(No Model.)

W. C. BRAMWELL.

WIND WHEEL.

No. 543,461. Patented July 30, 1895.

Fig:1.

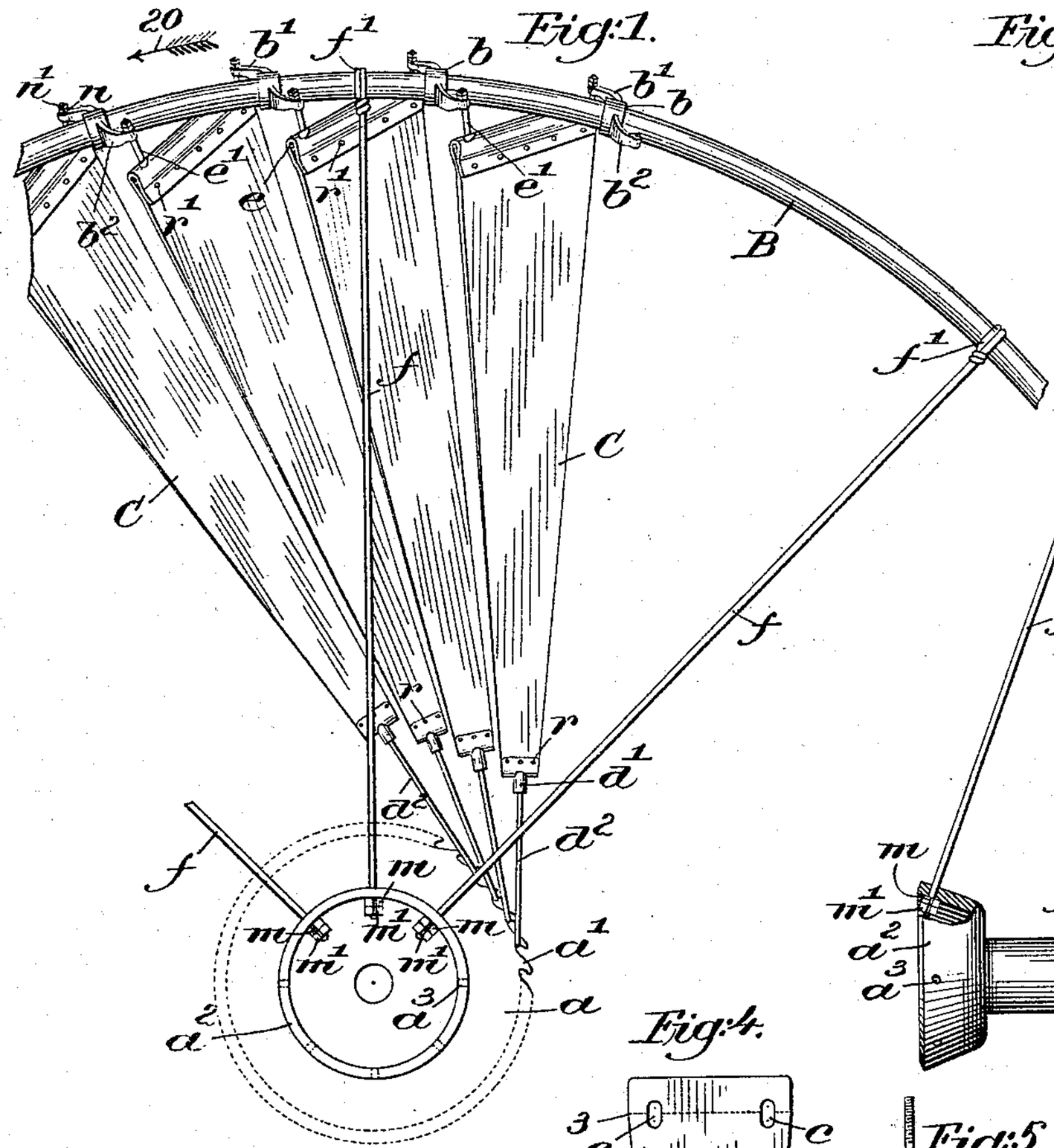


Fig:2.

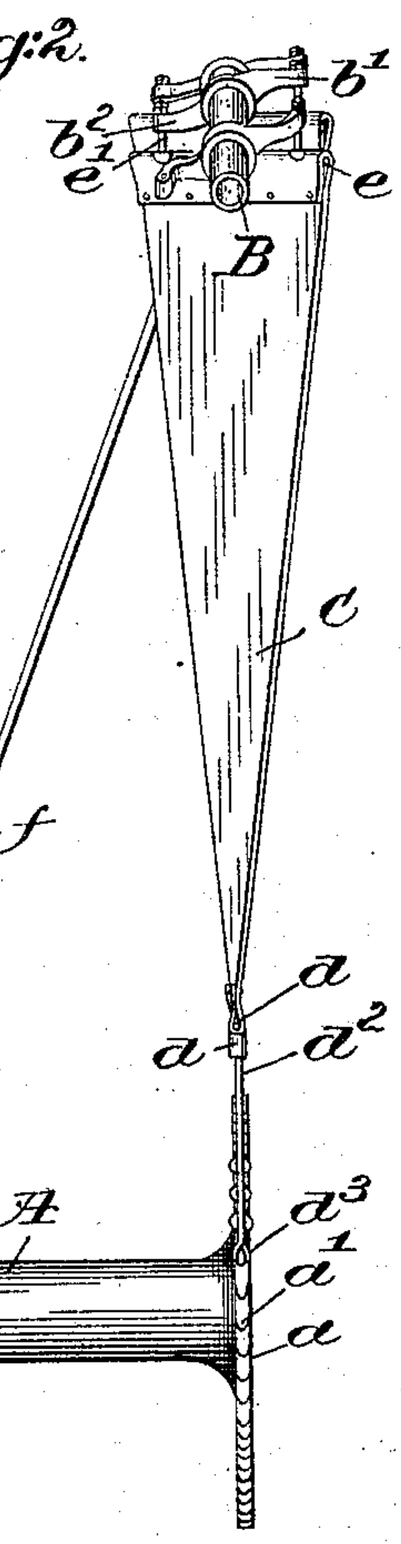


Fig:3.

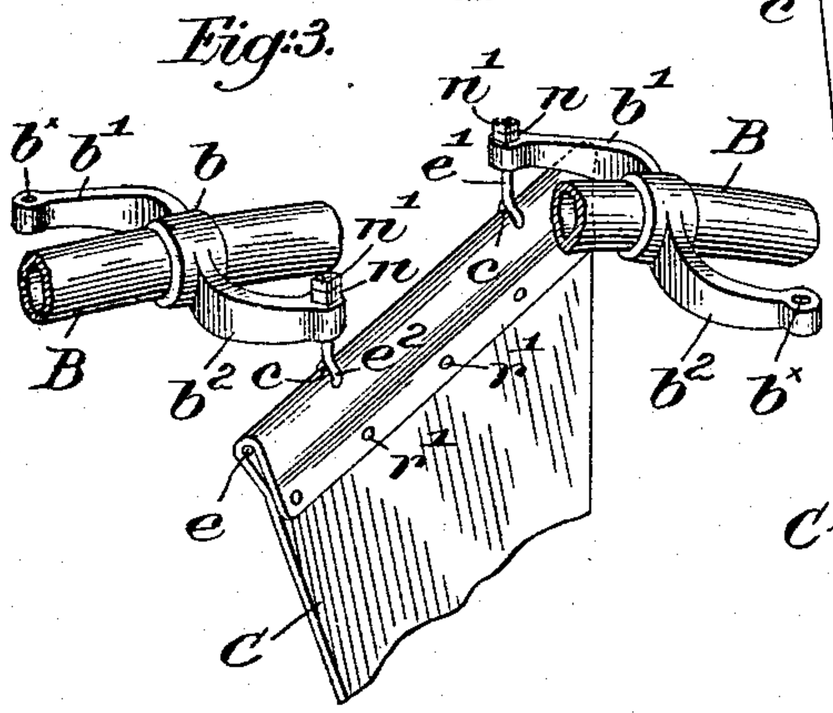


Fig:4.

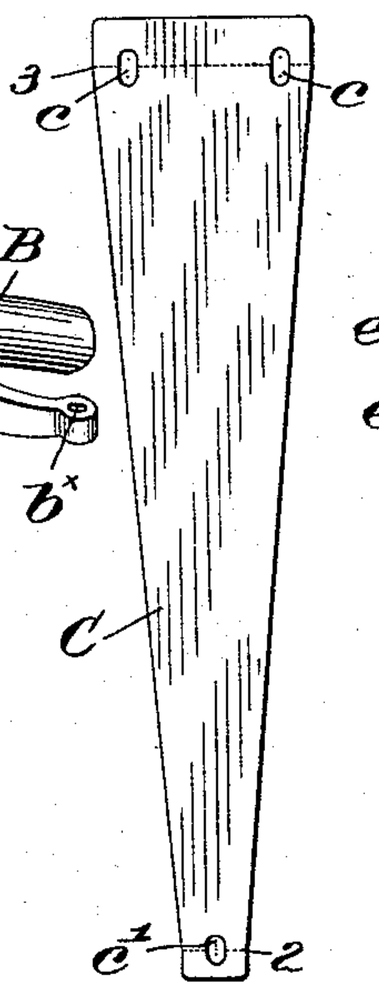


Fig:5.

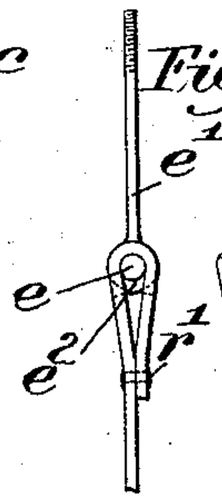


Fig:6.

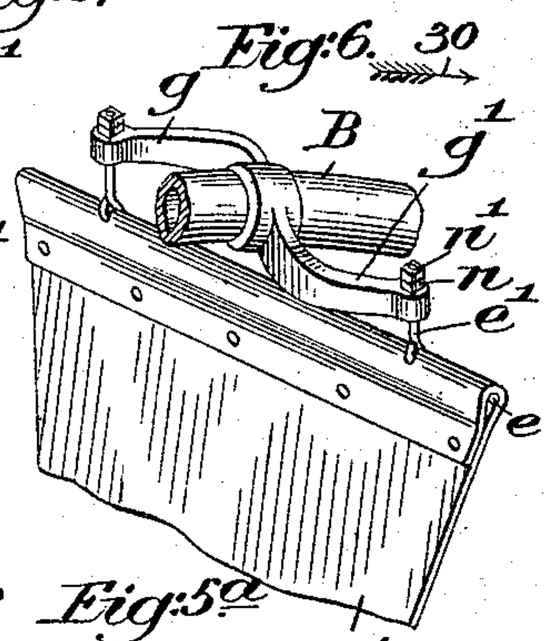
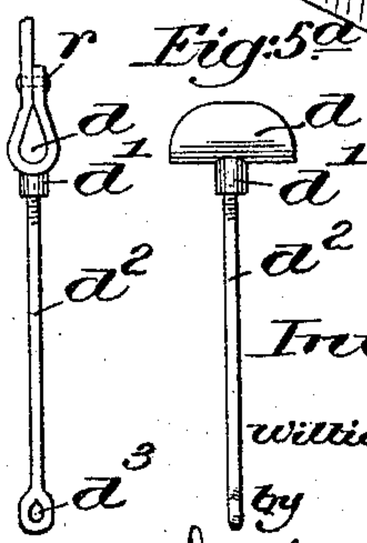


Fig:5a.



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UNITED STATES PATENT OFFICE.

WILLIAM C. BRAMWELL, OF HYDE PARK, MASSACHUSETTS.

WIND-WHEEL.

SPECIFICATION forming part of Letters Patent No. 543,461, dated July 30, 1895.

Application filed June 28, 1894. Serial No. 515,948. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. BRAMWELL, of Hyde Park, county of Norfolk, State of Massachusetts, have invented an Improvement in Wind-Wheels, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object the production of a wind-wheel wherein the wind-blades form a structural part thereof, the said blades being arranged tangentially to the hub and secured thereto and to the rim in such manner that the strength of the wheel is increased without additional weight.

As will be hereinafter shown, the wind-wheel embodying my invention is similar in its structural character to what is known as the "tangent" bicycle-wheel, the wind-blades herein taking the place of and having the structural functions of the spokes of such bicycle-wheels.

The wind-wheel is a tension-wheel, the hub and rim being connected by the wind-blades under tension, such tension being not only more than enough to prevent them from flapping, but sufficient to make them a structural part of the wheel.

My invention consists in a wind-wheel, of a hub, a rim, a series of holders thereon having oppositely-projecting arms, and a series of wind-blades connected tangentially to the hub at their inner ends, and at their outer ends to the arms of the holders, substantially as will be described.

Other features of my invention will be hereinafter described, and particularly pointed out in the claims.

Figure 1 is a front elevation of a sufficient portion of a wind-wheel to be understood, my invention being embodied therein. Fig. 2 is an edge view thereof, a portion of the wind-blades and wind-pressure braces being omitted. Fig. 3 is an enlarged view, partly broken out, of a part of the rim, showing the blade-holders. Fig. 4 is a front elevation of one of the wind-blades preparatory to being bent. Figs. 5 and 5^a are details to be described, and Fig. 6 is a modified form of connection between the blade and rim.

Referring to the drawings, I have herein shown the wind-wheel as comprising a hub A; a rim B, preferably a steel tube joined at its ends to form a continuous circle after the blade-holders, to be described, have been placed thereon, and a series of wind-blades C.

As shown in Figs. 1, 2, and 3, the rim B has thereon a series of metallic blade-holders, either cast or drop-forged, and consisting each of a hub b and projecting arms b' b^2, the said arms projecting from opposite sides of the hub and at an angle to the plane of the rim corresponding to the wind angle of the blades, so that the arms are set at an angle of about forty-five degrees to the hub. The arms have openings therethrough, as $b^\times$, at their outer ends to receive the connections, to be described, whereby the wind-blades are secured in place.

The blades C are preferably cut or stamped from thin sheet metal, such as galvanized iron, tin, brass, or any desired suitable material, the shape of the blades being substantially as shown in Fig. 4, each blade having at its outer end two elongated holes or slots c therein, and a similar slot or hole c' at its inner or narrow end. The inner end of each blade is bent over on the dotted line 2, Fig. 4, and about the head d of an internally-threaded shank d', the said shank being passed through the hole or slot c', after which the main and the turned-over portion of the blade are riveted together, as at r, thereby inclosing the head d, as clearly shown in Figs. 5 and 5^a. The outer end of the blade is bent over a rod e and riveted to the main part of the blade at r', after which the rod e is removed and eye-bolts e' are passed through the slots c in the end of the blade, the eyes e^2 entering the said slots at right angles to the plane of the blade, as shown in Fig. 5, after which the rod e is replaced, it passing through the eyes e^2 of the bolts and retaining them in place.

The hub A of the wheel is herein shown as extended in the direction of its longitudinal axis, and it is provided at one end with a flange a, preferably having hook-like teeth a' formed on its periphery, as clearly shown in Fig. 1, the other end of the hub having a cup-shaped enlargement a^2 thereon (see Figs. 1 and 2) provided with openings a^3, for a purpose to be described.

To attach the blades C to the holders the shank of one of the eyebolts e', at its outer

end, is passed through the opening $b^{\times}$ of one of the arms, as b^2, of a holder, the other eyebolt being preferably passed through the oppositely-extended arm, as b', of the next adjacent holder, as clearly shown in Figs. 1 to 3, inclusive, so that the blade is straddled, as it were, from one to the next holder and crossing the plane of the rim at the proper wind angle, and, as shown in the first three figures of the drawings, the direction of rotation of the wheel would be that of the arrow 20, Fig. 1. The eyebolts e' are held in place on the arms of the holders by nuts n, their threaded shanks projecting through the arms of the holders, and check-nuts n' prevent any loosening of the connections between the holders and blades by reason of vibration of the parts. This manner of securing the blades to the rim combines great strength and rigidity with lightness, as there is a substantially continuous connection between all the blades and holders around the rim.

The inner ends of the blades C are connected to the hub, the eyebolts d^2 screwed into the shanks d' of the heads d and having their eyes d^3 hooked over the teeth a' of the flange a in such manner that the blades are tangential to the hub, as clearly shown in Fig. 1.

In setting up the wheel, the blades are positioned as described, and the nuts n are tightened slightly all around the rim until the wheel is true, and the blades subjected to the proper amount of tension, after which the check-nuts n' are tightened to hold the parts securely in place. It will be observed that the blades are thus made a structural part of the wind-wheel, and that they are under tension supporting the hub from the rim, and their connection with the hub is tangential or other than radial.

A series of lateral wind-pressure braces f are shown as mounted at one end and extended through the openings a^3 in the cup-shaped portion a^2 of the hub, wherein they are held in place by suitable nuts m, the outer ends of the pressure-braces being suitably secured to the rim. As herein shown, the ends are twisted around the rim and then upon themselves, as at f', and the braces are subjected to the proper tension by tightening the nut m within the portion a^2 of the hub, suitable check-nuts m' retaining them as adjusted.

It is obvious that instead of twisting the braces around the rim, as shown, they could be secured to the rim in other ways, and while I have shown said braces as radial to the hub they could be made tangential thereto, if desired. It is also obvious that instead of providing the flange a with hook-like teeth a' to receive the eyes d^3 of the eyebolts the flange could be provided with holes to receive the hooked ends of similar bolts, such construction being practically a reversal of that shown in the drawings.

As shown in Figs. 1 and 2, the inner ends of the blades are in a plane at right angles to the axis of the hub and at the rear of the lateral or wind braces f, but it is to be understood that the blades could be located in front rather than behind the wind-braces.

In the modification shown in Fig. 6 I have shown the outer end of the blade C′ as attached to a single holder, the arms g and g' thereon projecting in opposite directions similar to the holders shown in Figs. 1 to 3; but in this instance the tangential angle of the blades would not be reversed, and the direction of rotation of the wheel would be that of the arrow 30, Fig. 6. By reversing the holders, however, so that the arms g and g' would be on opposite sides of the plane of the rim from that shown in Fig 6, the blades would have the same wind and tangential angles, as shown in Figs. 1 and 2.

So far as I am aware it is broadly new to connect the hub and rim of a wind-wheel by a series of blades under tension and connected tangentially to the hub at their inner ends, and at their outer ends to oppositely-projecting arms of holders on the rim; and my invention is not, therefore, restricted to the exact construction and arrangement as herein shown, as the same may be modified in various particulars without departing from the spirit and scope thereof.

I claim—

1. In a wind wheel, a hub, a rim, a series of holders thereon having oppositely projecting arms, and a series of wind blades connected tangentially to the hub at their inner ends, and at their outer ends to the arms of the holders, substantially as described.

2. In a wind wheel, a hub, a rim, a series of holders thereon having oppositely projecting arms, a series of wind blades connected tangentially to the hub at their inner ends, and at their outer ends to the arms of the holders, and means to stretch or tighten the said wind blades, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM C. BRAMWELL.

Witnesses:
GEORGE SANFORD,
HENRY B. TERRY.