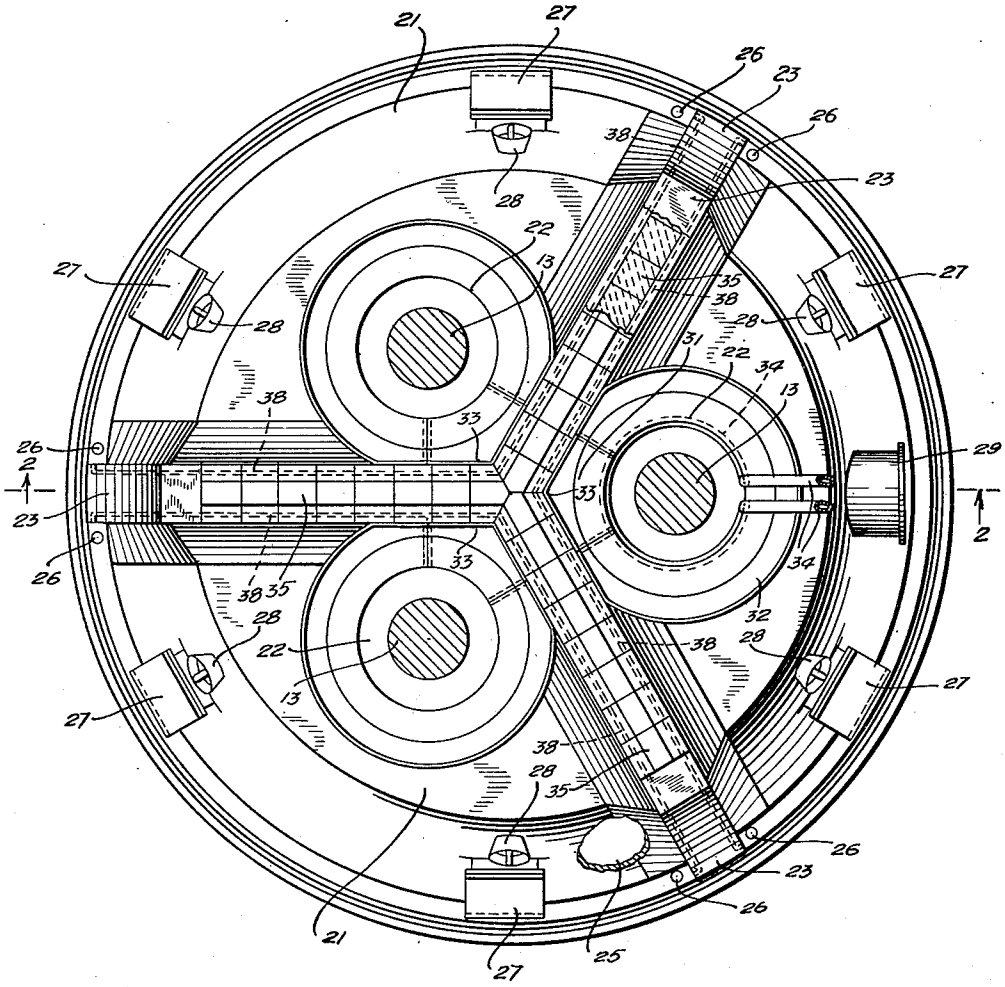
Aug. 15, 1933. R. G. MANSFIELD 1,922,312

ELECTRIC FURNACE

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Fig. 1.



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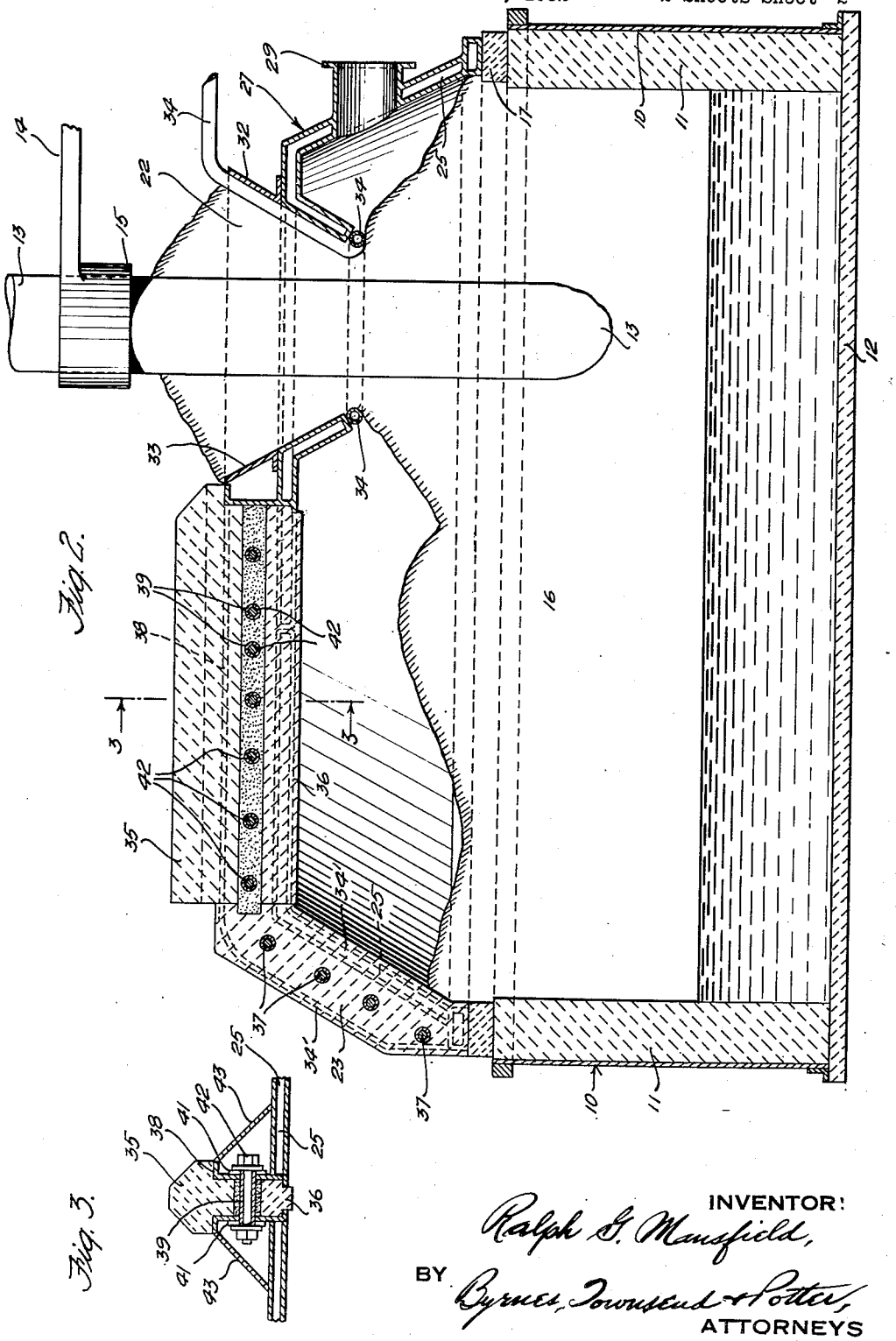


Fig. 2.

Fig. 3.

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ELECTRIC FURNACE

Ralph G. Mansfield, La Salle, N. Y., assignor to Union Carbide Company, a Company of Virginia

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6 Claims. (Cl. 13—1)

This invention relates to electric furnaces and especially to electric furnaces of the type which are provided with a cover whereby the gases produced by the reaction within the furnace, may be removed from the furnace and, if desired, utilized. An object of my invention is to provide a covered electric furnace having means for cooling the furnace cover and having a readily replaceable portion surrounding the electrodes. These and other objects of my invention will be evident from the following specifications having reference to the accompanying drawings in which:

Fig. 1 is a top view of a furnace constructed in accordance with one embodiment of my invention;

Fig. 2 is a vertical section on line 2—2 of Fig. 1, and;

Fig. 3 is a section on line 3—3 of Fig. 2.

I have illustrated my invention as applied to a three phase electric furnace, but it is obvious that it may be applied to other types of furnaces. In the drawings I show a furnace which is circular but may be of other shape. The furnace comprises an outer shell 10 having a lining 11 and a hearth 12. In a single phase furnace the hearth 12 may be made of conductive material and connected as one electrode. The furnace is provided with a plurality of electrodes 13, one for each phase. The current is supplied by a suitable connection 14 which I have shown connected to an electrode holder 15. Within the furnace is a mass of material 16 which is to be reacted upon in the furnace. Upon the lining 11, I provide suitable insulating members 17. These insulating members may be of various heights, thereby securing an adjustment in the height of the furnace cover.

The furnace cover consists of a plurality of cover sections 21. These sections are provided with openings 22 through which the electrodes extend and through which the charge of the furnace is fed. The sections are separated from each other by insulating walls 23 which will be described more in detail hereafter. The furnace cover is hollow, forming a space 25 for the circulation of cooling water. This space is provided with inlets and outlets for the cooling water as shown at 26. The cover sections are provided with cleanout doors 27 and stoke holes 28. One of the cover sections is also provided with an opening 29 for carrying away the gaseous products of the reaction taking place in the furnace. The cover sections are preferably made of iron castings but may be made of welded metal plates or a combination of cast and welded members. However, each cover section should be provided with a non-magnetic portion 31, to reduce the induction losses in the cover. Above the opening 22 is a hopper 32, providing means for introducing the charge into the furnace. This hopper is also preferably provided with a non-magnetic section 33. Surrounding the lower end of the hopper is a nose ring 34 which may take the form of a pipe bent to the desired shape or which may be a casting. Water is circulated through this pipe at a much more rapid rate than through the remainder of the cover. By the use of the separate nose ring it is possible to supply cooling fluid direct to the hottest portion; to supply it at a rate different from the remainder of the cover; to cut it off in case of leaks; and to permit of rapid replacement.

The cover sections are insulated from each other by insulating walls 23 which are formed of end sections 34', upper sections 35 and lower sections 36. The upper section 35 is preferably beveled at the edges to minimize the piling-up of material falling on the cover. The end sections 34' are held in place by bolts 37. The lower sections 36 rest upon a suitable shelf on the cover sections, while the upper sections 35 rest upon flanges 38 which are secured to the cover sections. Between the flanges are a plurality of tubular members 39 of insulating material which serve to insulate the flanges from each other. Bolts 42 extend through these tubular members. Insulating washers 41 prevent the head of the bolt and the nut from coming in contact with the flanges 38, thus effectively insulating the cover sections. Other means of insulating the cover sections may be employed instead of those herein set forth.

The space surrounding the tubular members and between the top and bottom portions may be filled with fire clay, sand or other suitable insulating material. As a further precaution I may provide covers 43 to prevent portions of the charge from short circuiting between the bolts and the cover sections. Should it be desired to change the spacing of the electrodes this may be done by varying the thickness of the wall of insulating material.

I claim:

1. An electric furnace comprising side walls and a cover, said cover being provided with apertures for the electrodes, said furnace further including tubular members forming almost a complete circle and disposed adjacent the electrode apertures, said circle normally being larger than the electrode apertures, said tubular members be-

ing capable of deformation whereby they will pass through said apertures.

2. An electric furnace comprising wall members and a plurality of cover members provided with apertures for electrodes, said apertures being disposed about the center, insulating walls extending outwardly from the center between the adjacent cover members, said cover members having metallic non-magnetic portions between the apertures for the electrodes and the center of the furnace.

3. An electric furnace comprising a wall member and a plurality of cover sections, each of said cover sections being provided with an aperture for an electrode, said cover sections being further provided with a circularly disposed tubular member beneath said sections adjacent the said apertures and means for circulating a cooling fluid through said tubular members.

4. An electric furnace comprising a wall member, a spider member extending across the top of the furnace and resting upon the wall member, cover sections between the arms of said spider and insulating members between the arms of said spider and said cover sections.

5. An electric furnace as claimed in claim 4 in which the insulating members are adapted to be of varying sizes to provide for adjustment in the arrangement of the electrodes.

6. An electric furnace comprising a wall member, a spider member extending across the top of the furnace, blocks of refractory material between the wall and the spider member for adjusting the height of the furnace and cover sections between the arms of said spider.

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