Sept. 2, 1930. D. L. SUMMEY 1,774,852

RESISTOR AND SUPPORT THEREFOR

Filed June 5, 1926 4 Sheets-Sheet 1

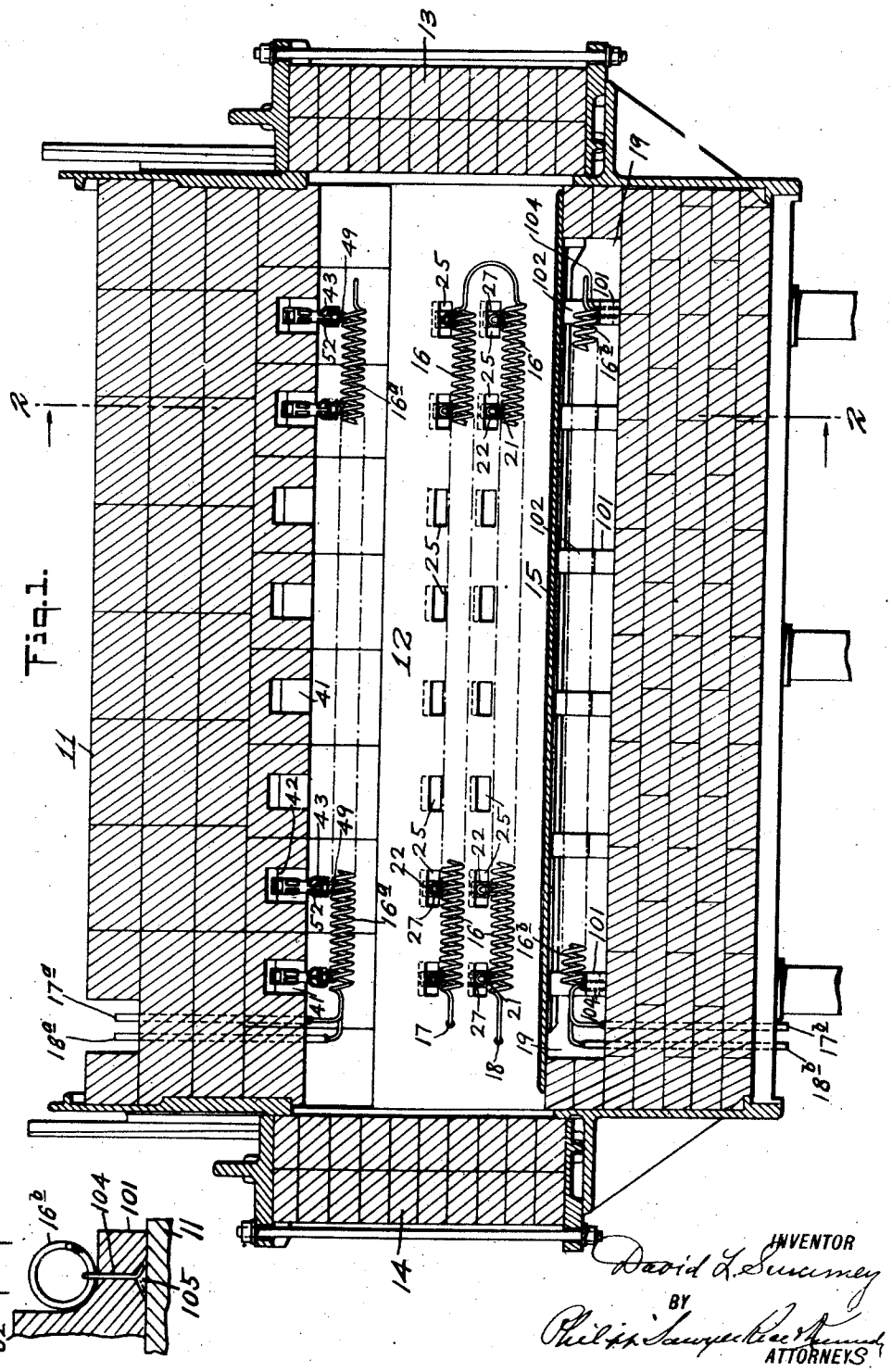


Fig. 1.

Fig. 10.

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RESISTOR AND SUPPORT THEREFOR

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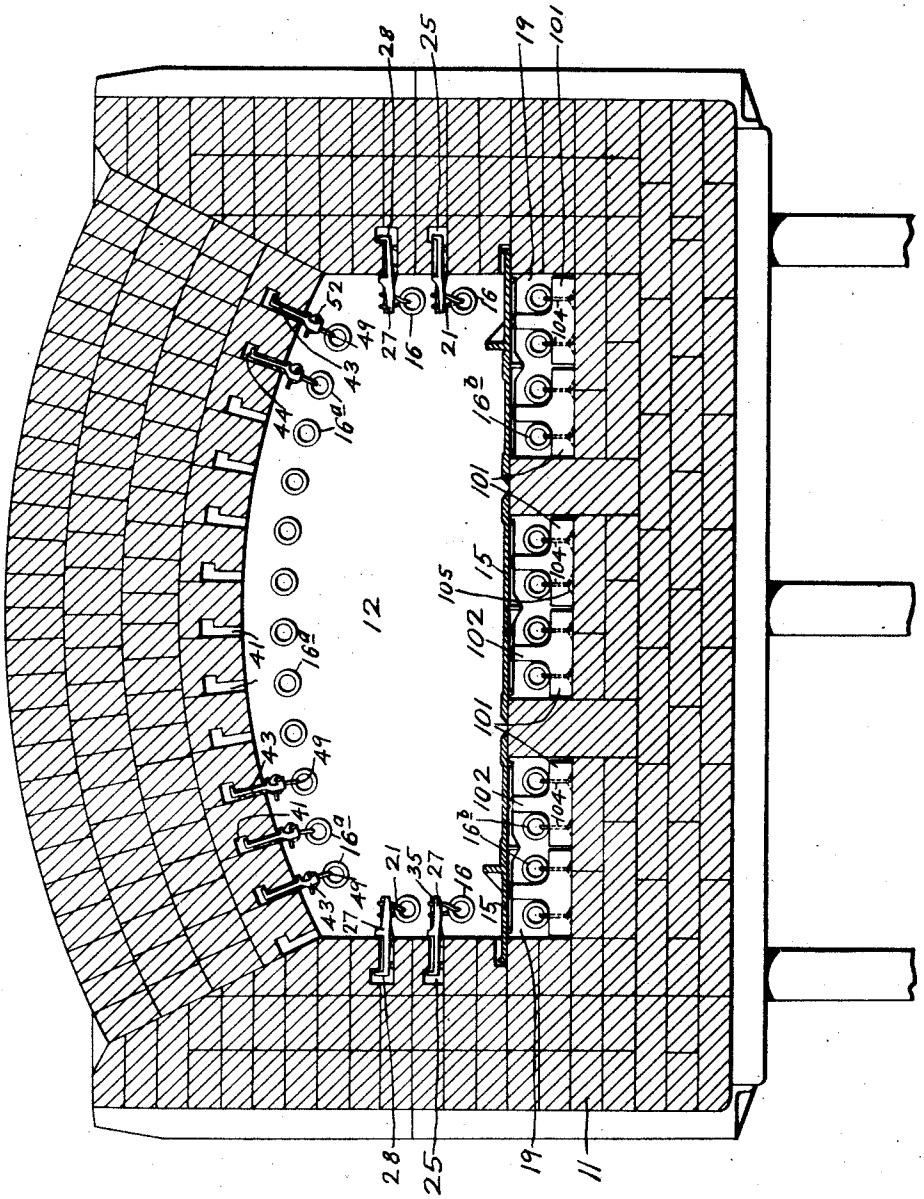


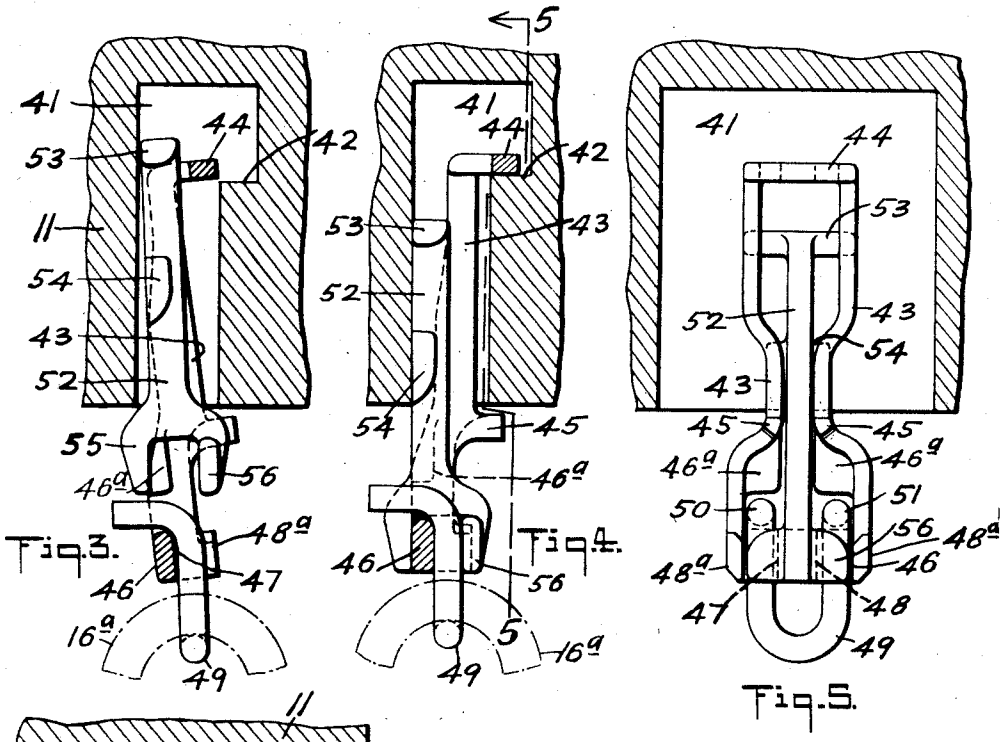
Fig. 2.

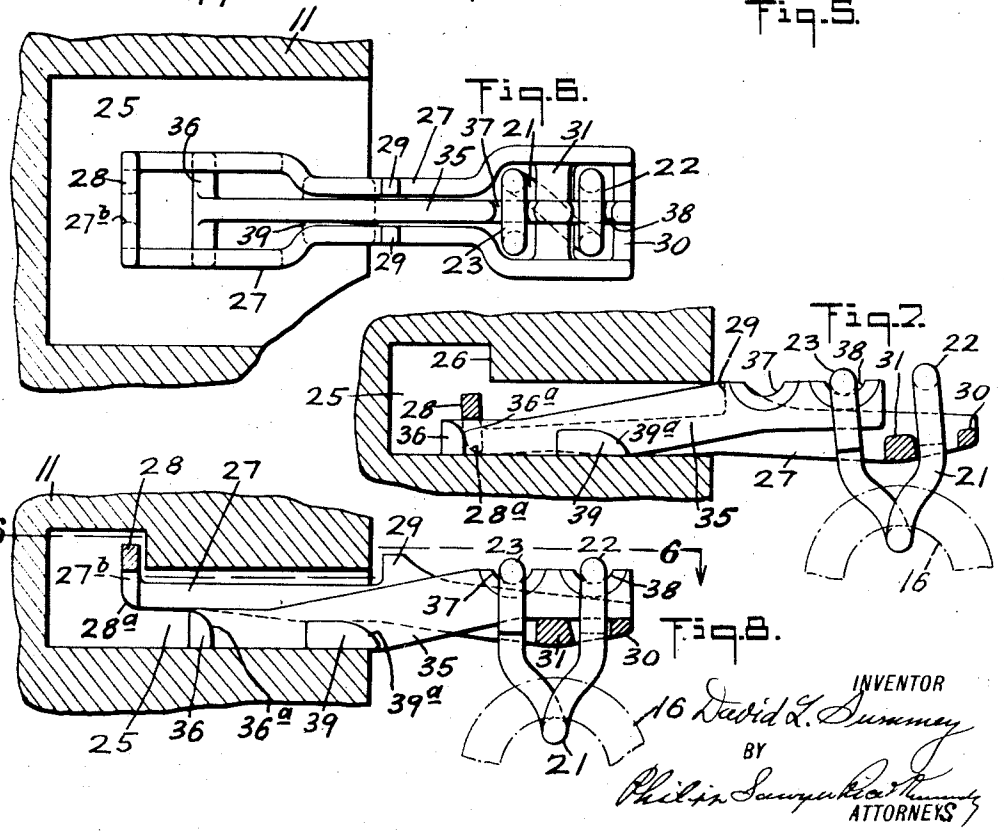
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RESISTOR AND SUPPORT THEREFOR

Filed June 5, 1926 4 Sheets-Sheet 3





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RESISTOR AND SUPPORT THEREFOR

Filed June 5, 1926 4 Sheets-Sheet 4

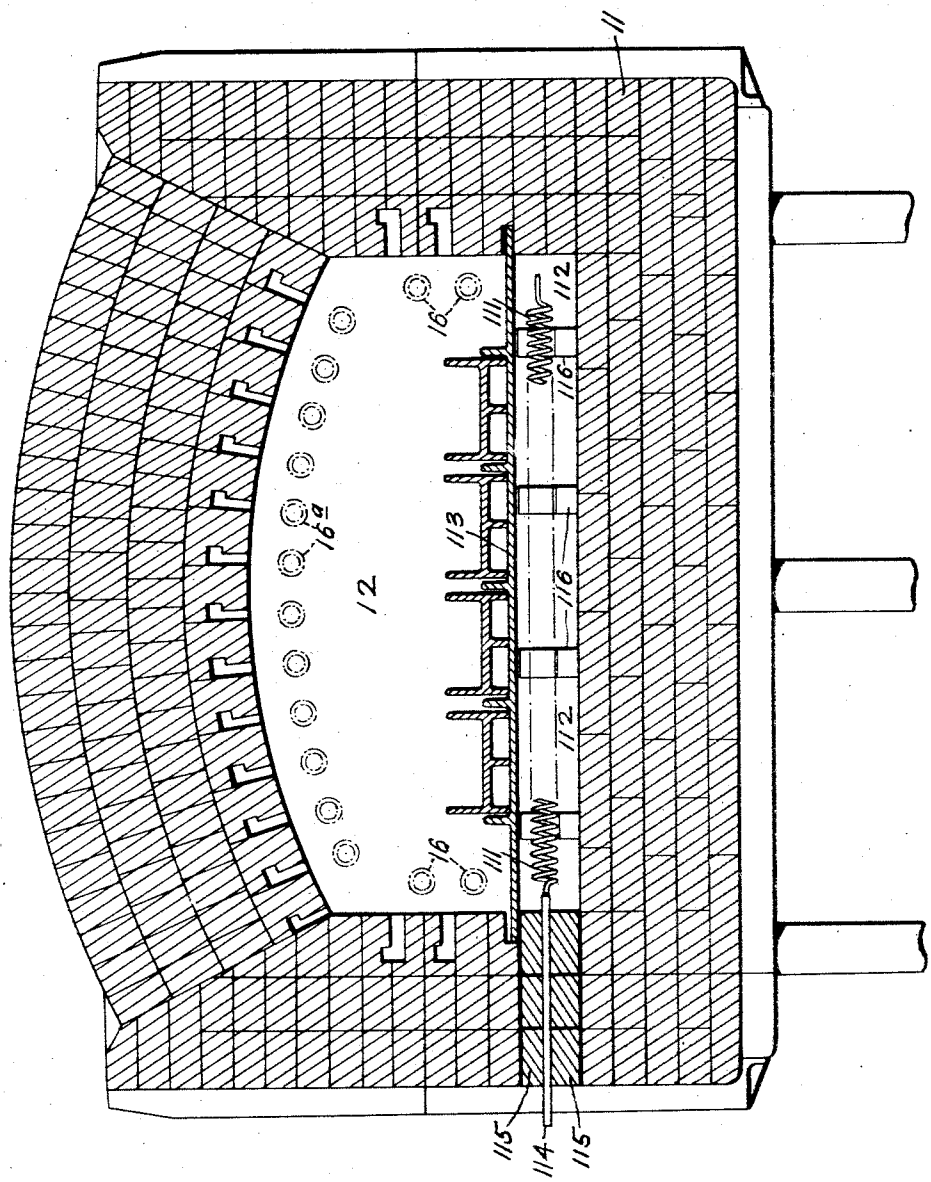


Fig. 3.

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RESISTOR AND SUPPORT THEREFOR

Application filed June 5, 1926. Serial No. 113,852.

This invention relates to resistors and supports therefor.

It is an object of the invention to provide a resistor for electric furnaces that gives a relatively great wire length for a small furnace area. It is a further object of the invention to provide resistor supporting means such that the resistors may be readily assembled and removed; such that the furnace walls give the necessary insulation; that are assembled and disassembled with the furnace walls in situ; and that are rugged, efficient and economical.

With these general objects and others, not specifically mentioned, in view, the invention consists in the features, combinations, details of construction and arrangements of parts which will first be described in connection with the accompanying drawings and then more particularly pointed out.

In the drawings:

Figure 1 is a view in vertical section of an electric furnace having embodied therein resistors and resistor supporting means constructed in accordance with the invention;

Figure 2 is a sectional view taken on the broken line 2—2 of Fig. 1;

Figure 3 is an enlarged detail view showing in vertical section a top resistor support prior to final position;

Figure 4 is a similar view showing the parts in final position;

Figure 5 is a sectional view taken on the broken line 5—5 of Figure 4;

Figure 6 is a sectional view, taken on the broken line 6—6 of Fig. 8;

Figure 7 is a view similar to Fig. 3 showing a side support prior to final position;

Figure 8 is a similar view showing the parts in final position;

Figure 9 is a transverse sectional view of a furnace embodying a modified form of bottom resistor unit; and

Figure 10 is a detail sectional view of part of a bottom unit.

Referring to the drawings, the furnace illustrated more or less conventionally in Figs. 1 and 2 comprises a furnace housing 11, of firebrick or other suitable material, enclosing a long furnace chamber 12. At the ends of the furnace are suitable doors 13, 14. At the bottom of the furnace chamber is a metal floor 15 for supporting the articles to be heated, e. g. trays of small articles, which may be slid across the floor.

The furnace illustrated is heated by resistors on all four sides of the furnace chamber. While the resistors may vary, in constructions embodying the invention to what is now considered the best advantage, each resistor will comprise a substantially rigid wire preformed into a hair-pin bend, the legs of which are helically coiled. Fig. 1 shows a side wall unit comprising a rigid wire 16 preformed into a hair-pin bend with its legs helically coiled and extending substantially the length of the furnace chamber. This unit has its legs in a plane parallel with a side wall and, as indicated in Fig. 2, the furnace has a duplicate unit on the other side. Fig. 1 shows also one leg of a top resistor 16^a and one leg of a bottom resistor 16^b which are substantially duplicates of unit 16. As indicated in Fig. 2, the furnace shown has six top units, six bottom units, and one unit on each side but it is to be understood that the number of units may vary to meet the demands of the particular furnace.

The resistors described have a relatively great wire length for a small furnace area and give a maximum heating capacity.

Each resistor, in the embodiment shown in Figs. 1–8, has leads extending through passages in the adjacent furnace wall and located at right angles to the axis of the resistor legs. As shown as an example, (Fig. 1) each top resistor wire 16^a is extended slightly beyond the coiled portion and the two ends are bent upwardly at substantial right angles to the axes of the coils. Welded to one end of the resistor wire is a conductor or lead in the form of a rigid rod 17^a which passes upwardly through a suitable bore or passage in the top wall of the furnace. The other end of the resistor has a similar lead 18^a. The leads 17^a, 18^a, are of larger diameter than the wire 16^a to avoid undue heating effect in the wall. Beyond the furnace wall the leads are connected in a suitable electrical circuit as by being attached to bus bars (not shown). The dupli-

cate top resistor units have duplicate leads and the other units have similar leads. Fig. 1 shows leads 17b, 18b, of a bottom unit and indicates the inner ends of leads 17, 18, of a side unit. It will be understood that the other side unit has similar leads extending in the opposite direction through the other side wall.

In the constructions described each resistor and its leads form a rigid unit. In assembling a unit, the hair-pin resistor is positioned parallel to its respective wall with the leads in line with their wall bores. The resistor is then given a right line movement toward the wall until the leads are pushed home. In removing a unit, the resistor is given a reverse right line movement until the leads are withdrawn from the wall bores. As shown in Fig. 1, the bottom units are located in a recess 19 below the floor 15. This floor is removable to permit removal of a bottom unit and may be assembled in position after assembly of these units. After withdrawal of its leads, a resistor may be removed through one of the end doors.

There is provided, for each resistor, a plurality of individual supporting means spaced along each leg of the resistor and supported from the adjacent furnace wall to permit ready removal of the resistor. In structures embodying the invention to the best advantage the supporting means will include loops embracing one turn of the resistor coil. Disregarding, for the present, the bottom units, and referring to the top and side units, in the embodiment illustrated, the supports are individually removable and assembled and the furnace walls have a series of spaced pockets in which the supports are releasably self-locked. This may be accomplished by a two-part holder for the resistor-embracing loop insertible in a pocket, one part being arranged to interlock with a part of the wall and the other part being capacitated to releasably retain the first part in interlocking position and being gravity held in retaining relation.

Although capable of various constructions, in that here shown as an example, and referring now to the side units only, each side wall of the furnace is formed with two series of spaced L-shaped pockets or slots 25 having inwardly facing shoulders 26, one series for each leg of the side resistor. This may be accomplished conveniently by forming a number of firebricks with the pockets described and setting such bricks in the proper location in building the furnace structure. The two-part holder comprises an L-shaped skeleton metal piece or bar 27 which may be termed a hanger. This hanger has, at its inner end, an upturned cross piece 28 constituting the short leg of the L and forming an abutment lug for interlocking engagement with shoulder 26 to prevent the withdrawal of the holder from the recess. When in this position (Fig. 8) the hanger extends out of the recess about half its length. To limit the inward position of the hanger, stop lugs 29 are provided for engaging the face of the furnace wall at the mouth of the recess. The side bars of the hanger are separated at the front and rear portions by relatively wide gaps but are curved inwardly (Fig. 6) at their central portions to form a narrow gap for a purpose to be described. At the outer or front end the side bars are connected by two cross pieces 30, 31. It will be apparent from Figs. 7 and 8 that the height of the recess permits sufficient right line movement of the hanger toward and away from interlocking position for the abutment 28 to clear the shoulder, so that the hanger may be inserted and removed.

The second part of the two-part holder may be termed a spacer and is arranged to normally retain the hanger in its interlocking position by being interposed between the hanger and the bottom of the recess. In structures embodying the invention to the best advantage the spacer will be movable endwise in the recess and in one position will block the holder up in interlocking relation and in another position will permit the holder to drop clear of the shoulder. Although capable of various constructions, in that here shown as an example, the spacer is a metal bar 35 located between the side bars of skeleton holder 27. It has a slight double bend (Fig. 8) so that the bottom edge of its outer portion is in a plane somewhat higher than the bottom edge of its inner portion, the inner end seating on the floor of the recess. To block the hanger up in interlocking position (Fig. 8) the spacer has a rear T-head 36 for underlying the side bars of the hanger at the rear wide gap and two side spacing lugs 39 for underlying the hanger side bars at the narrow middle gap. In the position of Fig. 8, therefore, the hanger cannot drop away from interlocking position because of the interposition of T-head 36 and lugs 39.

The hanger is released to permit its dropping clear of the shoulder 26 by a relative movement of the spacer bar. In the present embodiment the parts are so arranged that the hanger is released upon a given inward movement of the spacer bar. To this end, as here shown as an example, the lugs 39 are formed with rounded forward shoulders 39a and the lower edge of the hanger side bars slant upwardly and rearwardly, as indicated in Fig. 8. The lugs 39 are wide enough to underlie the hanger side bars at the narrow gap but not at the wide gap. Consequently, when the spacer is moved inwardly the bottom edge of the hanger rides down the lug shoulders 39a until the lugs 39 reach the wide gap of the hanger. As they do not span this gap the hanger is now free of any spacing function by the lugs. The T-head 36 has a rounded shoulder 36a and the abutment lug

28 has a rounded bottom shoulder 28ª. By the time the spacer is moved back far enough for the lugs 39 to clear the narrow gap, shoulder 28ª rides down shoulder 36ª until the T-head clears the hanger at the rear, a notch 27ᵇ in the underside of crosspiece 28 permitting drop of the hanger. By this movement of the spacer the hanger is permitted to drop down far enough for its abutment to clear the shoulder (Fig. 7) so that it and the spacer may be withdrawn from the wall pocket.

In assembling the holder, a reverse movement takes place. The two parts are inserted in the recess in some such position as shown in Fig. 7. The spacer bar is then drawn forwardly, manually or by any suitable tool, with the result that the rounded shoulders of lugs 39 and the rounded shoulder of T-head 36 engage the bottom face of the hanger and cam the hanger upwardly until the parts are again in the position above described, namely, the position of Fig. 8. This camming action of lugs 39 and T-head 36 is not essential as the hanger movement may be partly or entirely effected independently, as by hand, the spacer bar being merely drawn forward into the blocking position of Fig. 8.

In the embodiment illustrated, the spacer bar is gravity held in retaining position. That is, in the case of the side units being described, the holder is self-locked by the weight of the resistor. The resistor supporting means includes a wire loop 21 which takes around a single turn of the resistor coil so that the loop carries no current. The loop 21 is twisted so that its legs lie in offset planes (Figs. 7 and 8) and these legs terminate in oppositely facing hook portions 22, 23. These hooks hook into notches 37, 38, formed in the top of the spacer bar 35 at its outer end, this end seating on the crosspieces 30, 31 of the hanger. One branch of loop 21 passes up between cross bars 30, 31, the other branch passing up to the rear of cross bar 31.

The other side supporting units are duplicates of the unit described, there being a row of spaced supports for each leg of the resistor as indicated in Fig. 1.

In assembling a side resistor it is moved into position adjacent its wall, as above described, and is temporarily blocked up in any suitable manner until the supports are assembled. The two-part holder of each supporting unit is inserted in the wall pocket in some such position as shown in Fig. 7, and the wire loop 21 is hooked around a turn of the resistor coil with its legs passing up through the framework of hanger 27. As the spacer bar is drawn forward, as above described, its notches 37, 38, are brought under the hooks 22, 23, of the wire loop. When the resistor is unblocked, therefore, following assembly of all the support units, it is suspended by the loops from the two-part holders. The hangers, being blocked up in interlocking position by the corresponding spacers, cannot work loose unless the spacer bars are given inward movement as above described but the spacer bars cannot make this inward movement unless loops 21 are raised sufficiently for notches 37, 38, to clear hooks 22, 23. The loops, however, cannot so rise because they are held down by the weight of the resistor, undue lateral movement of the loops being prevented by the framework of hangers 27. The supporting units, therefore, are self-locked in position by the weight of the resistor.

In order to remove a resistor, it is blocked up sufficiently to relieve the wire loops of the weight so that each loop may be raised clear of the notches 37, 38. Thereafter, the spacer bars may be moved inwardly as described to permit removal of loops 21 and dropping of hanger 27.

In the embodiment illustrated the supporting holders are not limited to a fixed position longitudinally of the resistor but their positions may be adjusted so that they may accord with the resistor coil. To this end, as here shown, the pockets 25 and their shoulders are considerably wider than the holder units. Fig. 6 shows the holder located substantially in the center of the recess. But if the resistor does not present a coil turn in the proper position to take a loop 21 the hanger unit may be shifted to one side or the other in its wall pocket.

The top supporting units duplicate many of the features of the side supports. In the embodiment illustrated, the top wall of the furnace is provided with a row of spaced pockets 41 for each leg of each resistor. These recesses are like recesses 25, except that they open downwardly, and they have an inwardly, i. e. upwardly, facing shoulder 42 like shoulder 26. Insertible in each recess is a two-part holder much like the side holder. As shown, the holder comprises an L-shaped skeleton metal hanger 43 which is like hanger 27 except as to its outer end. That is, it has a rear cross piece 44 forming an abutment lug for interlocking with shoulder 42 and a forward pair of lugs 45 for limiting the inward position. Its side bars are bent inwardly at the middle part to form a narrow gap, as in the case of the side hangers. The second part of the top holder unit is a spacer bar 52 having a T-head 53 like T-head 36 and spacing lugs 54 like lugs 39. The spacer, when in outer, i. e. downward, position (Fig. 4) retains the hanger in its interlocking position by blocking it away from the opposite wall of the pocket. As in the case of the side units, when the spacer is moved inwardly, i. e. upwardly, the hanger is free to move out of interlocking position, its bottom edge riding down the lugs and T-head. In the top units shown, the abutment lug 44 not only prevents withdrawal of the holder but the

whole support is suspended from shoulder 42 by the abutment lug.

At its forward end the top hanger 43 has a crosspiece 46 formed with two longitudinal grooves 47, 48 for the wire loop and the side bars opposite the grooves have lug extensions 48ª. Spaced inwardly from the crosspiece 46 are two shoulders 46ª, later referred to. The top spacer bar, at its forward end, has a fork 55 one prong of which has a T-head 56. When the parts are in supporting position (Figs. 4 and 5) fork 55 straddles the crosspiece 46 and T-head 56 is embraced between lug extensions 48ª, whereby any undue relative side movement of hanger and spacer is prevented. The loop here shown for the top units is a plain wire loop 49 having its ends bent inwardly at a right angle to form hooks 50, 51. In supporting position, the legs of the loop lie in grooves 47, 48, and the hooks hook over crosspiece 46. The loop 49 embraces one turn of a resistor coil as in the case of the side units.

When the parts are in supporting position they are self-locked. The hanger cannot come out of interlocking position with the wall shoulder unless the spacer moves inwardly, i. e. upwardly, but the spacer is gravity held in spacing position. The loop cannot work loose unless the spacer moves inwardly because the T-head 56 forms a closure for grooves 47, 48, that locks the loop therein. Undue longitudinal movement of the loop in its grooves is prevented by the confinement of loop hooks 50, 51 between crosspiece 46 and shoulders 46ª. It will be understood that duplicate top supporting units are provided for the several top wall pockets.

In order to remove a top resistor, it is temporarily blocked up to relieve loops 49 of the weight and the spacers 52 are individually pushed inwardly, i. e. upwardly. This movement of the spacers removes T-heads 56 from blocking position so that the loops may be removed and also frees hangers 43 from interlocking position with the wall shoulder. The resistor is then drawn away from the wall, as above described. To assemble a top unit, the resistor is moved into position as before described and is temporarily held while the supports are being assembled. Each holder unit is inserted in a recess in some such position as shown in Fig. 3. Loop 49 is looped under a turn of the resistor coil and its hooks hooked over crosspiece 46. Spacer 52 is then drawn down to the position of Figs. 4 and 5, the hanger being cammed or manually moved into supporting position. When the temporary resistor holding means is removed, the weight of the resistor is taken by the supporting means which is self-locked as above described.

As in the case of the side units, recesses 41 are wide enough to permit a considerable latitude in the position of the support unit longitudinally of the resistor.

Referring now to the bottom units, the resistors have a number of supports spaced along each leg and a resistor is removable and assembled independently of the furnace structure. In this case, however, the supports merely rest on the bottom wall and form a movable unit with the resistor. In the embodiment illustrated as an example in Figs. 1 and 2, each bottom resistor is supported by a row of spaced, duplex pillow blocks 101. The blocks have central partitions 102 and each side provides a seat for one leg of the coiled resistor. The blocks 101 are made of firebrick or other suitable material and seat freely on the bottom wall of the furnace. The supporting means includes, in the embodiment illustrated, means for fastening the resistor in position on its supports. To this end, as here shown as an example, each side of the pillow block 101 has a pair of bores for receiving the legs of a wire loop or staple 104 which embraces one turn of a resistor coil. The bores are slightly staggered with respect to the axis of the resistor so that the loop may be at right angles to the resistor wire. At the bottom of the blocks, the bores open into countersunk recesses 105. After the staples are in place the ends are bent over to prevent withdrawal, the bent ends lying in the recesses 105 to provide a flush bottom surface.

In normal position the resistor rests on the pillow blocks 101 which are supported from the bottom wall. The resistor is held in place by the staples which cannot come out because of their bent ends. To remove a bottom resistor, floor 15 is removed and the resistor lifted upwardly as above described, the supports moving with it. To assemble a bottom resistor, the resistor is stapled to its several supports and the complete unit is lowered with a right line movement into position, the supporting blocks seating on the bottom wall. The floor 15 is then placed in position above the unit.

Fig. 9 illustrates a modification in which the bottom units may be removed and inserted without the necessity of removing the floor of the furnace chamber. As here shown as an example, a resistor 111 is located in a bottom chamber 112 transverse the furnace chamber and below a floor 113. The resistor 111 is like those described except that its leads 114 are coaxial with the resistor coils instead of at right angles. These leads pass through alining bores in a number of removable bricks 115 which are laid on brickwork flush with the bottom of chamber 112. These bricks may be luted with fireclay or the like. The resistor 111 is supported on pillow blocks 116 duplicating the blocks already described and having duplicating staples. To remove this unit the bricks 115 are removed and the

resistor, with its supporting blocks, is withdrawn, as a unit, through the opening in the side wall, the blocks sliding along the bottom furnace wall. The unit is assembled by stapling the resistor to its blocks outside the furnace, sliding the unit into chamber 112, and replacing bricks 115.

The various metal parts of the supporting units described, namely, the loops, hangers, spacing bars and staples are formed from a metal having substantially the same heat-resisting characteristics as the resistor itself. For this purpose, nickel chromium alloy has been found suitable. The loops may be formed from wire stock and the hangers and spacing bars may conveniently be formed by casting.

With the constructions described the resistors are insulated by the furnace walls themselves. The surface of the resistor is exposed in all directions to the furnace chamber and thus free heat radiation in all directions is possible. The resistors and their supports are assembled and removed independently of the furnace brickwork and the top and side supports are not limited to a fixed position with respect to the wall. The various resistor and supporting units are individually assembled and disassembled; are self-locked in supporting position; and are readily removable and replaceable. The top and side supporting units are rugged and efficient. They may be formed by casting without machine work and are economical also as to weight of metal.

The operation of the various features will be clear from the above without further description.

What is claimed is:

1. In combination with a furnace wall having a plurality of spaced pockets provided with rearwardly facing shoulders, a resistor, and a plurality of individual resistor supports, each comprising a portion having lugs for interlocking with one of said shoulders to prevent withdrawal of the supports, and portions for removably holding the first portions in interlocking position.

2. In combination with a furnace wall having an L-shaped pocket formed therein and providing a rearwardly faced shoulder, a resistor, and a resistor support comprising an L-shaped hanger insertible in said pocket and movable therein to cause its short leg to interlock with said shoulder or to clear the same, and an element for releasably retaining the hanger in such interlocking position.

3. In combination with a furnace wall having an L-shaped pocket formed therein and providing a rearwardly faced shoulder, a resistor, and a resistor support comprising an L-shaped hanger insertible in said pocket and movable therein to cause its short leg to interlock with said shoulder or to clear the same, and a removable spacer for engaging the hanger and the opposite wall of the recess normally to retain the hanger in interlocking position.

4. In combination with a furnace wall having an L-shaped pocket formed therein and providing a rearwardly faced shoulder, a resistor, and a resistor support comprising an L-shaped hanger insertible in said pocket and movable therein to cause its short leg to interlock with said shoulder or to clear the same, and a spacer movable in said pocket and capacitated, when in one position, to retain the hanger in interlocking position, and when in another position, to permit the hanger to move out of interlocking position.

5. In combination with a furnace wall having an L-shaped pocket formed therein and providing a rearwardly faced shoulder, a resistor, and a resistor support comprising an L-shaped hanger in said pocket and movable therein to cause its short leg to interlock with said shoulder or to clear the same, and a spacer movable in said pocket and capacitated, when in one position, to retain the hanger in interlocking position, and when in another position, to permit the hanger to move out of interlocking position, said spacer being gravity held in such retaining position.

6. In combination with a furnace housing having one of its walls formed with a pocket provided with a rearwardly facing shoulder, a resistor, and a resistor support comprising a loop for taking under a turn of the resistor coil and a two-part holder including a skeleton hanger having an abutment for engaging said shoulder and a narrowed central portion, and a spacer interposed between the hanger and the opposite wall of the pocket and having lugs for engaging said narrowed portion but incapable of spanning the end portion of the hanger, whereby the spacer, when in one endwise position, retains the hanger in a position to cause its abutment to interlock with said shoulder, and when in another endwise position permits the hanger to move so that its abutment clears said shoulder.

7. In combination with a furnace housing having its side wall formed with a pocket having an inwardly facing shoulder in the top thereof, a resistor, a skeleton hanger in said pocket, an abutment on the rear of said hanger for interlocking engagement with said shoulder, a spacer having its inner end seated on the bottom of said pocket, lugs on said spacer for engaging a portion of the lower edges of said hanger, when in one position, to retain the hanger in such interlocking position, the rear end of the hanger having a gap wide enough to clear said lugs whereby, in another position of the spacer, the hanger can move out of such interlocking position, the forward end of the spacer having two notches in its upper edge and seating on the forward end of the hanger when in retaining position and a loop for taking under the re-

sistor and having its legs offset and formed with hooked ends normally seated in said notches, whereby the spacer is held in retaining position by the weight of the resistor.

8. In combination with a furnace housing having its side wall formed with a pocket having an inwardly facing shoulder, a resistor, a resistor supporting unit comprising a hanger having an abutment for interlocking engagement with said shoulder, a spacer capacitated, when in one position, to retain the hanger in interlocking position, and, when in another position, to permit the hanger to move out of interlocking position, and a loop taking under the resistor and having its legs hooked over said spacer, when the latter is in such retaining position, whereby the spacer is held in retaining position by the weight of the resistor.

9. In combination with a furnace housing having its top wall formed with a pocket having an inwardly facing shoulder, a resistor, a skeleton hanger in said pocket, an abutment on the rear of said hanger for interlocking engagement with said shoulder, a spacer inserted between the hanger and the opposite wall of said pocket, lugs on said spacer for engaging the central portion of said hanger, when in one position, to retain the hanger in such interlocking position, the inner or upper end of the hanger having a gap wide enough to clear said lugs when the spacer is moved upwardly in the pocket, whereby the hanger may move out of such interlocking position, a grooved crosspiece on the lower end of the hanger, a loop for taking under the resistor and having hooked ends hooked over said crosspiece, and a T-head on said spacer for locking the loop in said grooves when the spacer is in retaining position, the spacer being held in retaining position by gravity.

10. In combination with a furnace housing having its top wall formed with a pocket having an upwardly facing shoulder, a resistor, a resistor supporting unit comprising a hanger having in abutment on its upper end for interlocking with said shoulder and a crosspiece on its lower end, a loop taking under the resistor and having its legs hooked over said crosspiece, and a spacer movable in said pocket and capacitated, when in position to retain said hanger in interlocking position, and when moved upwardly in the pocket, to permit the hanger to move out of interlocking position, the hanger having a T-head for holding the loop in hooked position when the spacer is in such retaining position.

11. In combination with a furnace housing having a plurality of pockets formed in one of its walls, a helically coiled resistor, a plurality of individual resistor supporting means each comprising a loop for taking under a turn of the resistor coil and a portion removably held in one of said pockets, the pockets being substantially wider than the received supporting parts, whereby the supporting means in assembly, may have its position adjusted to suit the resistor coil.

12. In an electric furnace, and in combination, a furnace wall having an L-shaped pocket, a resistor, and resistor-supporting means comprising an L-shaped bar insertible in said pocket and movable therein whereby its short leg may make interlocking engagement with the shoulder of the L-shaped pocket or clear the same, and a removable spacer bar for normally holding the L-shaped bar in such interlocking position.

13. In an electric furnace, and in combination, a furnace wall having an L-shaped pocket, a resistor, and resistor-supporting means comprising an L-shaped bar insertible in said pocket and movable therein whereby its short leg may make interlocking engagement with the shoulder of the L-shaped pocket or clear the same, and a removable spacer bar for normally holding the L-shaped bar in such interlocking position, said supporting means being held in the normal operative position by the resistor.

14. In an electric furnace, the combination with a furnace wall, a resistor-supporting member supported by said wall, and a resistor supported by said member, of means for holding said resistor-supporting member in its proper operative position in said wall, said holding means being prevented from longitudinal movement by said resistor member.

15. In an electric furnace, the combination with a furnace wall provided with a slot, of a resistor-supporting member extending into said slot and having interlocking engagement with one side thereof, a resistor supported by said member, means engaging one surface of said supporting member for maintaining said supporting member in proper operative position, said means being maintained in proper operative position by said resistor.

16. In an electric furnace, the combination with a furnace wall having a slot, of a resistor-supporting member, having interlocking engagement with the sides of said slot, an elongated member for maintaining said resistor-supporting member in proper operative position, a resistor supported by said member, said elongated member being prevented from longitudinal movement by the resistor.

17. In an electric furnace, the combination with a furnace wall having a slot, of a resistor member, and a two-part removable resistor-supporting means, the two parts thereof being insertable into proper operative positions in said slot in predetermined sequence and being held in said operative positions by the resistor member.

18. In an electric furnace, the combination with a furnace wall provided with an opening therein, of a resistor-supporting member extending into said opening and having interlocking engagement with the sides thereof, a

resistor supported by said resistor-supporting member, and means extending alongside of said resistor-supporting member for maintaining it in said interlocking engagement.

19. In an electric furnace, the combination with a furnace wall having a slot of L-shape, of a resistor-supporting member of L-shape, having interlocking engagement with said slot and means for holding the resistor-supporting member in its proper operative position in said wall.

20. In combination with a furnace housing having a plurality of spaced pockets in one of its walls, a resistor, and a plurality of individual resistor-supporting units, each unit comprising a part removably insertible in the corresponding pocket, and a part normally holding the first mentioned part in supporting position in the pocket and relatively movable to permit removal of said first part.

21. In combination with the wall of a furnace housing, a resistor, and a plurality of resistor-supporting units, each unit comprising an element having releasable interlocking engagement with a portion of the wall, and an element normally retaining said first named element in such interlocking engagement and relatively movable to permit release of the first element from such engagement.

22. In combination with the wall of a furnace housing, a resistor, and a plurality of resistor-supporting units, each unit comprising an element having releasable interlocking engagement with a portion of the wall, and an element normally retaining said first named element in such interlocking engagement and relatively movable to permit release of the first element from such engagement, said second named element being gravity held in normal position.

In testimony whereof, I have hereunto set my hand.

DAVID L. SUMMEY.