

H. L. HARTENSTEIN.

CARBON HOLDER.

APPLICATION FILED MAR. 11, 1907. RENEWED AUG. 20, 1909.

946,435.

Patented Jan. 11, 1910.

3 SHEETS—SHEET 1.

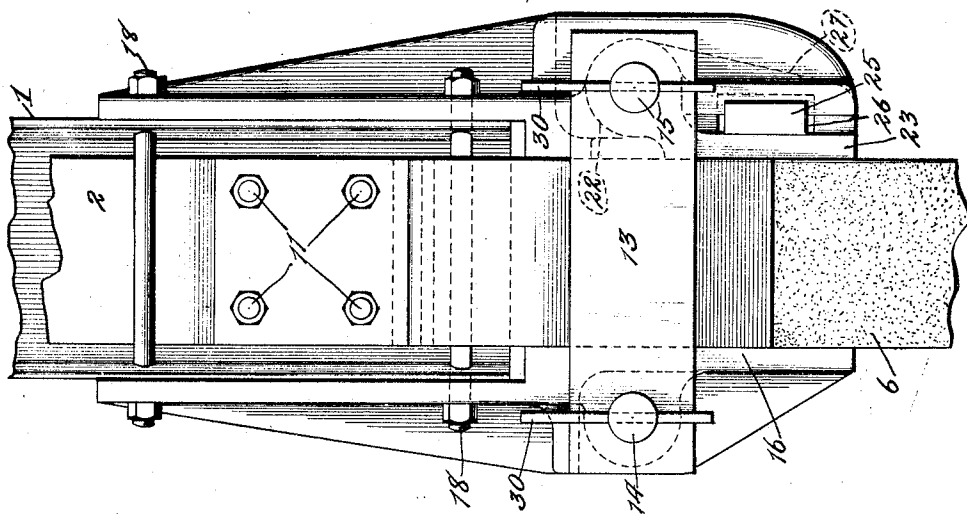


Fig. 2.

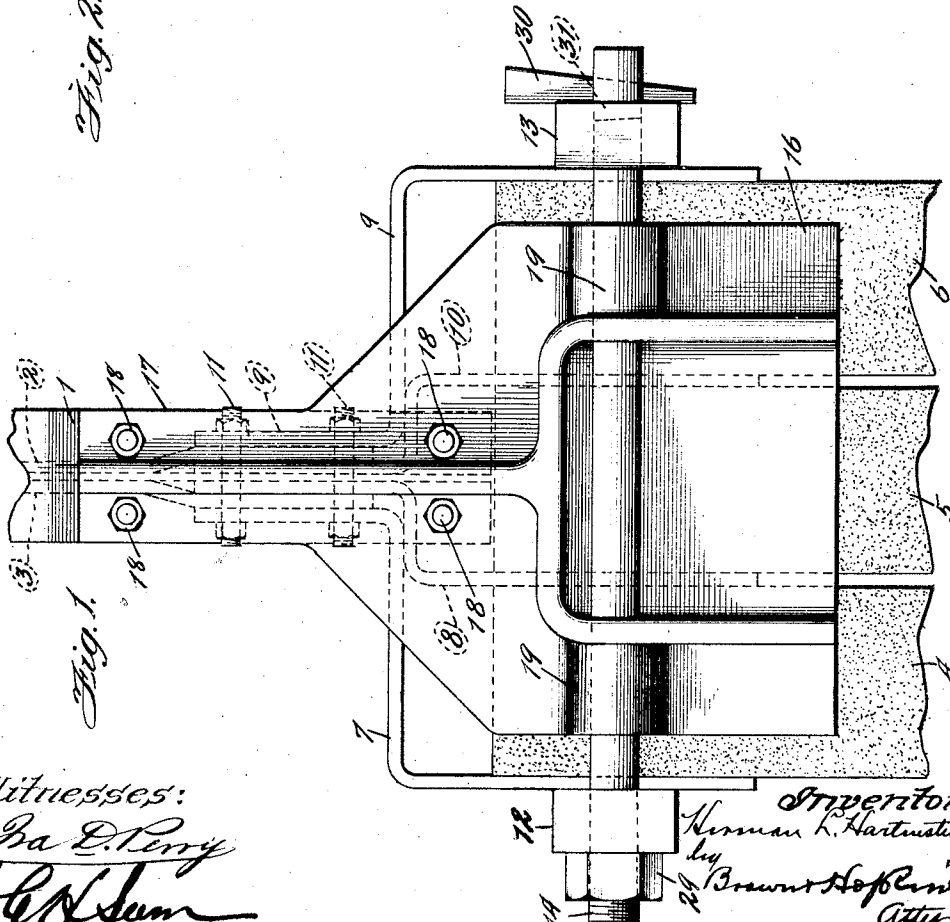


Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 3.

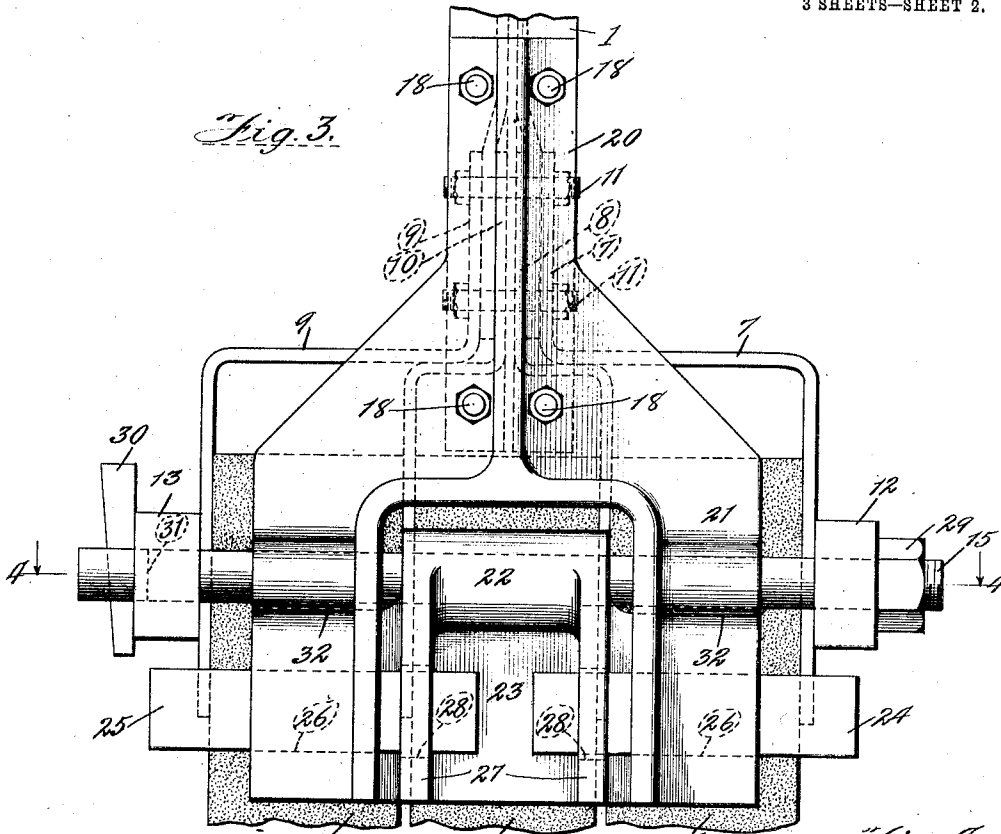
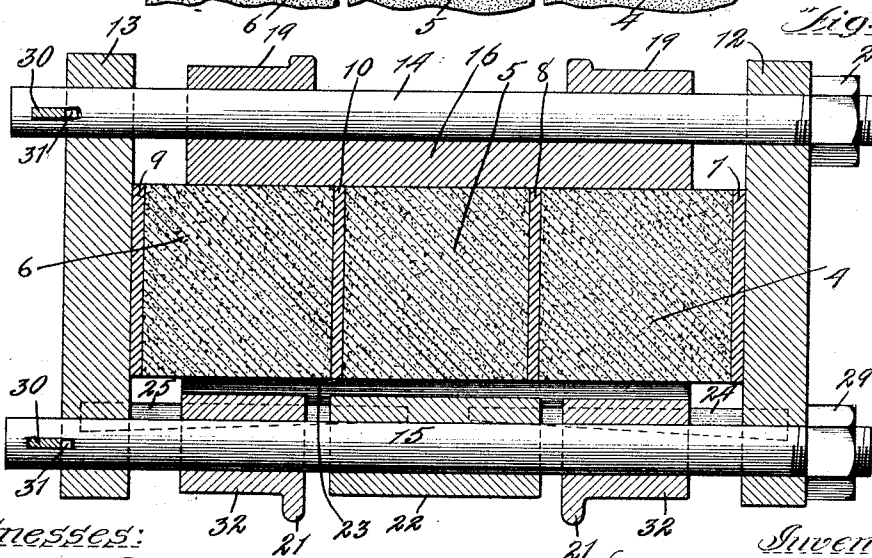


Fig. 4.



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3 SHEETS—SHEET 3.

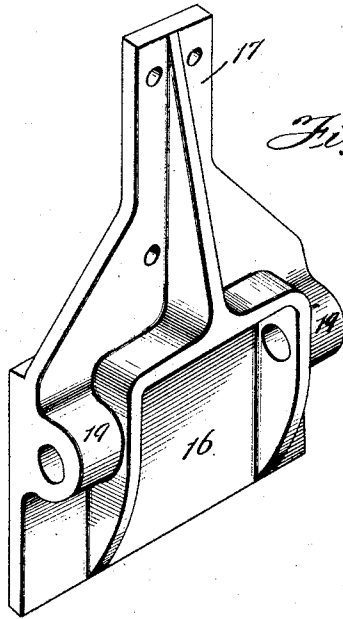


Fig. 5.

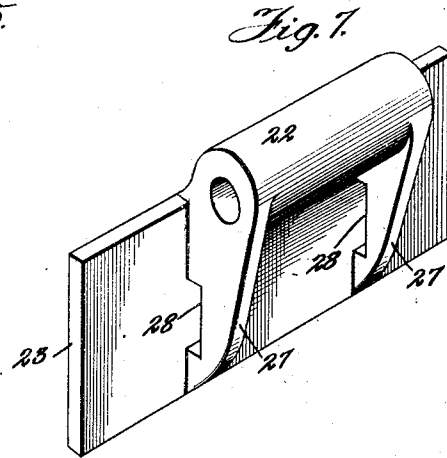


Fig. 7.

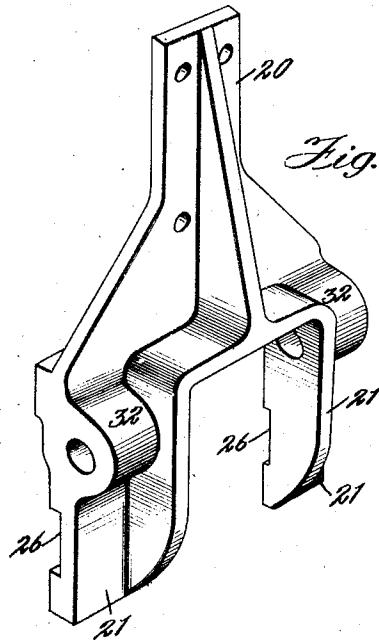


Fig. 6.

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UNITED STATES PATENT OFFICE.

HERMAN L. HARTENSTEIN, OF CONSTANTINE, MICHIGAN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CONTINENTAL INVESTMENT COMPANY, OF DULUTH, MINNESOTA, A CORPORATION OF MINNESOTA.

CARBON-HOLDER.

946,435.

Specification of Letters Patent.

Patented Jan. 11, 1910.

Application filed March 11, 1907, Serial No. 361,669. Renewed August 20, 1909. Serial No. 513,891.

To all whom it may concern:

Be it known that I, HERMAN L. HARTENSTEIN, a citizen of the United States, residing at Constantine, in the county of St. Joseph and State of Michigan, have invented certain new and useful Improvements in Carbon-Holders, of which the following is a full, clear, and exact specification.

This invention relates to carbon holders for holding the carbons of the electrodes in large electric furnaces, which carbons are usually of considerable size and of great weight, ordinarily being from five to eight inches in thickness and several feet in length. With electric furnaces of the type of that shown in my application Ser. No. 280729 (Patent 819,224) where dipping electrodes are employed carrying carbon electrode elements, it is necessary to secure a plurality of these carbons to each of the electrode beams or arms that extend into the furnace. Owing to the great weight of the carbons and the strain produced thereon by the movement of the beams while the carbons are immersed in the molten material which is frequently extremely stiff in consistency, considerable difficulty has been experienced in holding the carbons securely in their attachment on the beams. When the carbons become loose, it is obvious that they are not only in danger of being entirely dislodged and dropped into the molten material but bad electrical contact occurs and the excessive arcing where the contact between the conductors and the carbons is imperfect results in material oxidation of both the carbon and the contacts and soon deteriorates them beyond usefulness. Even where the contacts are tightly clamped to the carbons when they are first introduced into the heat of the furnace, the expansion of the metallic parts and the wriggling or wrenching action of the carbons soon renders them insecure. My present invention is designed to obviate these defects and to provide an improved and efficient form of carbon holder which will be capable of readily clamping one or more carbons and of permitting adjustment to take up expansion and contraction between the contacting surfaces while in use.

With these ends in view the invention consists in the features of novelty in the construction, combination and arrangement of parts which will now be described with ref-

erence to the accompanying drawings, and then more particularly pointed out in the claims.

In the said drawings, Figure 1 is a side elevation of a carbon holder embodying this invention. Fig. 2 is an edge view thereof. Fig. 3 is a side elevation looking at the opposite side to that presented in Fig. 1. Fig. 4 is a transverse horizontal section on the line 4-4 of Fig. 3. Fig. 5 is a detail perspective view of one of the jaws. Fig. 6 is a similar view of the fixed portion of another jaw, and Fig. 7 is a detail perspective view of a hinged member of the said other jaw.

1 is the electrode arm or beam which is in the form of an ordinary steel or iron channeled bar such as an I-beam and between its flanges and resting flat against its web portion are secured two conductors 2, 3, so that the conductivity of the iron beam 1 alone need not be depended upon. The conductors 2, 3, may be composed of copper as usual. In this exemplification of the invention three carbons are illustrated as constituting a composite electrode element and they are shown at 4, 5, 6. These carbons have flat faces or are rectangular in cross-section and the two conductors 2, 3, as well as the I-beam 1 are placed in electrical communication therewith by contact plates 7, 8, 9 and 10 which may be of copper. The two inner plates 8 and 10 which are in the form of elongated strips have their upper ends situated between the lower ends of the conductors 2, 3, and the web of the I-beam, with their lower ends situated between the faces of the inner carbon 5 and the inner faces of the outer carbons 4, 6. The two outer contact plates 7, 9, have their upper ends arranged against the outer faces of the conductors, 2, 3, and all of these contact plates, the conductors 2, 3, and the web of the I-beam 1 are firmly clamped together by a suitable number of bolts 11. The contact plates 7 and 9 are bent laterally and downwardly to bring their lower portions into the planes of the outer faces of the outer carbons, 4, 6 and these portions are carried downwardly a suitable distance along these faces where they are firmly clamped against such faces by clamping plate or cross bars 12, 13 respectively and bolts 14, 15.

Arranged against the diagonally opposite faces of the carbons on one side is a jaw

comprising a flat contact face 16, which is sufficiently wide to cover a material portion of the width of all three carbons, and a shank portion 17 adapted to be secured by a suitable number of bolts 18 to one of the flanges in the I-beam. This jaw 16, 17, is also provided with means for holding one of the bolts 14, 15, the means shown consisting of perforated ears 19 through which the bolt 14 passes. Against the face of the carbons on the other and diametrically opposite face engaged by 16 is another jaw which comprises a fixed member and a hinged member. The fixed member comprises a shank 20 adapted to be bolted by the bolts 18 to the other flange of the I-beam, and two offset arms 21 which are set off a slight distance from the faces of the carbons and are provided with bearings 32 for the hub 22 of the hinged jaw, the hinged jaw consisting of the said hub and a flat plate 23, which is disposed between the inner faces of the arms 21 against faces of the carbons. The hub 22 mounted on the bolt or shaft 15 carried by bearings 32 so that the hinged jaw is free to move slightly with respect to the fixed arms 21 and the carbons for effecting a clamping action against the carbons in a direction opposed to the clamping action of the fixed jaw 16 and 17. This clamping action of the hinged jaw is produced by wedges 24, 25, inserted between the plate 23 and the inner edges of the arms 21 and in order that the wedges may be securely seated, the inner faces of the arms 21 are formed with recesses 26 and the plate 23 is provided with ribs 27 having slots 28 contiguous to the outer face of the plate 23. Into the passages thus formed between the wedges 24, 25, are inserted, as clearly indicated in Figs. 2 and 3, with their larger ends outward so that by a tap of the hammer the hinged jaw may be sufficiently tightened while the device is in use.

The bolts 14, 15, are provided at one end with nuts 29 which engage the outer face of the cross bar 12 but their other ends are preferably provided with slots 31 in the protruding ends of the bolts. In these slots are inserted upright wedges 30 engaging against the outer face of cross-bar 13, so that by tapping these wedges 30 the carbons may be tightened in a direction transverse to the direction of pressure produced by the wedges 24, 25 and this action also may be accomplished while the device is in use. The cross bars 12, 13, it will be seen, are longer than the width of the contact plates 7, 9 and the carbons, so that in practice the nuts 29 may be tightened until they place the cross bars 12, 13 under slight tension sufficient to compensate for the expansion of the bolts when subjected to the heat of the furnace. The bolt 15 may be supported on the fixed element jaw 20, 21 in any suitable way as, for example, by perforated

ears or bearings 32 arranged in line with the perforated hub 22. With the described arrangement, the conductor plates 7, 8, 9 and 10 are not only kept in efficient contact with the carbons, but they act as cushioning devices enabling the use of comparatively high clamping pressures upon the hard and brittle carbons. They also operate to shield the contacting faces of the carbon against aerial and other oxidation.

In order that the invention might be fully understood by those skilled in the art, the details of an exemplification thereof have been thus specifically described but—

What I claim as new therein and desire to secure by Letters Patent is—

1. In a dipping electrode, the combination of a channeled bar and two jaws secured to opposite flanges thereof and adapted to clamp against diametrically opposite sides of electrode carbons, means for supporting said jaws, one of said jaws comprising a member movable independently thereof toward and from the carbons and means for pressing said independently movable member toward the carbons.

2. In a dipping electrode, the combination of a channeled bar and two jaws secured to opposite flanges thereof and adapted to clamp against diametrically opposite sides of electrode carbons, one of said jaws having a hinged section, means for forcing said hinged section inwardly against the carbons, and means for carrying the jaws.

3. In a dipping electrode, the combination of a channeled bar and two jaws secured to opposite flanges thereof and adapted to receive a carbon between them, one of said jaws having a hinged section and means for forcing said hinged section inwardly toward the carbons.

4. In a dipping electrode, the combination of a channeled bar and two jaws secured to opposite flanges thereof and adapted to receive a carbon between them, one of said jaws having a member movable independently thereof and adapted to clamp against the carbon, and means for forcing said member inwardly at will.

5. In a device for the purpose described, the combination of a pair of jaws adapted to receive an electrode carbon between them, one of said jaws having an independently movable member adapted to be clamped against the carbon, and a wedge interposed between said member and its jaw for forcing the member inwardly against the carbon.

6. In a device for the purpose described, the combination of two jaws adapted to receive an electrode carbon between them, one of said jaws being formed with spaced arms, a movable section hinged between said arms and having a plate disposed at the inner sides of said arms so as to rest against the

carbon, and a wedge interposed between said plate and one of said arms.

7. In a device for the purpose described, the combination of a pair of jaws adapted to receive an electrode carbon between them, one of said jaws having spaced arms, an independently movable section hinged between said arms and having a portion situated at the inner edges of said arms and wedges interposed between said arms and said portion.

8. In a device for the purpose described, the combination of a pair of jaws adapted to receive an electrode carbon between them, one of said jaws embodying an independently movable section and adapted to clamp against the carbons, provided with a passage for a wedge, a wedge inserted in said passage between the back of said section and the inner part of the jaw carrying it, for forcing said section against the carbon.

9. In a device for the purpose described, the combination of an electrode carbon, contact plates arranged against two of the diametrically opposite sides of the carbons, fixed jaws arranged at the other two sides of the carbons, cross bars arranged against said contact plates, rods passing through said cross bars and jaws, means supported on one of the jaws for clamping the carbons on that side and means engaging the bolts for clamping the cross bars against said plates.

10. In a device for the purpose described, the combination of a pair of fixed jaws adapted to receive electrode carbons between them, contact plates receiving the carbons between them at the sides of the carbons diagonally opposite said jaws, bolts passing through said jaws respectively, cross bars on the extremities of said bolts bearing against said contact plates and means engaging the ends of the bolts and one of said cross bars for tightening the bolts.

11. In a device for the purpose described, the combination of a pair of jaws adapted to receive an electrode carbon between them, one of said jaws having spaced arms provided with perforated ears, an independent section arranged between said arms and adapted to engage the carbon, and having a perforated boss, a bolt passing through said ears and boss, a bolt on the diametrically opposite side of the carbon supported by the other jaw, contact plates engaging the carbon on sides diagonally opposite said jaws, cross bars engaging said contact plates and supported by said bolts, means for tightening said bolts against said cross bars, and means for forcing said independent section inwardly against the carbon.

12. A dipping electrode comprising a steel arm carrying carbon clamping means at one extremity, said clamping means comprising a pair of clamping members adapted to ex-

ert pressure in one direction and another pair adapted to exert pressure in a direction at right angles thereto, said second pair comprising a fixed clamping member having a pivoted portion, and means for exerting pressure upon such pivoted portion.

13. A dipping electrode comprising a steel channel bar carrying carbon clamping means at one extremity, said clamping means comprising a pair of clamping members adapted to exert pressure in one direction and another pair adapted to exert pressure in a direction at right angles thereto, said second pair comprising a fixed clamping member and a clamping member having a pivoted portion, and means for exerting pressure upon such pivoted portion.

14. A dipping electrode comprising a channeled steel bar carrying a conductor in a channel thereof and provided with carbon clamping means at one extremity, said conductor having an extension beyond such extremity and said clamping means being adapted to clamp said extension to carbon electrode elements, and adjustable means in connection with said clamping means for taking up expansion and contraction.

15. A dipping electrode comprising a channeled steel arm, a pair of clamping members mounted at one extremity thereof and extending therebeyond, one of said members being rigid and one provided with a movable portion, and another pair of clamping members carried by said first-mentioned clamping members and having clamping faces at right angles thereto.

16. A dipping electrode comprising an arm or bar of rigid metal, a rigid clamping member secured at one end thereof and extending therebeyond, and a second clamping member oppositely placed at said end, said second clamping member comprising a rigid body and a hinged portion having a flattened face, said hinged portion being so mounted as to permit the insertion of wedges between the same and the said rigid body.

17. A dipping electrode comprising an arm or bar of rigid metal, a rigid clamping member secured at one end thereof and extending therebeyond, and a second clamping member oppositely placed at said end, said second clamping member comprising a rigid body portion having a pair of downwardly extending prolongations carrying bearings and a swingable clamping plate journaled in said bearings, and means for exerting clamping pressure on said plate.

18. A dipping electrode comprising an arm or bar of rigid metal, a rigid clamping member secured at one end thereof and extending therebeyond, and a second clamping member oppositely placed at said end, said second clamping member comprising a rigid body portion having a pair of downwardly

extending somewhat offset prolongations carrying bearings, and a swingable clamping plate journaled in said bearings, said clamping plate being so mounted as to permit the insertion of wedges between its outer face and said prolongations.

19. A dipping electrode comprising an arm or bar of rigid metal, a rigid clamping member secured at one end thereof and extending therebeyond, and a second clamping member oppositely placed at said end, said second clamping member comprising a rigid body portion having a pair of downwardly extending prolongations having recesses in their rear faces and carrying bearings, and a swingable clamping plate journaled in said bearings, said clamping plate being so mounted as to permit the insertion of wedges against its outer face through such recesses.

20. A dipping electrode comprising an arm or bar of rigid metal, a rigid clamping member secured at one end thereof and extending therebeyond, and a second clamping member oppositely placed at said end, said second clamping member comprising a rigid body portion having a pair of downwardly extending prolongations having recesses in their rear faces and somewhat offset, said prolongations carrying bearings, and a swingable plate journaled in said bearings and having slotted lugs on its forward face.

21. A dipping electrode comprising a steel I-beam, a pair of downwardly extending clamping members mounted on opposite faces at one end, one of said members being rigid and the other comprising a rigid and a swingable portion, means for exerting pressure on the latter, a tension rod extending through each of said clamping members and carried thereby and a pair of clamping bars and plates mounted on said tension rods.

22. A dipping electrode comprising a steel I-beam, a pair of downwardly extending clamping members mounted on opposite faces at one end, one of said members being

rigid and the other comprising a rigid and swingable portion, means for exerting pressure on the latter, a tension rod extending through each of said clamping members and carried thereby and a pair of clamping bars or plates mounted on said tension rods, one end of each of said rods being slotted to permit the introduction of a wedge bearing against the corresponding clamping plate or bar.

23. A dipping electrode comprising a rectangular steel beam or bar, a downwardly extending clamping member secured to each of two opposite faces at one end of said bar or beam, clamping members located between and carried by downward extensions of the first-named clamping members and adapted to clamp at right-angles thereto, wedge means for adjusting the pressure between the first named clamping members and wedge means for adjusting the pressure between the second-named clamping means.

24. A dipping electrode comprising a channeled steel beam or bar, an electric conductor secured in a channel and having a downward extension, a pair of downwardly extending clamping members secured to opposite faces of said bar or beam at one end thereof, one of said members being rigid and the other comprising a swinging portion, means for exerting pressure on the swinging portion, and a second pair of clamping members located between and carried by the downward extension of the first-named clamping members, said downward extension of the conductor being located at the inner face of one of said second clamping members, and means for exerting pressure on said second clamping members.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this seventh day of March A. D. 1907.

HERMAN L. HARTENSTEIN.

Witnesses:

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DANL. G. CASH.