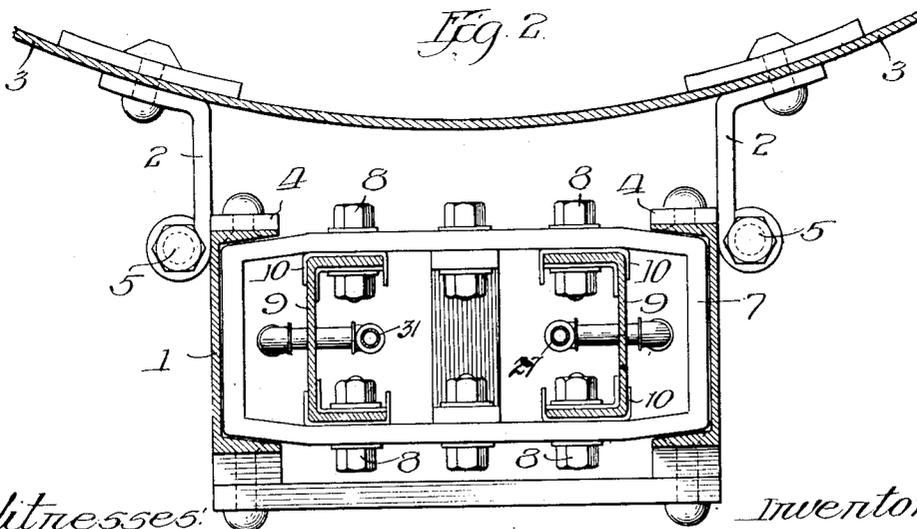
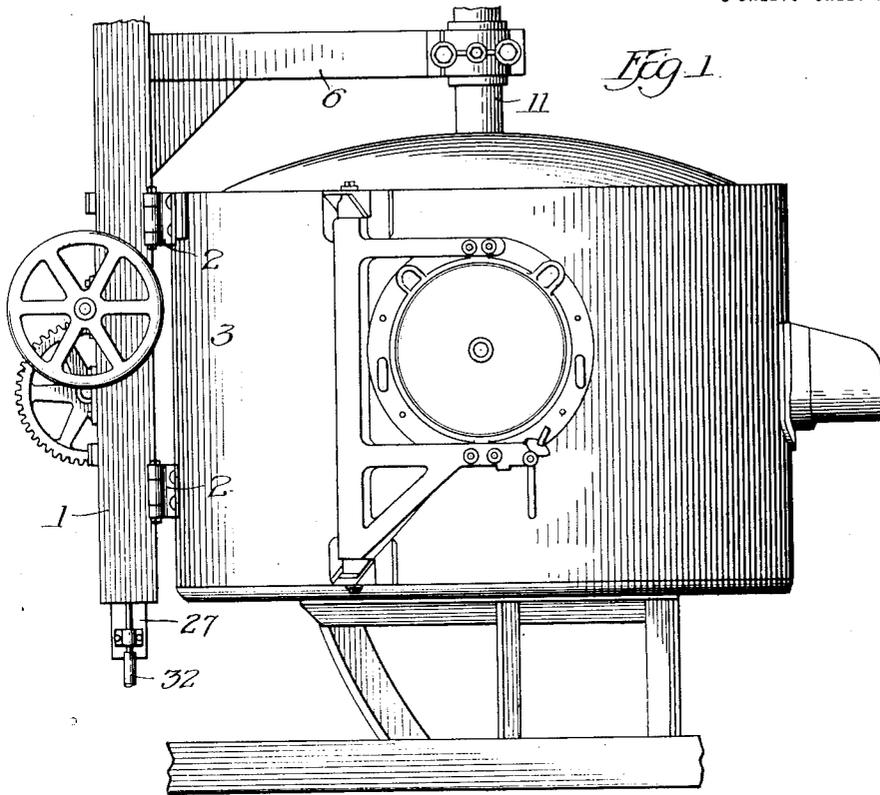


F. T. SNYDER.
ELECTRIC FURNACE.
APPLICATION FILED JAN. 19, 1914.

1,167,026.

Patented Jan. 4, 1916.

3 SHEETS—SHEET 1.



Witnesses:
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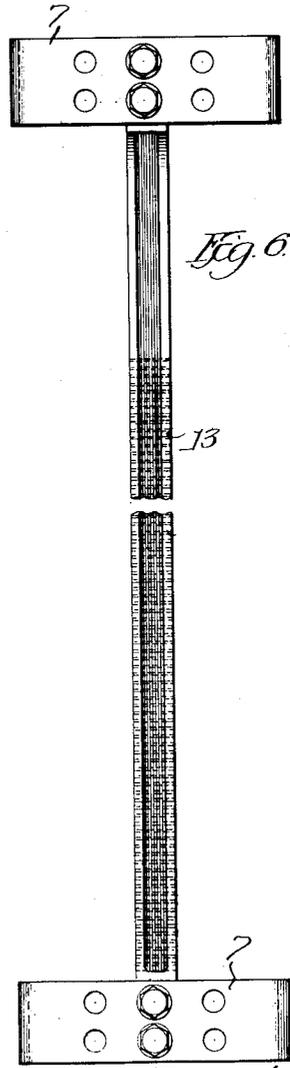
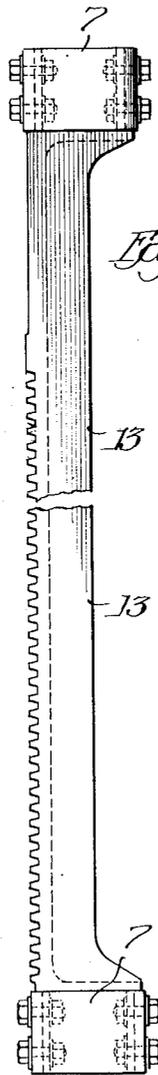
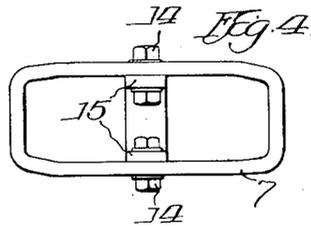
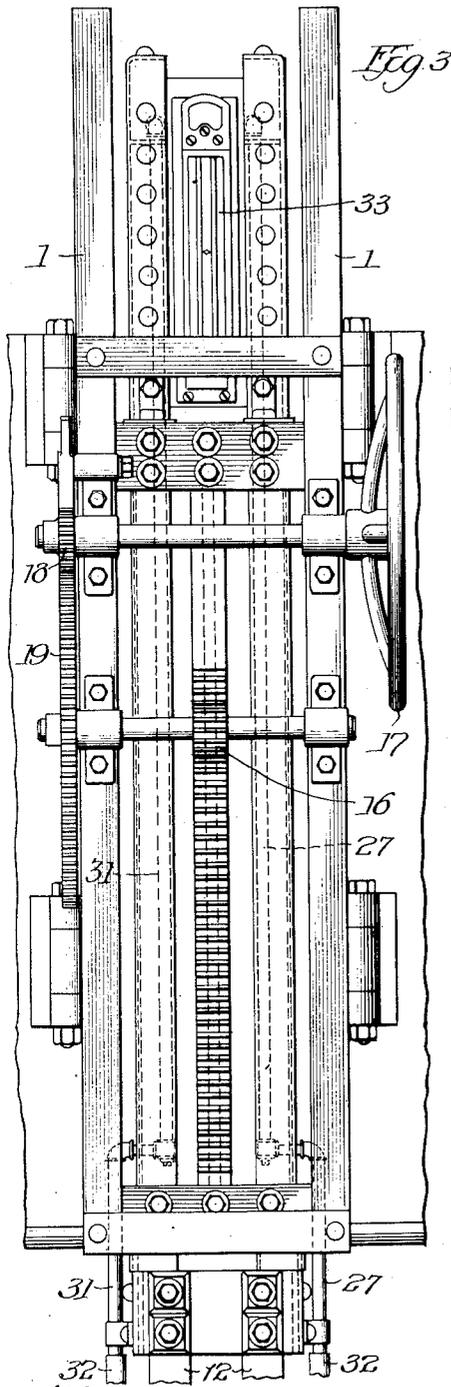
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3 SHEETS—SHEET 2.

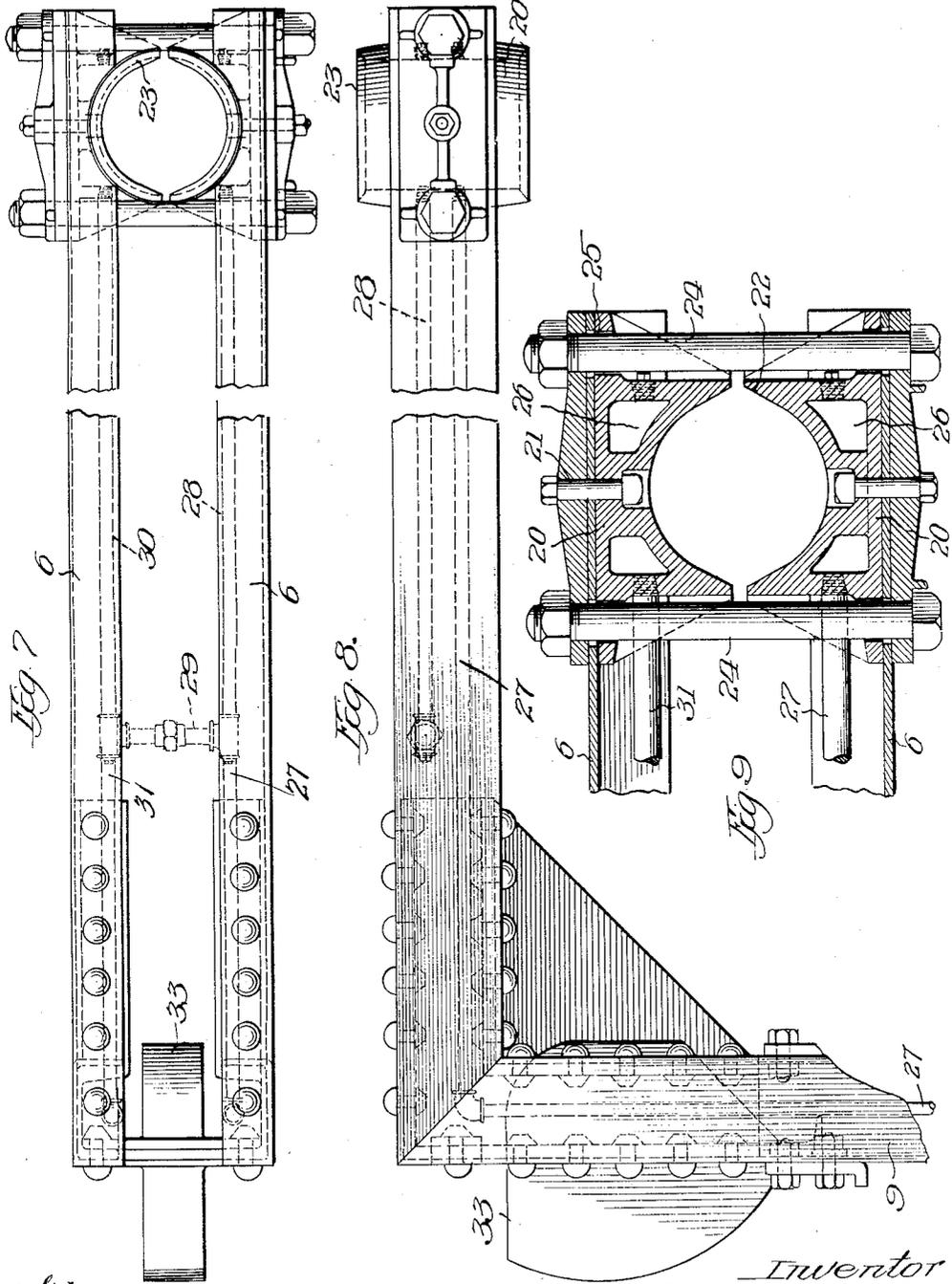


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1,167,026.

Patented Jan. 4, 1916.
3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

FREDERICK T. SNYDER, OF OAK PARK, ILLINOIS.

ELECTRIC FURNACE.

1,167,026.

Specification of Letters Patent.

Patented Jan. 4, 1916.

Application filed January 19, 1914. Serial No. 812,876.

To all whom it may concern:

Be it known that I, FREDERICK T. SNYDER, citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electric Furnaces, of which the following is a full, clear, concise, and exact description.

My invention relates to electrode control mechanism for electric furnaces. Its object is to provide an improved mechanism by which electrode can be adjusted vertically and by which said electrode and its supporting arm can be swung, when desired, to one side of the roof of the furnace.

A further object is to provide a structure in which there are no flexible conductors above the furnace, all flexibles being located beneath the furnace.

My invention comprises various detailed improvements which may be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a furnace equipped with my invention; Fig. 2 is an enlarged, detailed view in horizontal section of the electrode adjusting crane; Fig. 3 is a front elevation of the crane; Fig. 4 is a plan view of the slide and the rackbar secured thereto; Fig. 5 is a side elevation, and Fig. 6 is a rear elevation of the slide and rack shown in Fig. 4; Fig. 7 is an enlarged, top, plan view of a horizontal arm of the crane by which the electrode is held; Fig. 8 is a side elevation of said horizontal arm and a portion of the vertical post to which it is secured; and Fig. 9 is a horizontal section of the extreme end of the horizontal arm which supports the electrode.

Similar reference characters refer to similar parts throughout the several views.

Secured to the furnace at the rear thereof are two opposing guide-bars 1, 1, which may be in the nature of channel bars. Each of said bars is hinged to the furnace near the top and bottom thereof, one element 2 of each hinge being bolted to the shell 3 of the furnace, and the other element 4 of the hinge being bolted to the guide bar 1. The elements 2, 4 of the hinge are connected by the usual removable pin 5. Therefore, if the two pins 5 at either side of the crane be removed, the crane as a whole may be swung upon the opposite hinges to move the horizontal arm 6 of the crane to the one or the other side of the furnace as may be desired.

Such swinging movement of the arm 6 is desirable whenever it becomes necessary to repair the furnace roof.

Slidably mounted in the opposing guides 1, 1 are slides or travelers 7, preferably two in number, one near the upper portion and the other near the lower portion of the said guides. The slides 7 are in the general form of a rectangular loop, as are most clearly shown in Figs. 2 and 4. Secured to the slides 7 by means of bolts 8 are conductor bars 9, which are preferably of copper. Said conductor bars are insulated from the guides 7, as is most clearly shown in Fig. 2. The insulating material 10 on the front face of the bars 9 preferably extends the entire vertical length of said bars, so as to afford protection from accidental short-circuits. The conductor bars 9 are, as shown, preferably in the form of channel bars. At their upper ends they are secured to the horizontal arm 6, which likewise preferably consists of two approximately parallel opposed channel bars, as is most clearly shown in Fig. 7. The electrode 11 is clamped between said horizontal channel bars, as will hereinafter be more fully described. The flexible conductors 12 are secured to the lower ends of the bars 9, as shown in Fig. 3.

The means by which the vertical bars 9 may be raised or lowered to adjust the electrode 11 comprise a rack and pinion actuated through the medium of a hand-wheel, which mechanism will now be described, reference being had more particularly to Figs. 2 to 6, inclusive. A rack-bar 13 is secured at its upper and lower ends to the slide 7 by means of bolts 14 which pass through the said slide 7 and flanges 15 upon the ends of said rack-bar. Engaging the teeth of the rack 13 is a pinion 16 adapted to be actuated from the hand-wheel 17 through the medium of the pinion 18 and the gear-wheel 19, said pinion 18 being mounted upon the shaft of the wheel 17 and said gear-wheel 19 being mounted on the shaft of the pinion 16. Thus, by turning the hand-wheel 17, the rack 13, and therefore the bars 9 connected thereto through the medium of the slide 7, can be raised and lowered.

I shall next describe the clamping jaws by means of which the electrode is brought into close contact with its supporting parts, reference being had more particularly to Figs. 7 to 9, inclusive. Pivoted upon the

outer end of each of the channel bars comprising the horizontal arm 6 is a clamping jaw 20, said jaw being mounted upon a pivot-pin 21 so as to have a slight rocking motion upon a horizontal axis. Either face of each clamping jaw 20 is approximately semi-cylindrical, the opposite sides thereof being beveled, however, as shown at 22, such bevel being approximately tangent to the circular face of the jaw. Thus sharp corners upon the opposing members of the clutch are avoided. Likewise, as shown in Figs. 7 and 8, the jaws 20 are beveled at their upper and lower edges as indicated at 23, and thus there are no sharp corners about the periphery of the clamping jaws. This I find to be an important feature, since sharp edges would be liable to dig into the electrode and prevent a proper engagement of the surface of the jaws with the electrode. Not only is the electrode thus held in firmer contact, but the possibility of the electrode sticking to the jaws is largely eliminated, thereby making the removal of one electrode and the substitution of another therefor a much simpler operation.

Upon the opposite ends of the jaws 20 are bolts 24 which pass through said jaws and the channel bars of the horizontal arm 6, and by means of which the jaws may be drawn firmly into contact with the electrode. The openings 25 in the jaws 20 are somewhat larger than the bolts 24 in order to permit of a slight rocking of the jaws about their pivots 21, thereby permitting of an adjustment of the jaws to firmly engage the electrode even though the latter is of somewhat irregular shape or does not extend in an exact vertical direction. The two channel bars of the horizontal arm 6 are normally slightly bent away from each other, they thus tending to release the jaws from the electrode when the bolts 24 are disengaged.

Each of the jaws 20 has therein a water-chamber 26 for the circulation of water, whereby the jaws are water-cooled. The water flows in through the inlet pipe 27, passes around and up through the water-chamber 26 and out through the pipe 28, thence through the union 29, pipe 30 and through the water-chamber 26 of the other jaw 20 and out through pipe 31. The union 29 connecting the two pipes 28, 30 is some distance from the horizontal arm in order that the two channel bars of said arm may be drawn apart in the act of inserting or removing an electrode.

As shown in Figs. 1, 3, 7 and 8, the inlet pipes 27 and 31 lie in the channels of the horizontal and vertical bars 6 and 9 and at their lower ends are connected to hose 32. Said hose 32 and the conductors 12 are flexible in order to permit of the tilting of the furnace during the pouring of the metal.

Such arrangement of water pipes and conductors entirely eliminate all flexibles above the furnace, such flexibles being located entirely beneath the furnace.

Mounted between the vertical bars 9, 9 is a watt-meter 33. The watt-meter thus sets in the crane and moves with it and at all times is directly in front of the operator while he is adjusting the electrode by means of the hand-wheel 17. This is an important feature of my invention, since it enables the operator to adjust the electrode and at the same time watch the reading of the power indicator or watt-meter.

The furnace to which my present invention is shown to be attached is of the tilting type. The flexible conductors 12 and the flexible hose 32 readily permits of the tilting of the furnace during the pouring operation. The mechanism for tilting the furnace and certain other details shown in the drawings and forming no part of my present invention constitute the subject matter of other co-pending applications, Serial No. 728,089, filed October 28th, 1912, and Serial No. 812,875, filed January 19th, 1914.

What I claim is:

1. The combination with an electric furnace, of an electrode supporting-crane, hinges connecting said crane and furnace and providing two axes of rotation for said crane, said hinges normally holding the crane against rotation, but permitting the crane to be rotated on one of said axes when the hinge mechanism which provides the other axis is rendered inoperative.

2. The combination with an electric furnace, of an electrode supporting-crane, and two independent sets of hinges connecting said crane and furnace, whereby the crane may be swung upon one set of hinges when the other set is disconnected.

3. In an electric furnace, the combination of a pair of oppositely disposed vertical channel bars constituting guides, an upper and a lower traveler slidably mounted therein, a pair of vertical conductor bars of U-shaped cross-section secured to said travelers, horizontal conductor arms of U-shaped cross-section forming a continuation of said vertical conductor bars, and electrode clamping means carried upon the ends of said vertical arms.

4. In an electric furnace, the combination of a pair of oppositely disposed vertical channel bars constituting guides, slides comprising approximately rectangular shaped loops having their ends fitting in the channels of said guides, rigid conductors secured to said slides, said conductors extending from the bottom to the top of said furnace, and means for raising and lowering said slides.

5. In a tilting electric furnace, the combination with a water-cooled electrode holder

at the top of the furnace, said holder being provided with a chamber for the circulation of water, of channel bars constituting conductors mounted to move with said furnace, 5 rigid water pipes extending from the bottom of the furnace to said electrode holder and located within the channel of said conductors, and flexible hose connected to the lower ends of said rigid pipes.

10 6. In an electric furnace, the combination of a pair of approximately parallel horizontal conductor bars, an electrode clamping jaw pivoted to each bar upon a horizontal axis, and means for drawing said bars together to clamp an electrode between said 15 jaws.

7. In an electric furnace, an electrode

holder comprising a pair of opposing clamping jaws each having a concave face in the form of a semi-cylindrical surface having 20 the opposite edges beveled.

8. In an electric furnace, an electrode holder comprising a pair of opposing clamping jaws each having a concave face in the form of a semi-cylindrical surface having 25 their entire peripheral edges beveled.

In witness whereof, I hereunto subscribe my name this thirteenth day of January, A. D. 1914.

FREDERICK T. SNYDER.

Witnesses:

McCLELLAN YOUNG,
GREEN P. BRAXTON.