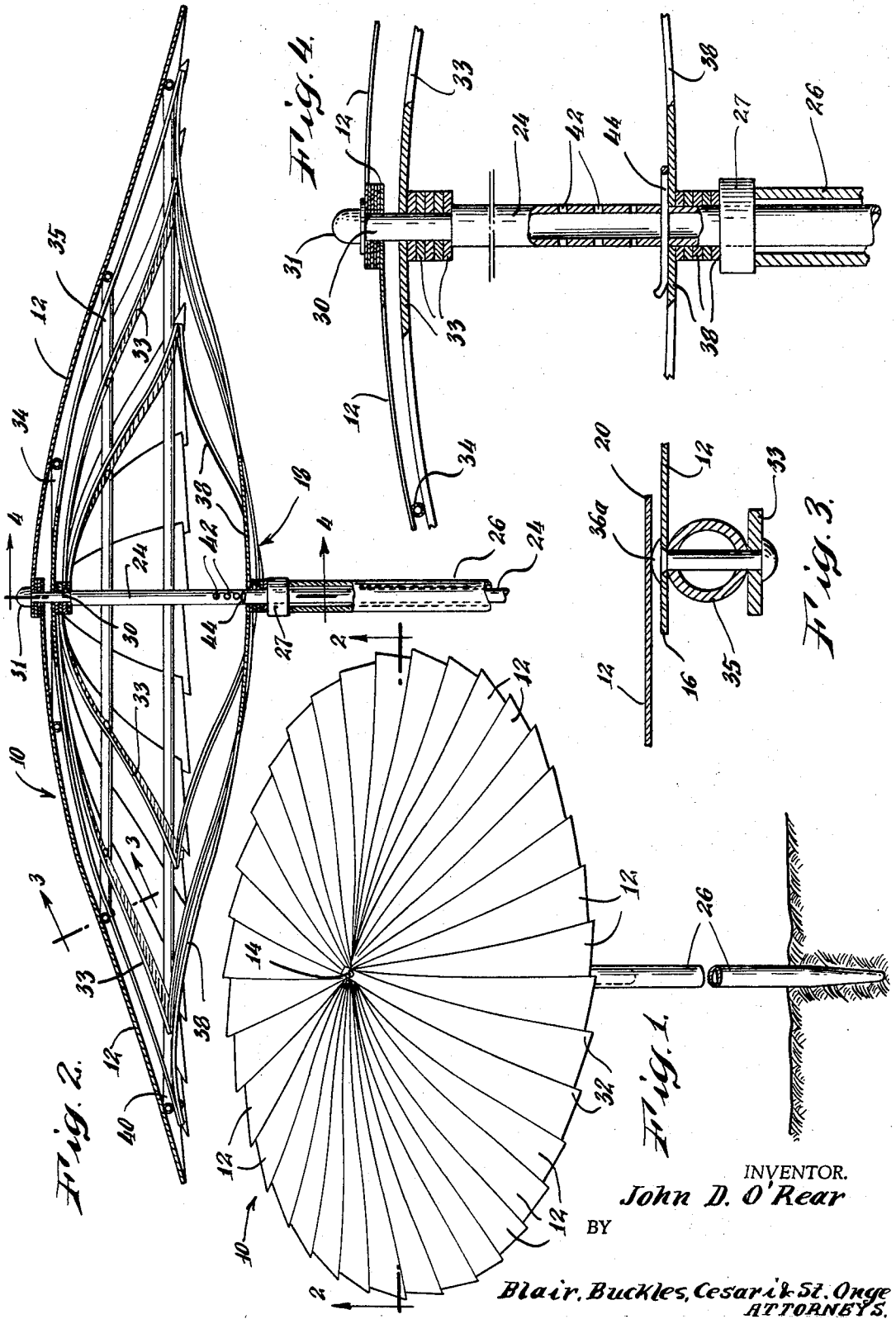
June 4, 1968 J. D. O'REAR 3,386,455

WIND-RESISTANT UMBRELLA

Filed March 28, 1967 2 Sheets-Sheet 1



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Filed March 28, 1967 2 Sheets-Sheet 2

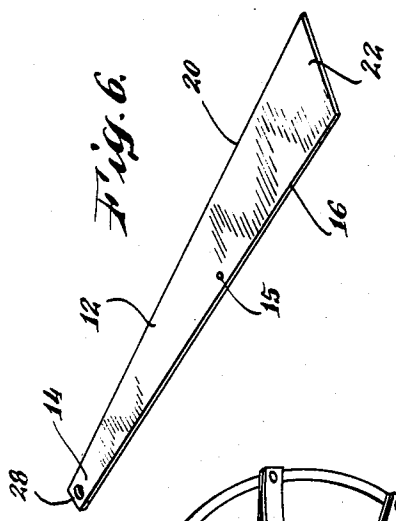

Fig. 6.

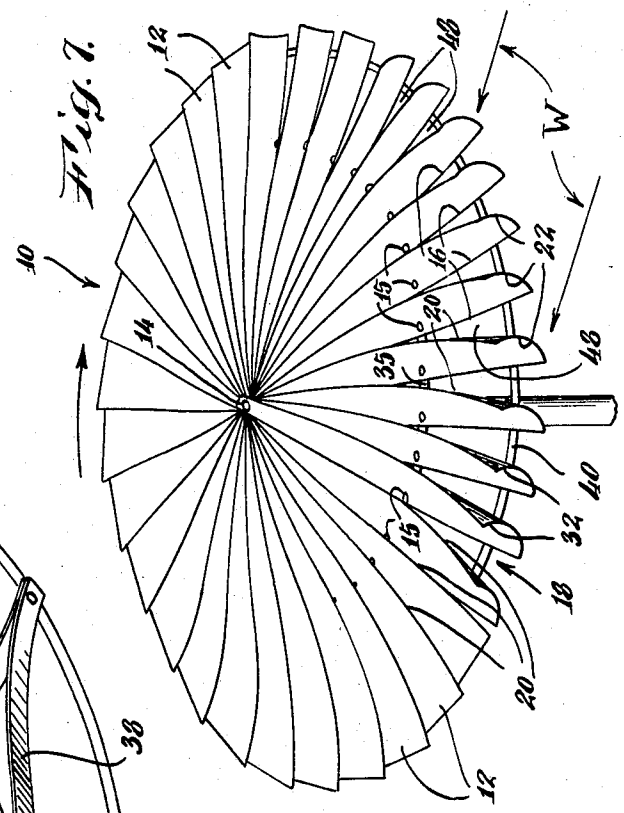

Fig. 7.

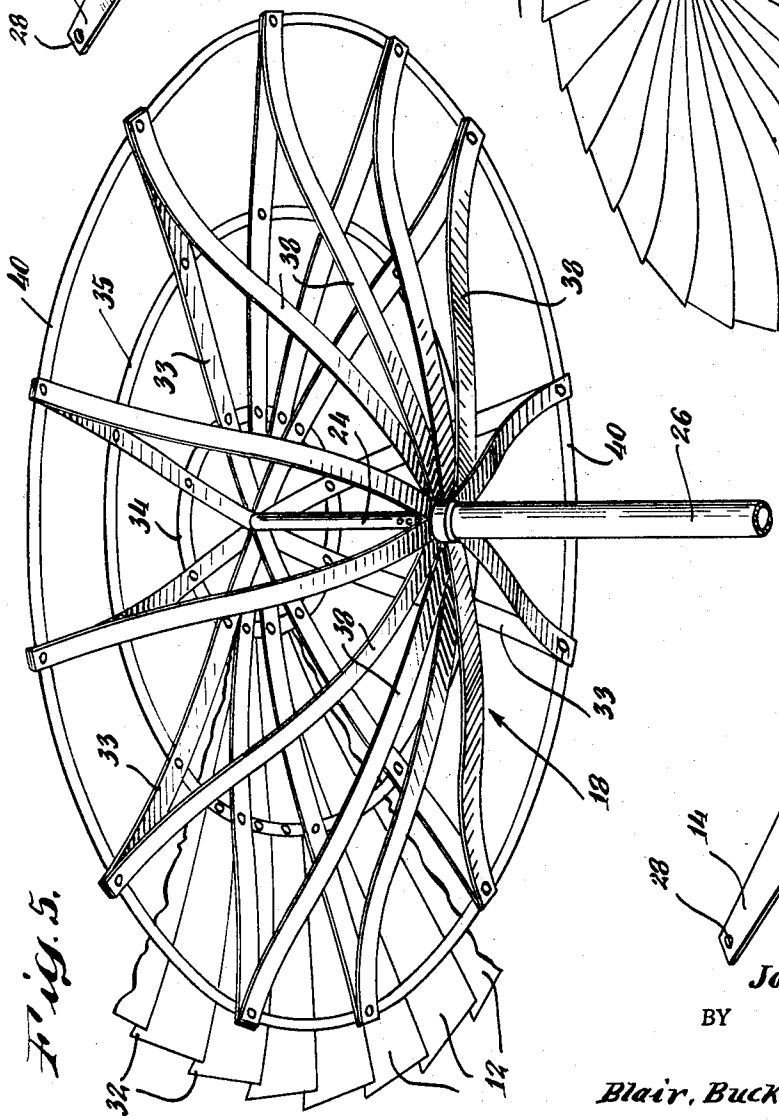

Fig. 5.

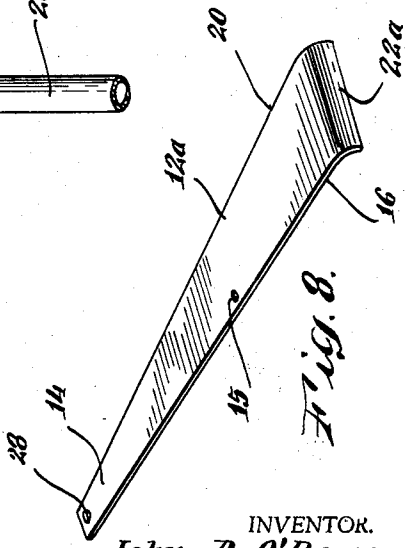

Fig. 8.

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WIND-RESISTANT UMBRELLA

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ABSTRACT OF THE DISCLOSURE

The invention relates to an umbrella having a top formed of a plurality of triangular shaped vanes which are joined together at their apexes and fanned out to serially overlap one another over an umbrella frame. Each vane is secured to the umbrella frame along one longitudinal edge so that they can lift partially free from the frame when subjected to wind currents to permit venting and relieve pressure on the umbrella as a whole. The umbrella also rotates to dissipate the force of the wind and may be made adjustable to permit variation in the curvature of the umbrella top.

BACKGROUND OF THE INVENTION

The present invention relates to an umbrella for use particularly on lawns, patios, or the beach where gusts of wind are apt to upset or carry away the umbrella and cause injury or damage.

In an effort to reduce or eliminate the dangers of windborne umbrellas, umbrella poles have been anchored in concrete or secured by other means to objects such as lawn tables or the like. However, by anchoring an umbrella, flexibility of location is completely sacrificed, and when umbrellas are secured to tables or other articles, the combination may tip or blow about compounding the danger of injury or damage.

Attempts have been made to vent umbrella tops to reduce lifting forces and thus make them resistant to wind. These attempts, however, have not been fully satisfactory in eliminating the tendency of umbrellas to become windborne. In addition, the resultant umbrellas have been inordinately heavy, complicated and expensive commercial products.

Accordingly, representative objects of the present invention are to provide a wind-resistant umbrella which is effective, simple in construction, lightweight and inexpensive.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the constructions hereinafter set forth, and the scope of the invention will be indicated in the claims.

SUMMARY OF THE INVENTION

Referring to FIGURE 1, the umbrella of the invention comprises a top **10** formed of a plurality of essentially triangular vanes **12** joined at their apexes **14** and spread out to serially overlap one another. As shown in FIGURE 7, each vane **12** is secured at an intermediate point **15** along one longitudinal edge **16** to an umbrella frame shown generally at **18**. The other longitudinal edge **20** of each vane **12** is free from restraint. Thus, when the umbrella is caught by a gust of wind (W) as shown in FIGURE 7, the base **22** and free edge **20** of each vane **12** can bend and lift free of the next adjacent vane to permit air to vent through top **10**. This venting action substantially reduces the lifting force of the wind on top **10** to prevent displacement of the umbrella.

Preferably, the umbrella pole **24** is loosely telescopically mounted in a tubular support **26** (FIGURE 1) so that the

umbrella will rotate in a gust of wind. The rotation of top **10** serves to dissipate the force of the wind and thus further enhances the umbrella's wind resistance.

The curvature of top **10** may also be made variable through adjustment of frame **18** in a manner more fully described below. By varying the curvature of top **10**, various characteristics of the umbrella can be advantageously altered.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a top perspective view of the umbrella of the invention showing the vane configuration of the umbrella top.

FIGURE 2 is an enlarged partial sectional view taken along line **2—2** of FIGURE 1.

FIGURE 3 is an enlarged partial sectional view taken along line **3—3** of FIGURE 2 and showing the manner of attachment of the vanes to the umbrella frame.

FIGURE 4 is an enlarged partial sectional view taken along line **4—4** of FIGURE 2 and showing the manner of attachment of the vanes and struts to the umbrella pole.

FIGURE 5 is an enlarged bottom perspective view showing the structure of the frame of the umbrella of the invention.

FIGURE 6 is a perspective view of a vane used in the umbrella of the invention.

FIGURE 7 is a top perspective view showing the reaction of the umbrella to wind.

FIGURE 8 is a perspective view of another embodiment of a vane for use in the invention.

Similar reference characters refer to similar parts throughout the several views of the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The vanes **12** which make up top **10** of the umbrella of the invention are formed of a relatively flexible material such as plastic or metallic (e.g., aluminum) sheet. As shown in FIGURE 6, each vane **12** is essentially triangular in shape and comprises a base portion **22**, apex **14** including opening **28**, and two longitudinal edges **16** and **20**.

A plurality of vanes **12** are stacked at the top **24** of the umbrella pole by threading their openings **28** over the reduced diameter portion **30** thereof as shown in FIGURE 4. A cap **31** threaded or force fitted over the end of portion **30** secures vanes **12** in place. Vanes **12** are fanned out over umbrella frame **18** and serially overlap one another as shown in FIGURES 1 and 3. They are secured to frame **18** in a manner more fully described below to form umbrella top **10**. The number of vanes required to form umbrella top **10** will, of course, depend upon the width of the individual vanes used and the amount of overlapping employed between vanes.

When it is desirable for aesthetic purposes to have an umbrella top with an overhanging outer edge, a vane **12*a*** such as shown in FIGURE 8 may be used in the invention. Vane **12*a*** is identical in all respects to vane **12** (FIGURE 6) except that base portion **22*a*** is bent over. When a plurality of such vanes **12*a*** are assembled into an umbrella top, their base portions **22*a*** jointly produce the desired overhanging edge effect.

Referring to FIGURES 4 and 5, vanes **12** are supported and configured by means of an umbrella frame **18**. A first plurality of struts **33** formed of a flexible resilient material such as glass fiber strip, aluminum or wood are

mounted at their centers on reduced portion 30 of pole 24 so as to project in sunburst fashion therefrom. Preferably the mounting of struts 33 is accomplished by providing each with an opening at its center and threading that opening over reduced portion 30.

A pair of ring supports 34 and 35 preferably formed of fibrous glass material, plastic or aluminum are concentrically disposed and secured to the upper surfaces of struts 33. As shown in FIGURE 3, a rivet or like fastening device 36 may be used to secure supports 34 and 35 to struts 33. Thus ring supports 34 and 35 maintain struts 33 in their sunburst configuration and provide reinforcement for the umbrella frame.

A second plurality of struts 38 similar to struts 33 are mounted and threaded on pole 24 at a point spaced below the mounting area of struts 33 (FIGURE 4). Struts 38 also project in sunburst fashion from pole 24 and are preferably in vertical alignment with struts 33. The free ends of struts 33 and struts 38 are resiliently deformed toward each other as shown in FIGURE 2, and jointly fastened to a third ring support 40 concentrically disposed with respect to the other ring supports 34 and 35 (FIGURE 5).

Thus as shown, struts 33 and 38 and ring supports 34, 35 and 40, in combination with pole 24 form the resilient umbrella frame 18. The resilience of frame 18 serves to cushion the umbrella from the shock of sudden high gusts of wind thus lessening the danger of wind damage to the umbrella and enhancing its wind resistant characteristics.

As shown in FIGURES 3 and 7, each vane 12 is secured at an intermediate position 15 along longitudinal edge 16 to the central ring support 35 by rivets 36 headed over at 36*a*. Vanes 12 are arranged so that each secured edge 16 is overlapped by the free edge 20 of the next adjacent vane 12 (FIGURE 3). The vanes 12 thus generally assume the curvature of umbrella frame 18. Preferably, the free longitudinal edge 20 of each vane 12 is longer than the secured edge 16 so that base portion 22 presents a protruding flap 32 (FIGURES 1 and 5) when top 10 is assembled.

Referring to FIGURES 2 and 4, the umbrella may be provided with a top 10 of variable curvature. One may wish to vary the curvature of top 10 for purely aesthetic purposes; however, such variation may also be used to adjust the aerodynamic characteristics of the umbrella to varying wind conditions, or to vary the area shaded or protected by the umbrella.

Due to the resilience of both struts 33 and 38, struts 38 can be moved along pole 24 to either increase or decrease their spacing from struts 33. It can be seen that as the spacing between struts 33 and 38 along pole 24 is increased, the curvature assumed by both sets of struts is also increased. Since vanes 12 are secured to the struts 33 as shown in FIGURE 3 and generally conform to the configuration thereof, the movement of struts 38 along pole 24 will also increase or decrease the curvature of top 10 depending upon the direction of movement.

Struts 38 can be secured in a number of predetermined positions by providing a series of spaced holes 42 in pole 24. Struts 38 may be moved along pole 24 to a position just below the particular hole 42 which provides the desired degree of curvature in top 10. A pin 44 (FIGURE 4) inserted through that hole 42 will then hold struts 38 in the desired position.

The resilient nature of frame 18 further provides for ease of storage of the umbrella. Upon removal of pin 44, struts 33 and 38 will return to their normal relatively flat configuration. In this position the top and frame structure and associated parts slide or move into a more compact arrangement. Upon removal of cap 31, the top and frame structure can be lifted from pole 24 for storage.

For optimum wind resistance, the umbrella is constructed to rotate. Thus, as shown in FIGURES 1 and 4, a tubular support 26 is provided into which pole 24 is telescopically mounted in a loose fit. A flange 27 at the top of support 26 (FIGURE 4) supports slats 38 so they may rotate.

The reaction of the umbrella of the invention to wind (W) is shown in FIGURE 7. The base portions 22 and free edges 20 of the vanes on the windward side of the umbrella bend and lift free of the secured edges 16 of the next adjacent vanes to form vents 48. Protruding flaps 32 on the vanes serve to facilitate the desired uplifting by providing a non-overlapped portion at which uplifting can readily commence. Vents 48 serve to relieve the upward pressure produced by the wind on umbrella top 10 to the point where it cannot overcome the static weight of the umbrella and thus cannot cause the umbrella to become wind-borne. At the same time, the umbrella rotates within tubular support 26 due to wind pressure on the uplifted edges 20 and base portions 22 of vanes 12. The rotation of the umbrella further dissipates the force of the wind and thus enhances wind resistance.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above article without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention, which, as a matter of language, might be said to fall therebetween.

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

1. A wind-resistant umbrella comprising, in combination:
   - (a) a pole;
   - (b) a plurality of vanes each having an apex, a base portion, and two longitudinal edges,
     - (1) said vanes being connected at their respective apexes to said pole and arranged to fan out in serially overlapping relationship; and
   - (c) frame means for supporting and configuring the curvature of said umbrella top,
     - (1) each said vane being secured to said frame means along one said longitudinal edge,
     - (2) the other longitudinal edge of each vane remaining free and overlapping the fixed longitudinal edge of the next adjacent vane;

whereby a portion of each vane may lift free of the next adjacent vane in wind to permit venting of said umbrella top.

2. A wind-resistant umbrella as defined in claim 1 wherein said secured longitudinal edge of each vane is shorter than said free longitudinal edge thereof whereby said base portion presents a protruding flap when said vanes are assembled into said umbrella top.

3. A wind-resistant umbrella as defined in claim 1 wherein said vanes are formed of flexible sheet material.

4. A wind-resistant umbrella as defined in claim 1 wherein said base portion of each said vane curves downwardly to produce an overhanging outer edge on said umbrella top.

5. A wind-resistant umbrella as defined in claim 1 and further including a tubular support into which said pole is loosely telescopically mounted whereby said umbrella is rotatable when subjected to wind.

6. A wind-resistant umbrella as defined in claim 1 wherein said frame means comprises:
   - (a) a ring support
     - (1) secured to the underside of each said vane at an intermediate position along one longitudinal edge thereof; and
   - (b) a first plurality of struts
     - (1) projecting in sunburst fashion from said pole adjacent the underside of said umbrella top, and
     - (2) each being secured to said ring support.

7. A wind-resistant umbrella as defined in claim 6 including:

(a) a second plurality of struts

(1) projecting in sunburst fashion from said pole from a point spaced below said first plurality of struts, and

(2) each secured adjacent the end remote from said pole to one of said first plurality of struts.

8. A wind-resistant umbrella as defined in claim 6 including a plurality of concentrically disposed ring supports only one of which is secured to said vanes as aforesaid, each of said ring supports being secured to said first plurality of struts.

9. A wind-resistant umbrella as defined in claim 7 including means for spacing said second plurality of struts from said first plurality of struts along said pole to configure the curvature of said umbrella top.

10. A wind-resistant umbrella as defined in claim 8

wherein said first and second pluralities of struts are equal in number and wherein corresponding struts in said first and second pluralities are secured to each other and to the outermost of said concentric ring supports.

11. A wind-resistant umbrella as defined in claim 9 wherein said means for spacing is adjustable to vary the curvature of said umbrella top.

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