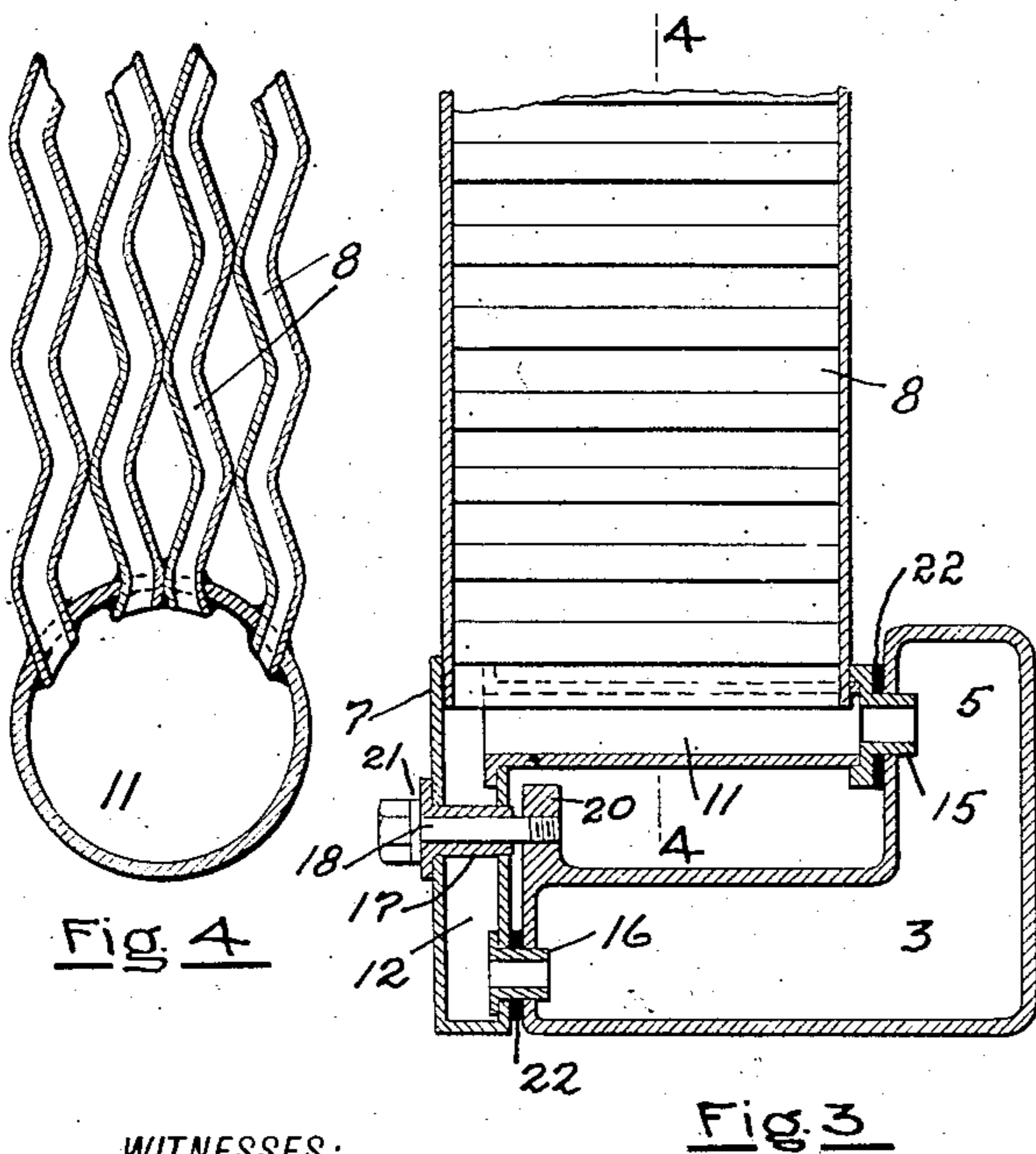
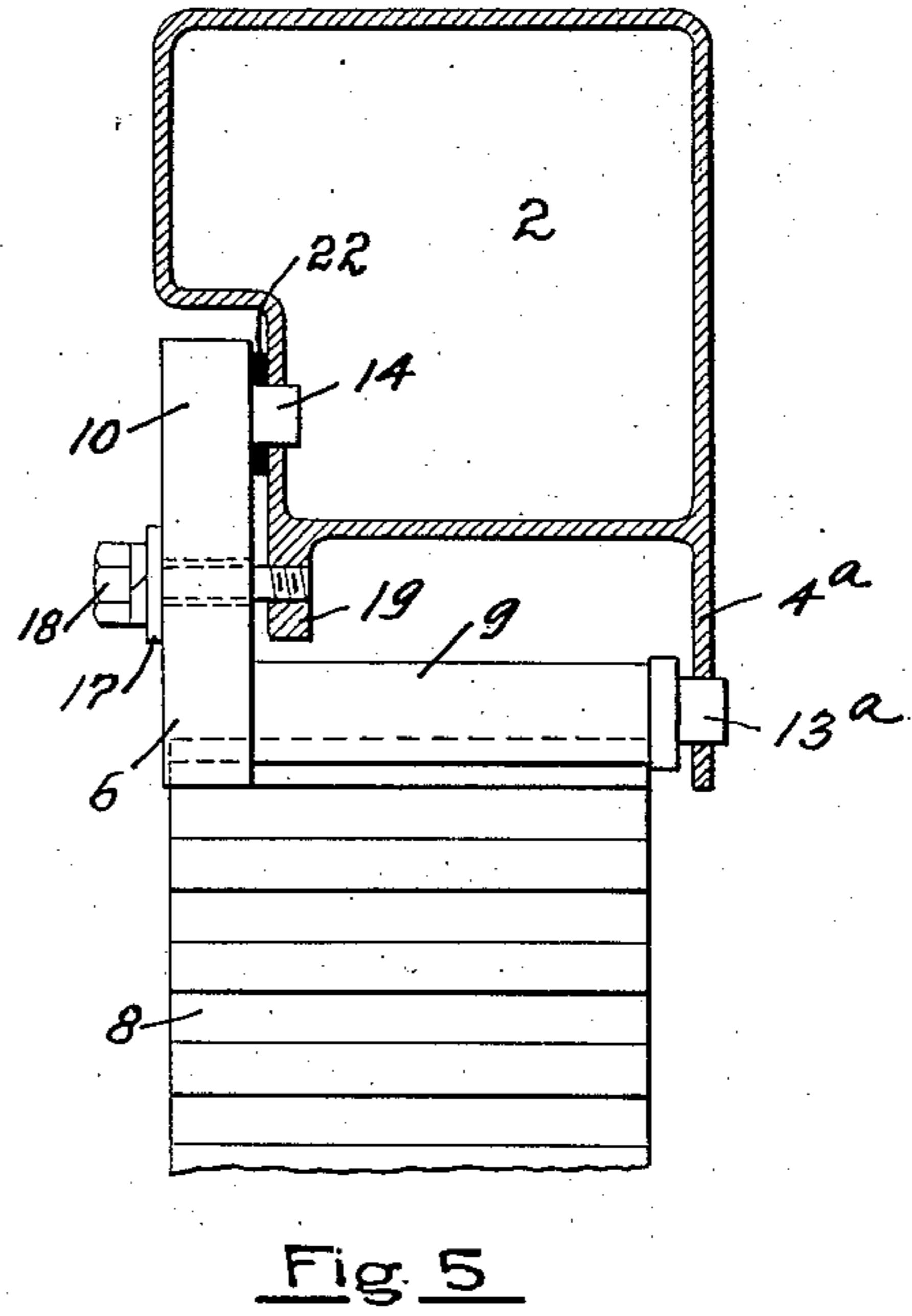
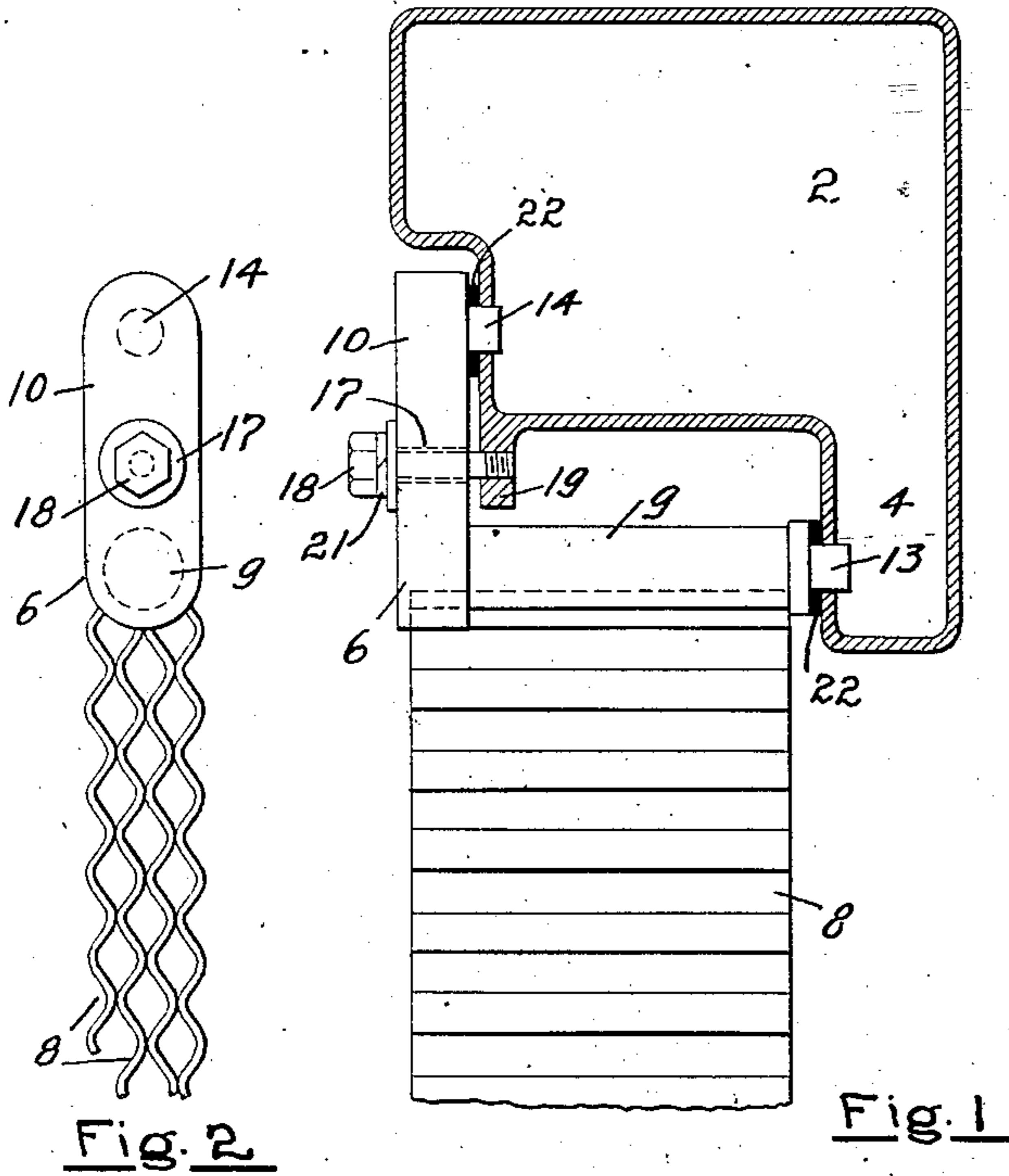


E. & H. BEHRINGER.
RADIATOR ELEMENT.

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997,949.

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EMIL BEHRINGER AND HERMAN BEHRINGER, OF BROOKLYN, NEW YORK.

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To all whom it may concern:

Be it known that we EMIL BEHRINGER and HERMAN BEHRINGER, citizens of the United States, and residents of the borough of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Radiator Elements, of which the following is a specification.

Our invention relates to automobile radiators comprising individually removable sections and particularly to radiators of the honey-combed or cellular type, wherein the surfaces of sections radiate direct without the use of heat absorbing disks.

The chief object of the invention is to provide novel, simple and efficient means for attaching the removable sections and for placing them in communication with the rest of the system.

With this and other objects in view, the invention consists in the parts, improvements and combinations, hereinafter more fully set forth.

Referring now to the drawings for a brief description thereof, Figure 1 is a partial side view of the upper portion of the invention, contiguous parts thereof being shown in section; Fig. 2 is a front view of Fig. 1, contiguous parts being omitted; Fig. 3 is a sectional view, corresponding to Fig. 1, through the lower part of the invention; Fig. 4 is a sectional view on the line 4-4 of Fig. 3; Fig. 5 is a modification of Fig. 1; and Fig. 6 is a modification of Fig. 2, showing straight tubes.

In these views the numeral 2 indicates the water-tank of an automobile radiator, and 3 is the water-recipient below the water-tank. Preferably, the water-tank 2 has the hollow depending rear portion 4, and the water-recipient 3 is provided with hollow upstanding rear portion 5. In the modification illustrated in Fig. 5, the depending rear portion 4^a of the water-tank is merely a flange or wall.

Each radiator section, of which there are a plurality in the radiator, consists of a compartment 6 under and communicating with the water-tank 2, a compartment 7 over and communicating with the water-recipient 3, and a plurality of thin and deep tubular cooling elements 8 (as shown, four in number) arranged side by side connecting and communicating with the compartments 6 and 7.

Preferably, these cooling elements 8 are wavy or sinuous, but in Fig. 6 we have illustrated straight elements 8^a, between which are disposed wavy or sinuous strips of copper or brass 8^b, which afford radiating surfaces. The total width of the cooling elements of each section is as great as the width of the compartments 6 and 7.

In accordance with the invention, the compartment 6 consists of the horizontal portion 9 and the vertical portion 10; and the compartment 7 has the horizontal portion 11 and the vertical portion 12. The ends of the cooling elements 8 or 8^a are secured to and communicate with these horizontal portions 9 and 11. The horizontal portion 9 has a horizontal guide 13, which is received in an aperture in the depending portion 4 of the water-tank; and the vertical portion 10 has a horizontal guide 14, which is received in an aperture in the front portion of the water-tank. Similar guides 15 and 16 are provided at the lower end of the radiator section.

In accordance with the invention both of the horizontal guides 13 and 14, and similarly both of the guides 15 and 16, constitute ports placing the compartment in communication with the water-tank 2, and the water-recipient 3. In Fig. 5, however, we have shown a form of the invention wherein the guide 13^a is closed; and it will be understood that in this form of the invention the guide 15 will be of a similar nature.

According to our invention, attaching bolts 18 pass through the vertical portions 10 and 12 of the compartments between the axial lines of the guides 13 and 14, and 15 and 16. Thimbles 17 surround the bolts and keep them out of contact with the water in the compartments. The bolts are shown as screwed into lugs or flanges 19 and 20, formed on the water-tank 2 and the water-recipient 3, respectively. Lock washers 21 may be inserted under the heads of the bolts 18.

Packing is indicated at 22 for the several slip joints.

It will be apparent that the construction described is at once simple and efficient, and that the radiator sections may be readily removed and replaced, and when in place are firmly held. It will be seen, also, that the provision of two ports for each compartment insures free circulation.

Having described our invention, what we desire to secure by Letters Patent and claim, is:—

1. A radiator element consisting of a plurality of thin and wavy tubes placed side by side in the breadth of the radiator body, and a pair of compartments of substantially the same depth and width as the plural tubes and running fore and aft in said body, said compartments communicating with the opposite ends of said tubes and having forwardly-located ports for ingress and egress of the fluid passing through the radiator.

2. A radiator element comprising a pair of L-shaped compartments with the horizontal members thereof extending fore and aft in the radiator body; guides connected with both members of each compartment to direct and sustain the same forwardly and rearwardly in said body, and a plurality of wavy tubes joining said compartments one with the other, some of said guides affording suitable ports for the reception and discharge of the fluid flowing through the radiator to and from said compartments and tubes.

3. In a radiator, the combination with a water-tank, and a water-recipient below the same, of a detachable radiator section comprising a compartment under and communicating with said water-tank, said compartment consisting of a horizontal portion and a vertical portion, horizontal guides connecting said portions, respectively, with said water-tank, the guide of the vertical portion constituting a port placing said compartment in communication with said water-tank, a similar compartment over and similarly connected and communicating with said water-recipient, a plurality of cooling elements connecting and communicating with said horizontal portions, and means for securing said compartments against removal from said water-tank and water-recipient.

4. In a radiator, in combination with a water-tank, and a water recipient below the same; a detachable radiator section comprising an upper compartment, a lower compartment and cooling elements connecting and communicating with said compartments, said upper compartment comprising a horizontal portion to which the upper ends of said cooling elements are connected, and a portion extending upward from the front end of said horizontal portion, an upper and forward tubular guide constituting a port connecting said upward extending portion with the tank and a lower and rearward tubular guide constituting a port connecting the rear end of said horizontal portion with the tank.

5. In a radiator, in combination with a water-tank and a water recipient below same; a detachable radiator section comprising an upper compartment connected to and

communicating with said tank, a lower compartment connected to and communicating with said recipient, and cooling elements connecting and communicating with said compartments, said compartments comprising horizontal portions to which said elements are connected, and vertical portions extending upward and downward respectively, from the front ends of said horizontal portions, horizontal guides connecting the rear ends of said horizontal portions with the tank and recipient, horizontal guides connecting said vertical portions with the tank and recipient, certain of said guides constituting ports and attaching bolts passing through said vertical portions into the tank and recipient between the axial lines of the two horizontal guides of each compartment.

6. In a radiator, in combination with a water tank and a water recipient below the same: a detachable radiator section, comprising an upper compartment connected to and communicating with said tank, a lower compartment connected to and communicating with said recipient, and cooling elements connecting and communicating with said compartments, said compartments comprising horizontal portions to which said elements are connected and extensions projecting upward and downward, respectively, from the forward ends of said horizontal portions, horizontal guides connecting the rear ends of said horizontal portions with said tank and recipient and short attaching bolts passing through said extensions into said tank and recipient.

7. In a radiator, the combination with a water-tank having a depending rear portion, and a water-recipient below the same and having an upstanding rear portion, of a detachable radiator section comprising a compartment under and communicating with said water-tank, said compartment consisting of a horizontal portion and a vertical portion, horizontal guides connecting said portions, respectively, with said depending rear portion and the front portion of said water-tank, a compartment over and communicating with said water-recipient, said compartment consisting of a horizontal portion and a vertical portion, horizontal guides connecting said portions, respectively, with said upstanding rear portion and the front portion of said water-recipient, and a plurality of cooling elements connecting and communicating with said compartments.

8. In a radiator, the combination with a water-tank having a hollow depending rear portion, and a water-recipient below the same and having a hollow upstanding rear portion, of a detachable radiator section comprising a compartment under said water-tank, said compartment consisting of

a horizontal portion and a vertical portion, slip joints connecting and placing said portions in communication, respectively, with said depending rear portion and the front portion of said water-tank, a compartment over and communicating with said water-recipient, said compartment consisting of a horizontal portion and a vertical portion, slip joints connecting and placing said portions in communication, respectively with said upstanding rear portion and the front portion of said water-recipient, a plurality of cooling elements connecting and communicating with said compartments, and means for securing said compartments against removal from said water-tank and water-recipient.

9. In a radiator, the combination with a water-tank, and a water-recipient below the same, of a detachable radiator section comprising a compartment under and communicating with said water-tank, and a compartment over and communicating with said water-recipient, thimbles extending across the interiors of said compartments, securing bolts passing through said thimbles out of contact with the water in the compartments, and a plurality of cooling elements connect-

ing and communicating with said compartments.

10. In a radiator, the combination with a water-tank, and a water-recipient below the same, of a radiator section comprising a compartment under and communicating with said water-tank, said compartment consisting of a horizontal portion and a vertical portion, horizontal guides connecting said portions, respectively, with said water-tank, a similar compartment over and communicating with said water-recipient and similarly connected therewith, thimbles extending across the interiors of said vertical portions, securing bolts passing through said thimbles into the water-tank and water-recipient, respectively, and cooling elements connecting and communicating with said compartments.

Signed at the borough of Manhattan in the county of New York and State of New York this 29th day of January A. D. 1910.

EMIL BEHRINGER.

HERMAN BEHRINGER.

Witnesses:

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