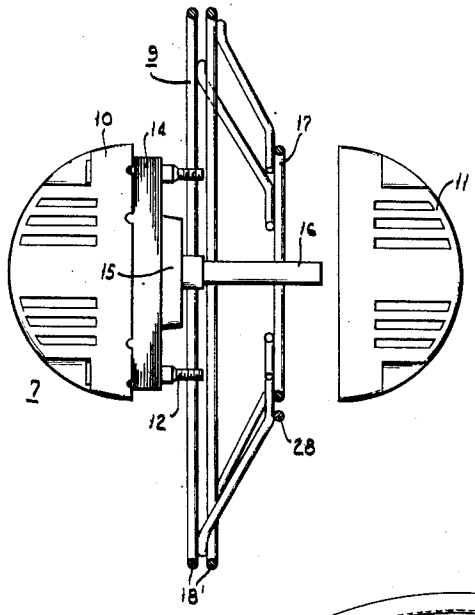
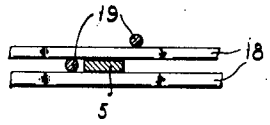


FIG. 5.



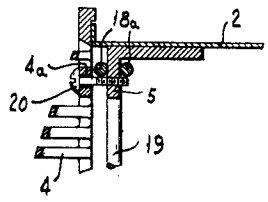
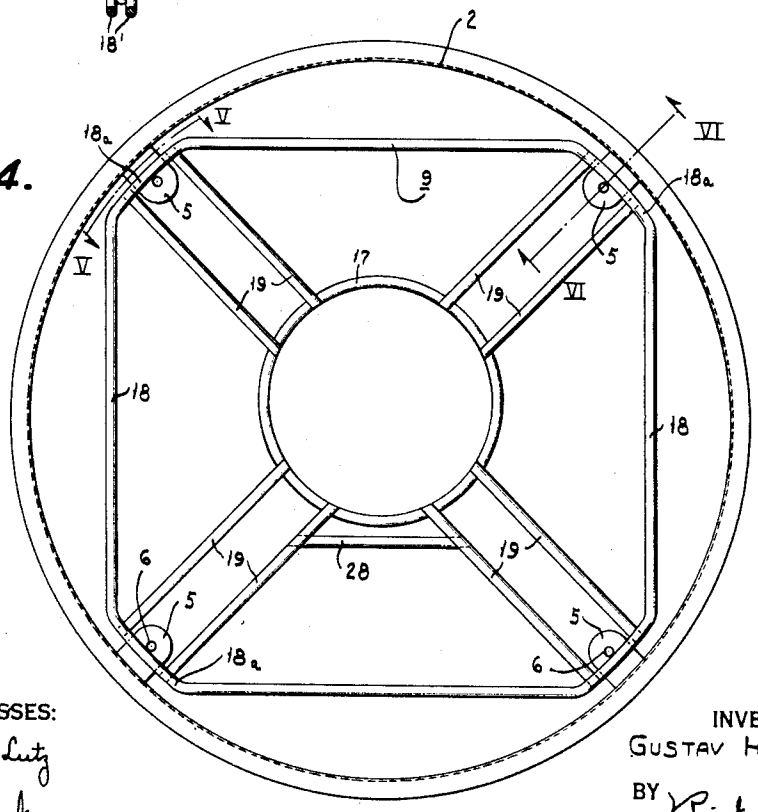


FIG. 6.

FIG. 4.



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2,512,159

AIR TRANSLATING APPARATUS

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11 Claims. (Cl. 230—273)

1

This invention relates to ventilating fans, and more particularly to an electric ventilating fan of the type mounted in a wall box or duct.

In designing an electric ventilating fan of the wall box type for household use, such as a relatively small exhaust fan to be employed for improving the ventilation of a kitchen, it is desirable to provide simply and sturdily constructed means to enable mounting of the fan unit in place at minimum expense. Such a mounting means should also be constructed and arranged to facilitate ready accessibility of the fan unit for cleaning, in view of the tendency of an exhaust fan to accumulate a deposit of grease and soot during operation in ventilating a kitchen or the like.

It is a principal object of the present invention to provide an improved ventilating fan assembly of the household type embodying the desirable features of construction just mentioned.

Another object of the invention is the provision of an improved fan assembly including a novel mounting frame structure constituting a convenient means for supporting the fan while in use and for facilitating the removal of the unit from the wall box for cleaning.

A feature of the invention is the provision of an improved ventilating fan assembly comprising a fan motor housing having complementary casing sections, and a supporting frame including an inner member engirdling the motor and clamped between the casing sections and having substantially radially extending strut portions for mounting the assembly in place.

Still another object of the invention is to provide an improved ventilating fan and mounting frame assembly as just described, which may be equipped with a convenient operating switch device supported on the frame and thus facilitating mounting of the entire assembly as a unit in a wall box.

It is a further object of the invention to provide an improved ventilating fan structure of economical design which may readily be manufactured and assembled by mass production techniques at minimum cost to produce a sturdy and efficient operating unit having a long service life.

These and other objects are effected by my invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is an isometric or perspective view of a wall box and ventilating fan assembly embodying features of the invention;

Fig. 2 is a somewhat enlarged side view of the wall box and fan assembly shown in Fig. 1, certain portions thereof being shown in section;

Fig. 3 is an exploded view, of the component parts of a fan motor and mounting frame structure constructed in accordance with the invention, and illustrating the method of assembly thereof;

Fig. 4 is a front view of the mounting or carrier frame of the assembly shown in Fig. 1, illustrating association thereof with a wall box or duct;

Fig. 5 is a fragmentary sectional view taken along the line V—V of Fig. 4; and

Fig. 6 is a fragmentary sectional view taken along the line VI—VI of Fig. 4.

As shown in Fig. 1 of the drawings, the improved ventilating fan assembly embodying features of the present invention is adapted for association with a wall box or duct indicated generally by the reference character 1, which may be mounted in any suitable manner in an aperture provided in a wall of the kitchen or other space to be ventilated. The wall box or duct preferably comprises a cylindrical section 2 having interior and exterior openings, the exterior opening of which may be provided with suitable door or other closure (not shown) supported on an integral flanged plate 3.

As shown in Fig. 2, the interior opening of the cylindrical section 2 of wall box 1 may be screened by a closure member or grill plate 4, which is adapted to be secured in place in a manner hereinafter explained. Adjacent this interior opening, the cplindrical section 2 of the wall box is provided with a number of mounting lugs or tabs 5, each of which is welded or otherwise secured to the interior wall of the cylindrical section and has an inwardly extending portion provided with a threaded bore 6.

As shown in Figs. 2 and 3 of the drawings, the fan assembly includes a motor 7 for driving a fan or propeller 8 and supported within the wall box 1 by means of a mounting frame 9. The fan motor 7 comprises a pair of complementary casing sections 10 and 11 which are adapted to be secured in assembled relation by means of a plurality of through bolts 12 and associated nuts 13, for which suitable recessed openings are formed in the two casing sections. Mounted within the assembled casing sections 10 and 11 is a stator 14, which is disposed in cooperative alignment with a rotor 15 carried by a shaft 16 that is journaled in bearings 16a and 16b, mounted in the respective casing sections. One end of the shaft 16 extends outwardly of the casing section 11 and carries the propeller 8. It will be understood, of

course, that the construction of the motor 7 is not illustrated in detail, the elements identified having been mentioned in order to facilitate proper understanding of the invention.

According to the invention, the mounting frame 9 is preferably made of stiff wire or light bar stock, and comprises an inner annular portion or ferrule 17, a pair of concentrically disposed substantially rectangular outer portions or bails 18, and a plurality of substantially radially disposed strut portions 19 spaced in pairs for connecting the bails 18 to the ferrule 17. The outer bails 18 are similar in size and preferably made substantially rectangular in form with flattened corner portions 18*a* disposed approximately 90 degrees apart, as best shown in Fig. 4. The strut portions 19 are similarly spaced substantially 90 degrees apart with the inner ends thereof contiguous to and welded to one side of the ferrule 17. The outer ends of the respective pairs of strut portions 19 are bent slightly out of alignment, one end of each pair being interposed between and welded to the separate bails 18, and the end of the adjacent strut portion of each pair being welded to the outer side of one of the bails.

The frame assembly 9 is adapted to be combined with the casing elements of the motor 7 to form a unitary structure, which may easily be handled and mounted in any suitable position while affording maximum protection to the motor and fan. As is best illustrated in Fig. 3 of the drawings, the inner annular portion or ferrule 17 of the frame assembly is of substantially the same diameter as the complementary casing sections 10 and 11, so that assembly of the unit may readily be accomplished by first mounting the stator 14, rotor 15 and shaft 16 in the casing section 10, after which the ferrule 17 of the frame assembly may be placed adjacent thereto and finally clamped between the two casing sections by means of the bolts 12. It will be noted that suitable notches are formed in the abutting edge of the casing section 10 to receive the respective ends of strut portions 19 overlapping the ferrule 17 of the frame assembly, when the parts are assembled.

Referring again to Fig. 1, it will be noted that the construction and arrangement of the strut portions 19 of frame assembly 9, with the ends of four such strut portions welded between the bails 18 and the ends of the alternate strut portions welded only to the inner bail, provides a fan motor carrier structure which may be conveniently mounted within the wall box 1. With the frame assembly 9 tilted angularly to enable corner portions 18*a* of the inner bail 18 to pass the respective lugs 5, the frame assembly may be inserted into the cylindrical portion 1 of the wall box and turned in clockwise direction, as viewed in Fig. 1, to cause the four corner portions 18*a* to slide over the lugs 5, which then occupy the spaces between the bails 18 and between the strut portions 19 of the respective pairs. Referring to Fig. 4, it will be seen that with the frame 9 thus mounted in wall box 1, and properly centered therein, the threaded bores 6 of the lugs 5 will be exposed inwardly of the corner portions of bails 18.

The frame assembly 9 and fan motor 7 are then adapted to be secured in position within the wall box 1 upon attachment to the wall box of the interior closure plate or grill 4, which is provided with suitably spaced apertures 4*a* (see Fig. 6) for receiving screws 20 designed for engagement in the respective threaded bores 6 of lugs 5.

The grill may be of any suitable construction, and may consist of either a punched sheet steel plate or a die casting provided with louvres or small apertures. The grill 4 is preferably provided with a peripheral flange of sufficient width to overlap the interior edge of the cylindrical portion 2 of the wall box, as shown in Fig. 6, thereby contributing to the appearance of the apparatus when installed.

In order to facilitate the electrical connection of the fan motor 7 to a suitable power supply, an outlet fixture 21 is provided in the lower wall of the cylindrical portion 2 of the wall box for receiving a plug 22 of the usual detachable type connected to a motor terminal conductor 23, as shown in Fig. 1. An operating switch device of suitable construction may also be associated with the motor 7 and may preferably be housed within a tubular element 24 made of a non-conducting composition. As shown in Figs. 1 and 2 of the drawings, the switch housing 24 is arranged in a vertical position and is supported on a bracket 25, the lower end of which is secured to the bails 18 by means of bolts 26. In order to provide further support for the switch housing 24, the upper end thereof is provided with a groove 27 through which extends a horizontally disposed strut 28, the opposite ends of which are welded to two of the radial strut portions of the frame assembly 9. With the switch housing 24 thus mounted as an integral element of the frame assembly 9 and motor 7, mounting of the apparatus in the wall box is facilitated, since the only electrical connection that need be made consists in insertion of the plug 22 into the outlet fixture 21.

From the foregoing, it will now be apparent that a ventilating fan assembly having features of the invention is adapted to be manufactured and assembled at low cost, and can readily be mounted in a wall box and secured in place without special tools or fixtures. Although the fan assembly, when mounted in the wall box, may be expected to operate throughout a long service period without attention, when inspection and cleaning become desirable, the entire fan unit including the frame assembly and motor may easily be removed from the wall box and safely handled during the cleaning operation, and afterwards replaced in the wall box with minimum effort. It will further be recognized that the novel features of construction of motor 7 and the associated carrier frame assembly 9, enabling treatment of these elements as a unit, may readily be adapted to a variety of purposes other than that of association with a wall box as hereinbefore disclosed.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

What I claim is:

1. In an electric fan assembly, in combination, a fan motor having complementary casing sections containing stator and rotor elements, and a supporting frame therefor comprising an inner ferrule portion adapted to be clamped between said casing sections, an outer bail portion, and a plurality of radial strut portions connecting said ferrule and bail portions.

2. In an electric fan assembly, in combination, a fan motor having complementary casing sections containing stator and rotor elements, and a supporting frame therefor comprising an in-

ner ferrule portion adapted to be clamped between said casing sections, and a plurality of substantially radially disposed carrier strut portions projecting outwardly from said ferrule portion.

3. The combination with an electric motor having complementary casing sections, of a wire mounting frame assembly comprising an inner ferrule member adapted to be clamped between said casing sections, a concentrically arranged pair of spaced bail members surrounding said ferrule member, and a plurality of pairs of strut members disposed in substantially radial alignment with the inner ends thereof secured to said ferrule member and outer ends thereof secured to at least one of said bail members.

4. The combination with an electric motor having complementary casing sections, of a wire mounting frame assembly comprising an inner ferrule member adapted to be clamped between said casing sections, a concentrically arranged pair of spaced bail members surrounding said ferrule member, and a plurality of strut members disposed in substantially radially aligned pairs having inner ends secured to said ferrule member and outer ends spaced apart and contiguous to said bail members, one outer end of each pair of strut members being secured between and jointly to said bail members, and the alternate outer end of each pair being secured to only one of said bail members.

5. In an electric fan assembly, in combination, a fan motor having complementary casing sections containing stator and rotor elements, a supporting frame therefor comprising an inner ferrule portion adapted to be clamped between said casing sections, an outer bail portion, and struts connecting said portions, and a switch housing entirely supported on said supporting frame in association with said fan motor.

6. In a ventilating fan assembly, a wall box having outlet and inlet openings, a fan motor having complementary casing sections, a supporting frame including an inner annular portion and strut portions extending radially therefrom, said inner annular portion being clamped between said casing sections of the motor, and means for removably securing said strut portions of the frame to said wall box for supporting said motor between said inlet and outlet openings.

7. In a ventilating fan assembly, a wall box having inlet and outlet openings, a fan motor having complementary casing sections, a supporting frame including an inner ferrule portion clamped between said casing sections, a pair of spaced substantially rectangular bail portions, and strut means joining said bail portions to said ferrule portion, a plurality of lugs carried within said wall box and adapted to be received between said bail portions of said frame, and means for locking said bail portions to said lugs.

8. In a ventilating fan assembly, a wall box having inlet and outlet openings, a fan motor having complementary casing sections, a supporting frame including an inner ferrule portion clamped between said casing sections, a pair of spaced substantially rectangular bail portions, and strut means joining said bail portions to said ferrule portion, a plurality of lugs carried within said wall box and adapted to be received between said bail portions of said frame, and a closure member for said wall box adapted to be secured to said lugs in engagement with said bail portions of the supporting frame.

9. The combination with a motor having complementary casing sections, of a mounting frame assembly comprising an inner ferrule member adapted to be clamped between said casing sections, a plurality of strut members secured to said ferrule member and disposed in pairs extending substantially radially thereof, and a pair of spaced bail members arranged concentrically of said ferrule member, one of each said pair of strut members being disposed between and secured to both said bail members and the other being secured to only one bail member, thereby defining, adjacent the respective pairs of strut members, spaces between said bail members closed at one side by the intermediate strut member and open at the other side.

10. In a ventilating fan assembly, a wall box having inlet and outlet openings, a plurality of lugs secured within said wall box, a fan motor having complementary casing sections, a supporting frame including an inner ferrule member clamped between said casing sections, a pair of bail members arranged concentrically of said ferrule member, and a plurality of strut members joining said bail members to said ferrule member, said strut members being arranged in radially disposed pairs, the other end of one strut member of each said pair being interposed between the bail members and the outer end of the other strut member being secured to only one of said bail members, whereby a plurality of lug-receiving spaces are provided between the strut members of the respective pairs, each of said lug-receiving spaces having an open side through which one of said lugs can enter said space.

11. In an electric fan assembly, in combination, supporting means, a fan motor having complementary casing sections containing stator and rotor elements, and a supporting frame therefor comprising an inner ferrule portion clamped between said casing sections, and a plurality of substantially radially disposed carrier strut portions projecting outwardly from said ferrule portion into engagement with said supporting means.

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