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United States Patent [19]
Jones

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[45] **Date of Patent:** **Feb. 8, 2000**

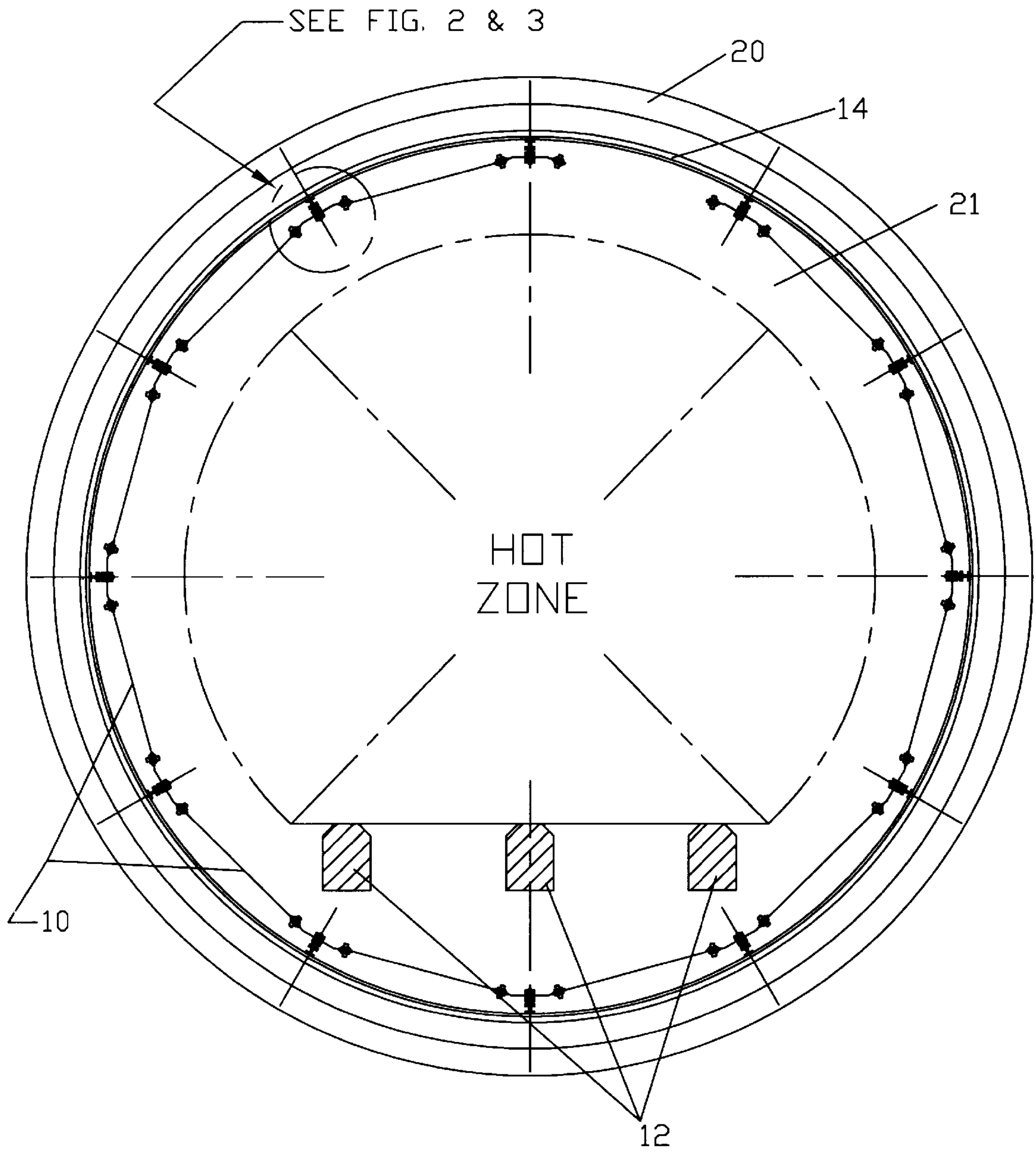
[54] **PROCESS FOR REPAIRING HEAT**
REPAIRING SURFACE OF HEAT

4,559,631 12/1985 Moller 373/130
4,608,600 04/1986 Moller 373/130

ELEMENTS THEREFOR

4,612,651 9/1986 Moller et al. 373/130
5,497,394 3/1996 Jhavar et al. 373/130

[57] **CLAIMS**



VIEW LOOKING INTO FURNACE

(VACUUM FURNACE 100)

FIG. 1

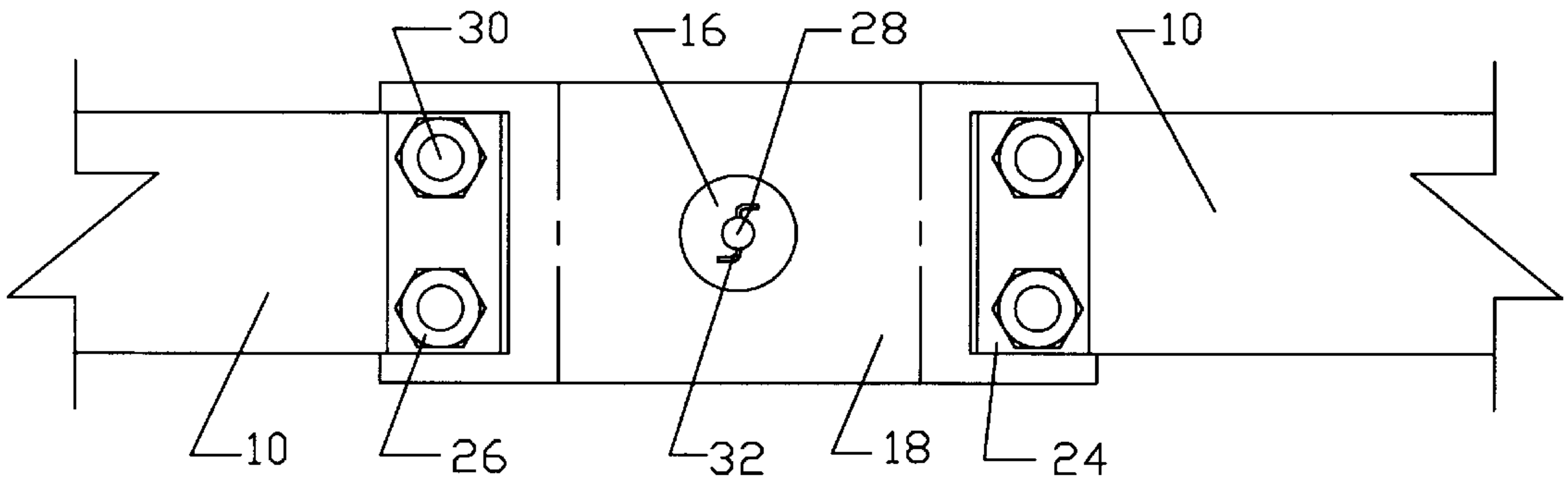
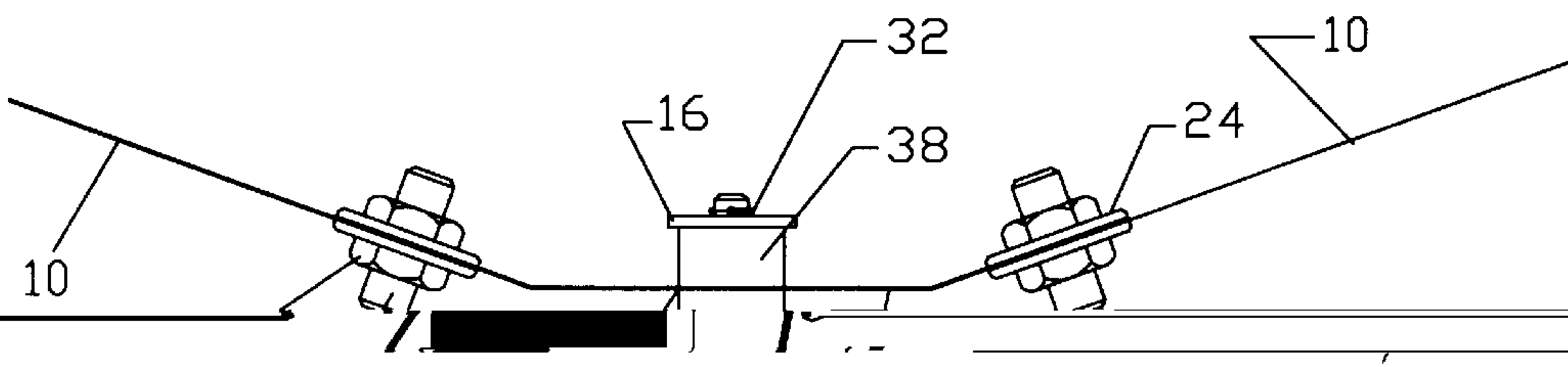


FIG. 2



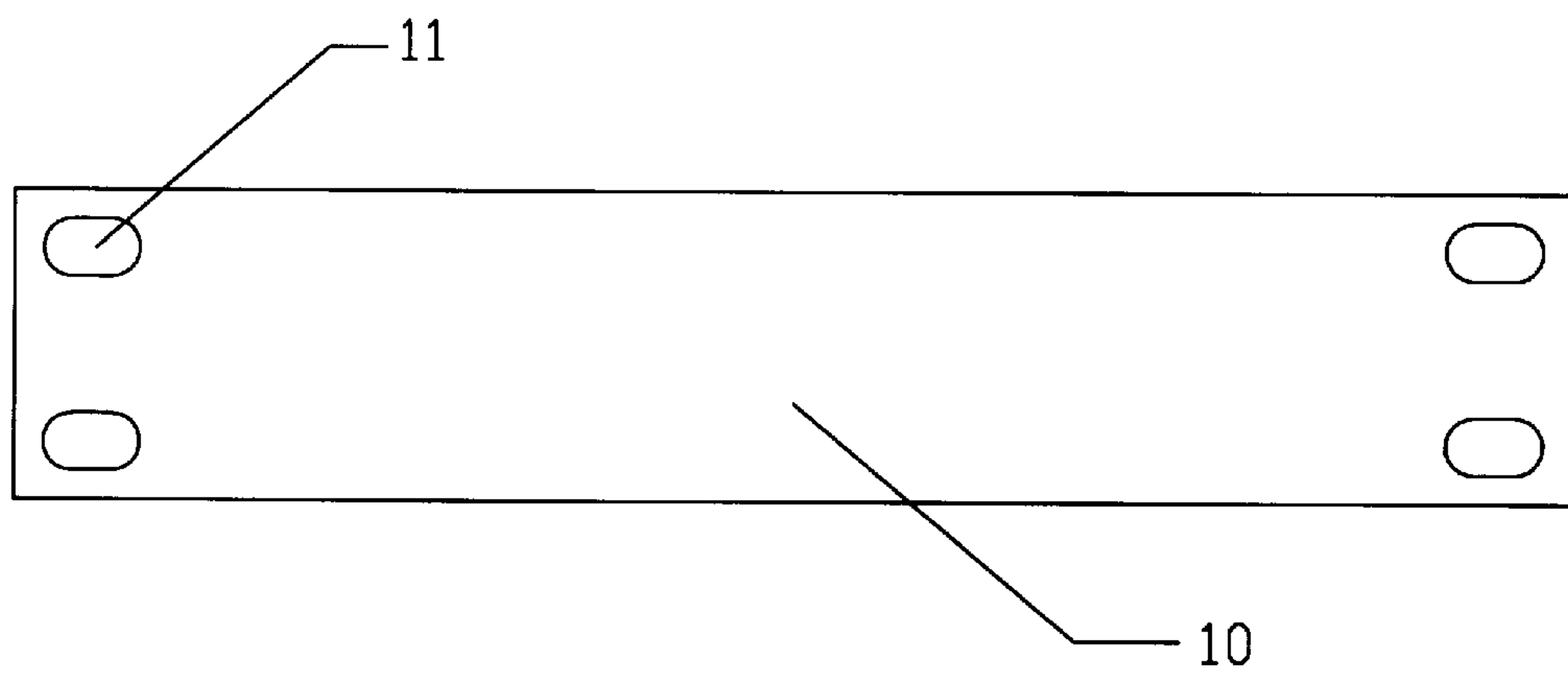


FIG. 4A

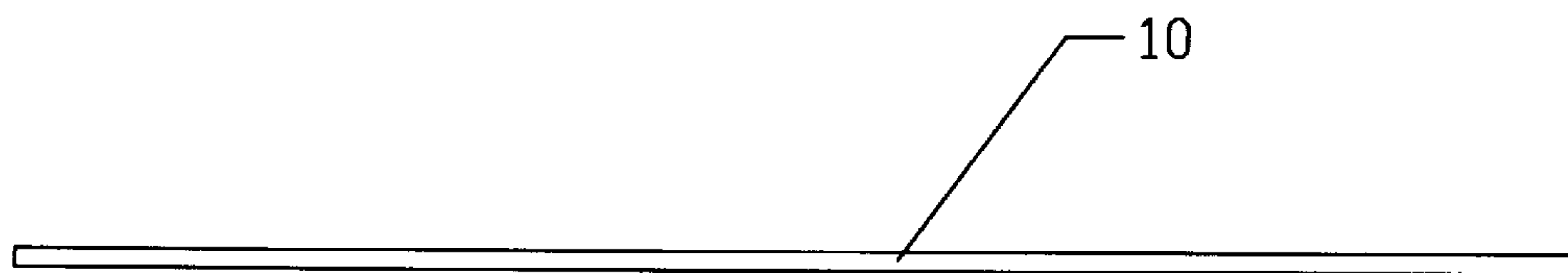


FIG. 4B

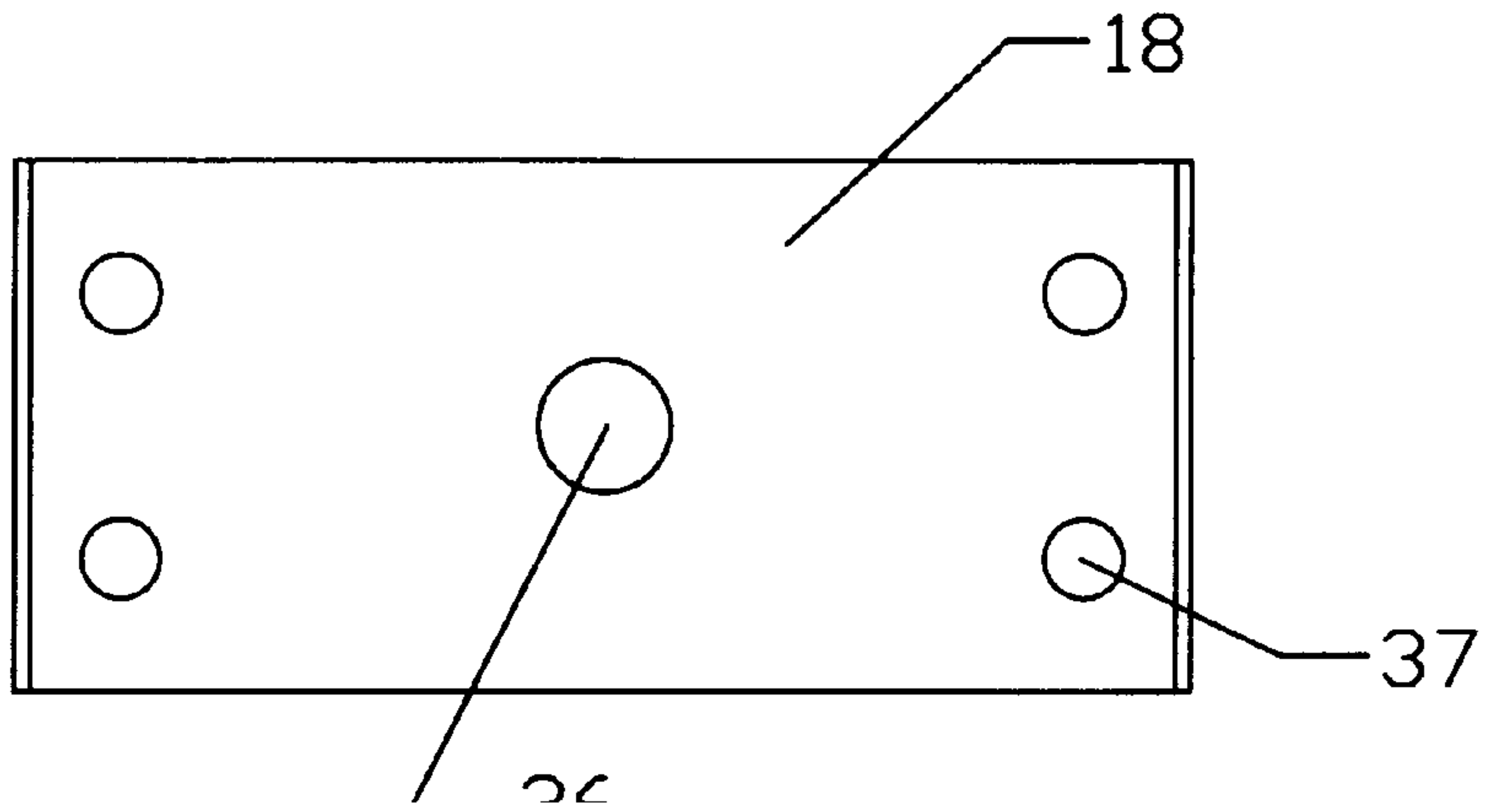


FIG. 5A

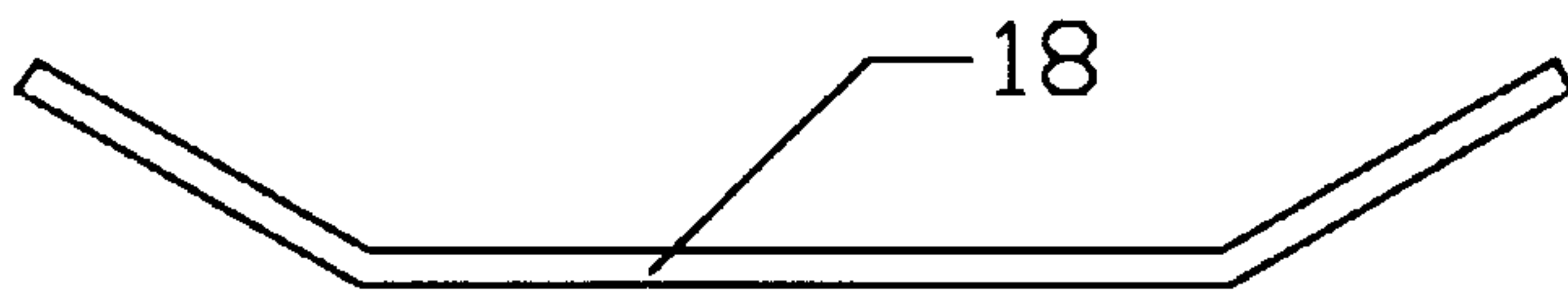


FIG. 5B

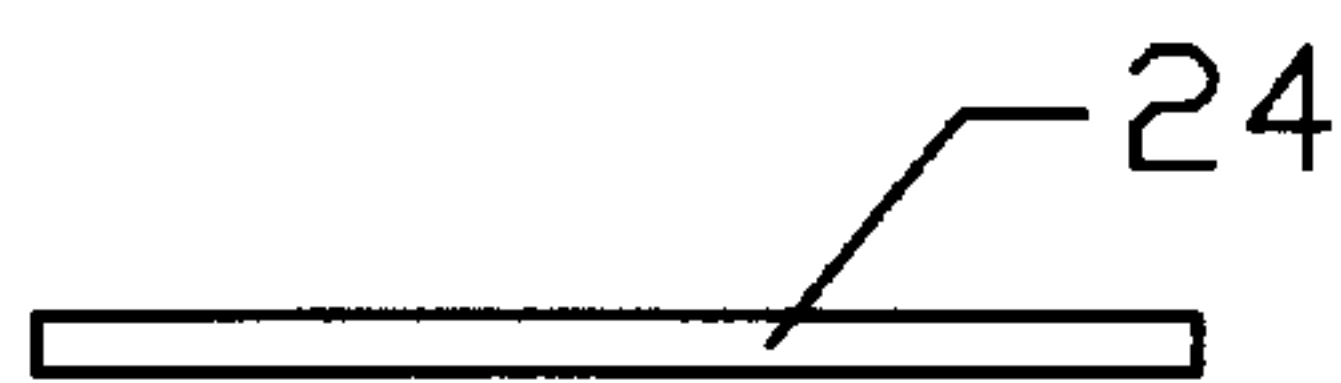
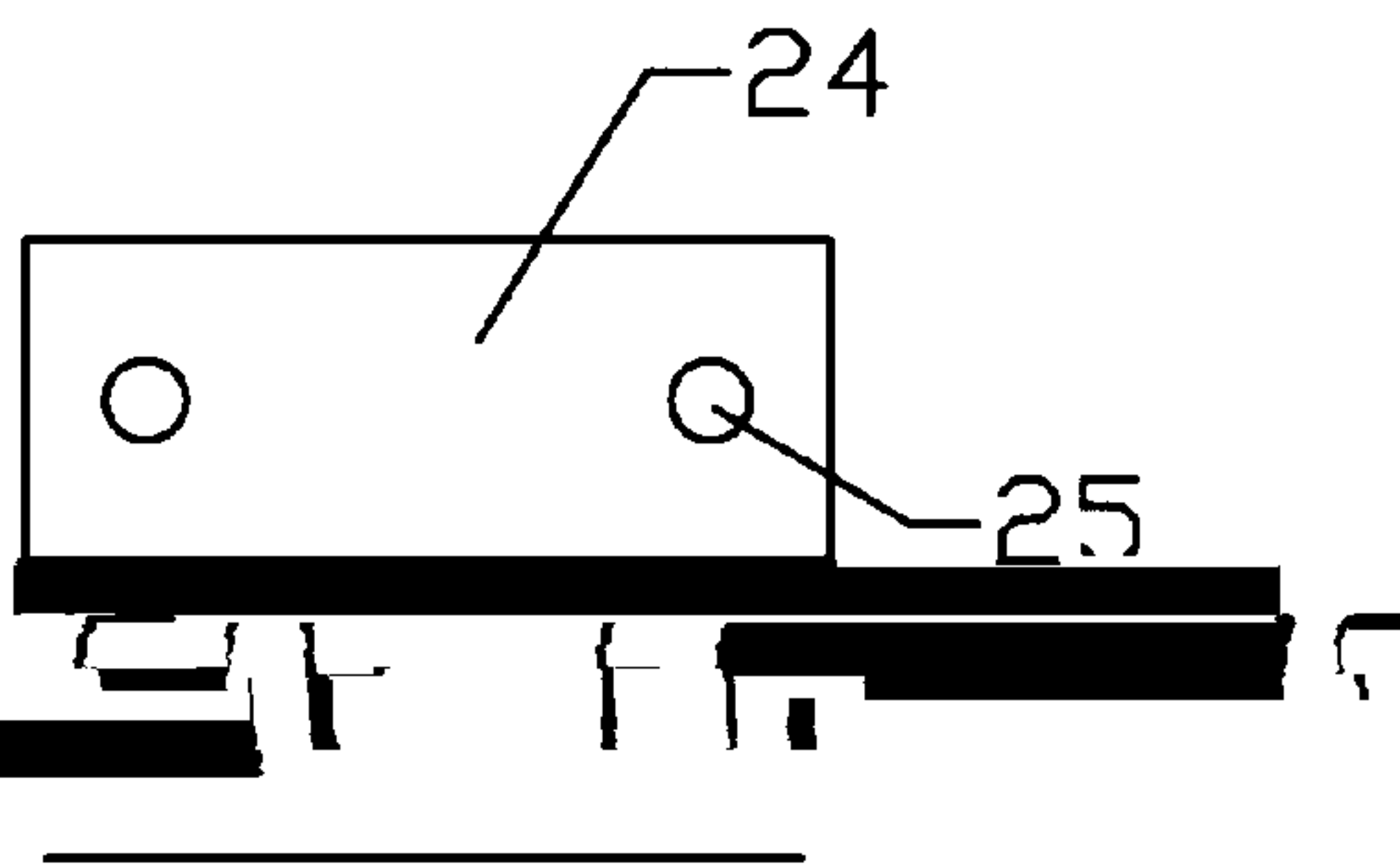


FIG. 6B

**PROCESS FOR REPAIRING HEAT
TREATING FURNACES AND HEATING
ELEMENTS THEREFOR**

This application is a continuation in part of U.S. appli- 5
cation Ser. No. 09/027,868 filed Feb. 23, 1998.

FIELD OF THE INVENTION

This invention relates to heat treating furnaces which

comprises a plurality of heating elements sandwiched at
their transverse ends between a stabilizer bar and a com-
pensator bar. The compensator bars of this embodiment are
contoured to provide a shape to the polygon, for example an
octagon or pentagon. The polygons are connected to the
inner wall of the hot zone chamber by a plurality of support
rods which support each of the polygons a distance away
from the heat shield. In a preferred embodiment, the heating
elements are formed from relatively pure (commercially

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In a preferred embodiment of this invention, the vacuum furnace **100** includes about six to ten longitudinally spaced banks of heating elements **10**, each bank being formed by eight separate elements **10** as shown in FIG. **4a**. The elements **10** preferably include oblong-shaped apertures **11** located approximately near their four corners. These aper-

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preferred lower width-to-thickness aspect ratio. In a typical prior art heating element using a 3.0 inch width and a 0.025 inch thickness the width-to-thickness ratio is 120. Although gravitational forces might be expected to have a higher impact on thin elements, that impact would not appear to account for the high incidence of failure in elements that are

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heating elements and provide greater creep resistance and (b) has a significantly lower width to thickness ratio.