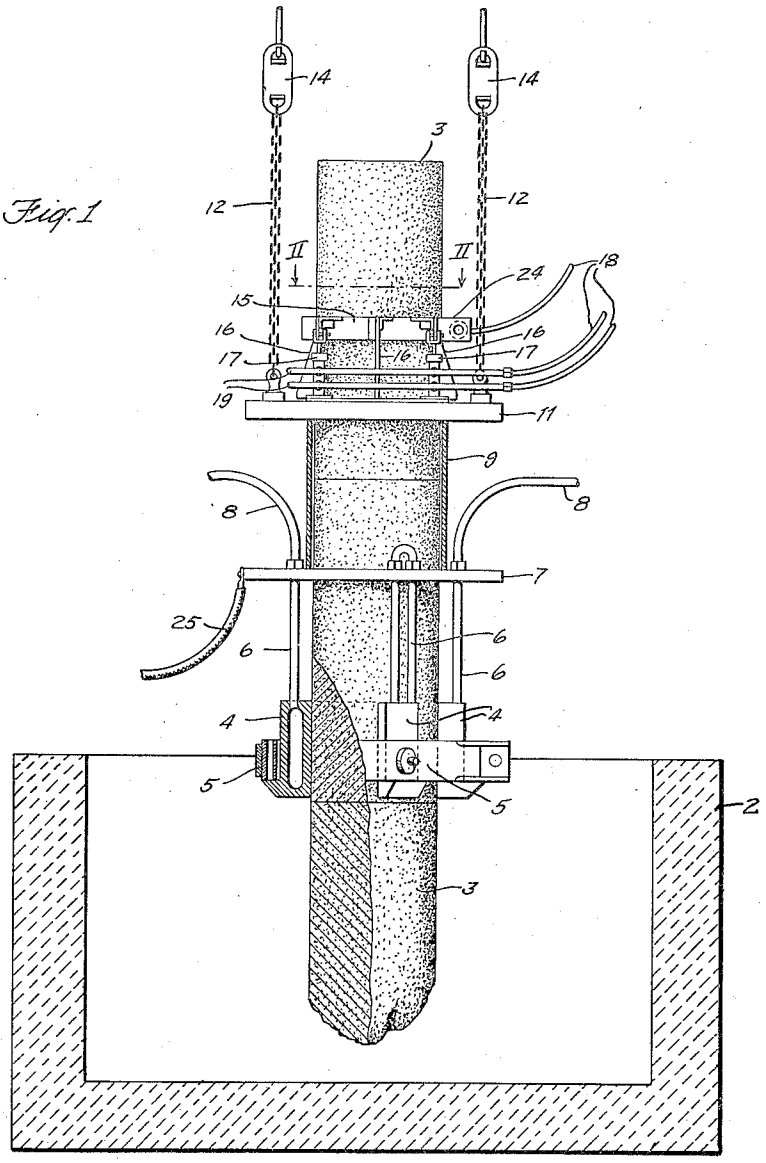
Dec. 27, 1932. J. G. MARSHALL 1,892,109

APPARATUS FOR FEEDING ELECTRIC FURNACE ELECTRODES

Filed June 2, 1931 2 Sheets-Sheet 1

Fig. 1



INVENTOR:
James G. Marshall,

BY
Byrnes, Townsend & Potter,
Attorneys

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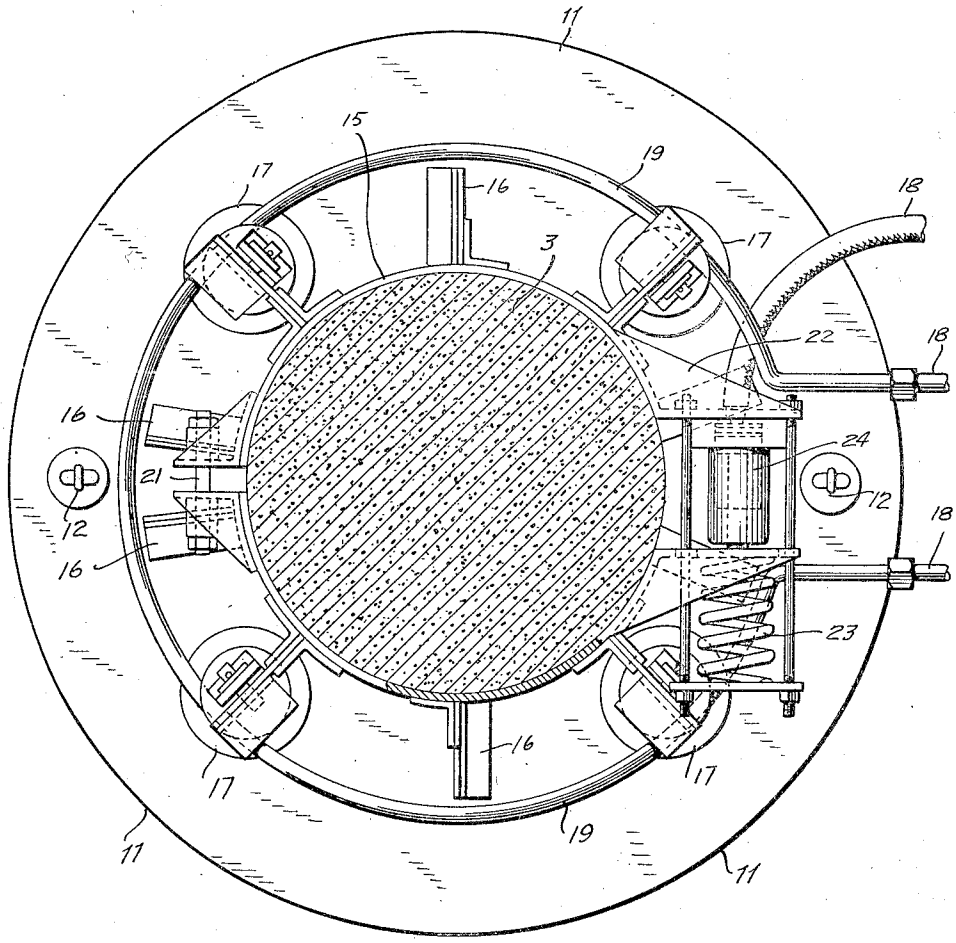


Fig. 2.

INVENTOR:
James G. Marshall,
BY
Byrnes, Townsend & Potter,
Attorneys.

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UNITED STATES PATENT OFFICE

JAMES G. MARSHALL, OF NIAGARA FALLS, NEW YORK, ASSIGNOR TO ELECTRO METALLURGICAL COMPANY, A CORPORATION OF WEST VIRGINIA

APPARATUS FOR FEEDING ELECTRIC FURNACE ELECTRODES

Application filed June 2, 1931. Serial No. 541,711.

This invention relates to apparatus for feeding electrodes into an electric furnace without interrupting the furnace operation or diminishing the electrical input.

In electric furnace operation it is customary to hold the electrode in a certain position with respect to the furnace by means of a set of clamps which also act as electrical contacts to the electrode. These clamps have heretofore usually been of the type which must be released occasionally to permit feeding of the electrode. In one type of mechanism the clamp remains stationary and the electrode is allowed to slip by gravity by releasing the pressure on the clamping members. In another the clamp travels with the electrode but must be released and raised occasionally as it approaches too near the furnace.

When either of these methods is employed for feeding the electrode, it is obvious that the electrical input must be diminished, or cut off entirely whenever the clamps are shifted, in order to avoid destroying them by the electrical arc which results if they are too far released. Furthermore, by the former practice, feeding of the electrode necessarily takes place at intervals, and the distance between the electrode and the furnace charge continually varies depending on the rate of consumption of the electrode and the intervals between feeding. This is objectionable where uniform furnace conditions and electrical input are desired.

In accordance with my invention feeding of the electrode may be accurately controlled by any desired amount, without disturbing the furnace operation, and without varying in any way the pressure of the contact clamps upon the electrode. In this manner a practically constant separation may be maintained between the electrode and the furnace charge. A further object of the invention is to provide a remote control for adjustment and feeding of the electrode, in which the procedure necessary for the attachment of additional electrode sections is greatly simplified.

The advantages of the invention will be evident from a description of the accompanying drawings, wherein

Fig. 1 is a vertical view partly in section of an apparatus embodying one modification of my invention.

Fig. 2 is a view of a section shown by the lines II—II of Fig. 1.

Reference numeral 2 represents an electric furnace into which is vertically suspended the electrode 3. The clamps 4 serve as part of the suspending mechanism and also act as electrical contacts to the electrode. These clamps are firmly held against the electrode by means of the band 5. By means of the bolts 6 the clamping member is suspended from the annular horizontal frame 7. The bolts 6 are preferably in the form of tubes to permit water cooling of the clamps 4 through the water connection 8. A cylindrical shell 9 connects the frame 7 with the yoke 11, and the chains 12, connected with this yoke, act through the insulating members 14 to suspend the entire mechanism.

Adjustably attached to the electrode above the yoke 11 is the band 15, the under side of which carries the brackets 16. Double-acting hydraulic or pneumatic rams 17 are fixed to the yoke 11 and are connected through a clevis with the band 15. The inlets 18 and manifolds 19 serve to conduct fluid pressure to the rams. As shown in Fig. 2, the band 15 is connected with the electrode by means of the bolt 21 and the frame 22. A spring 23 normally acts to keep the band in tight contact with the electrode, and another fluid pressure ram 24 is adapted to act against the pressure of the spring 23 to spread the band when desired for adjustment.

When in operation, electric current is supplied to the electrode through the cable 25 connected with the frame 7, and the electrode is moved downward when desired by means of the rams 17. To feed the electrode the band 15 is spread by means of the ram 24, and the rams 17 acting in abutment to the yoke 11 are caused to move the band upward to a new position on the electrode. The ram 24 is then released and the electrode is forced through the clamps 4 by actuating the rams 17 in the opposite direction. The electrode

may be fed to the limit imposed by the brackets 16 which are fixed to the band 15 but not to the yoke 11. This completes one cycle, and the electrode may be controllably shifted any desired amount by a mere repetition of the operation.

Thus the invention provides means for very accurately controlling the feeding movement of the electrode from a position quite remote from the furnace, and there is no necessity for the furnace operator to go onto the furnace to in any way assist in the feeding operation. The apparatus is especially well adapted for use with cylindrical electrodes of the type which are made continuous by connecting electrode sections with a threaded pin, since the new sections can be very easily attached without removing any part of the apparatus, and without interrupting or interfering in any way with the continuous operation of the furnace.

While I have shown and described the invention as used with a cylindrical sectional electrode, it should be understood that the apparatus may be equally well applicable to electrodes of rectangular and other cross sections, to multiple electrode groupings fastened together by other than threaded joints, and to continuous electrodes of the self-baking type. It will also be evident that various modifications in the particular assembly shown may be made without departing from the spirit of my invention as defined in the appended claims.

I claim:

1. In an electric furnace an apparatus for feeding an electrode comprising in combination a clamp yieldingly holding said electrode, means including an annular yoke for supporting said clamp in a stationary position with respect to the furnace, and means operative against said yoke as an abutment for sliding the electrode through said clamp.

2. In an electric furnace an apparatus for feeding an electrode comprising in combination a clamp yieldingly holding said electrode, means for supporting said clamp in a stationary position with respect to the furnace including an annular yoke through which the electrode passes, and fluid pressure means operative against said yoke as an abutment for sliding the electrode through said clamp.

3. In an electric furnace an apparatus for feeding an electrode comprising in combination a clamp yieldingly holding said electrode, means for supporting said clamp in a stationary position with respect to the furnace, an annular yoke through which the electrode passes forming part of the clamp supporting means, and fluid pressure means fixed to said yoke, said last mentioned means being adapted to act against said yoke as an abutment to slide the electrode through said clamp.

4. In an electric furnace an apparatus for feeding an electrode comprising in combination a clamp yieldingly holding said electrode, means for supporting said clamp in a stationary position with respect to the furnace, an annular yoke through which the electrode passes forming part of the clamp supporting means, an adjustable annular band gripping the electrode in proximity to said yoke, and fluid pressure means fixed to said yoke and operatively connected with said annular band, whereby the electrode may be caused to slide through said clamp.

5. In an electric furnace an apparatus for feeding an electrode comprising in combination a clamp yieldingly holding said electrode, means for supporting said clamp in a stationary position with respect to the furnace, an annular yoke through which the electrode passes forming part of the clamp supporting means, an adjustable annular band gripping the electrode in proximity to said yoke, fluid pressure means adapted to loosen said band to permit adjustment, and a second double-acting fluid pressure means fixed to said yoke and operatively connected with said annular band, whereby said last mentioned means may be operative in one direction to cause the electrode to slide through said clamp and in the opposite direction to cause adjustment of said annular band on the electrode.

6. In an electric furnace an apparatus for feeding an electrode comprising in combination a clamp yieldingly holding said electrode, means for supporting said clamp in a stationary position including an annular yoke through which the electrode passes, means adjacent said annular yoke for gripping the electrode, and means fixed to said yoke and operatively connected with said gripping means to slide the electrode through said clamp.

In testimony whereof, I affix my signature.

JAMES G. MARSHALL.