Nov. 26, 1929. J. E. BIRCH 1,737,293

ENAMEL DRIER

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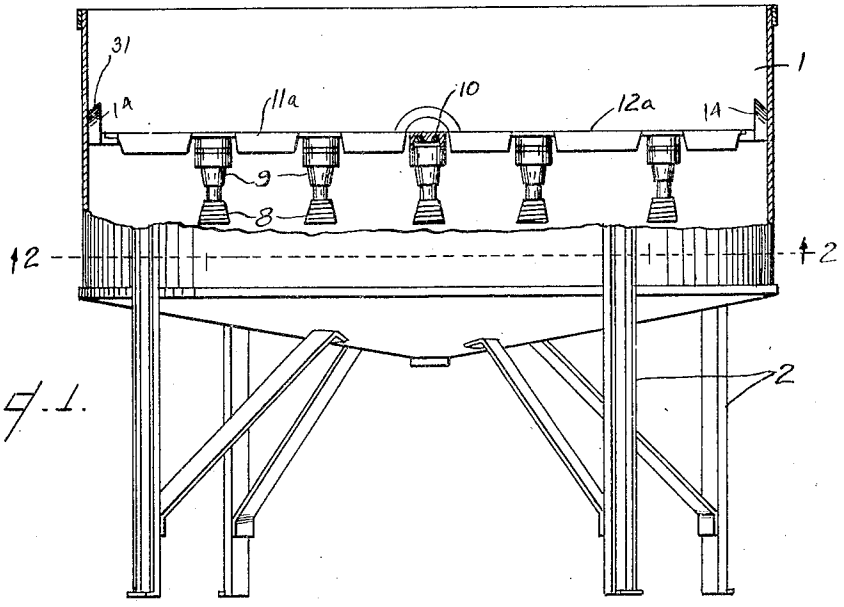


Fig. 1.

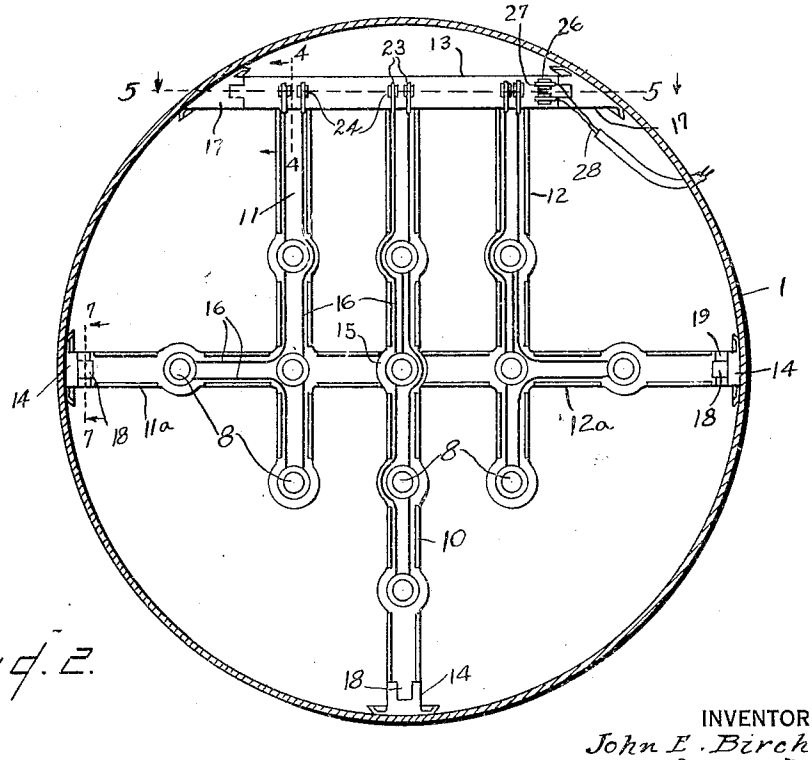


Fig. 2.

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Fig. 3.

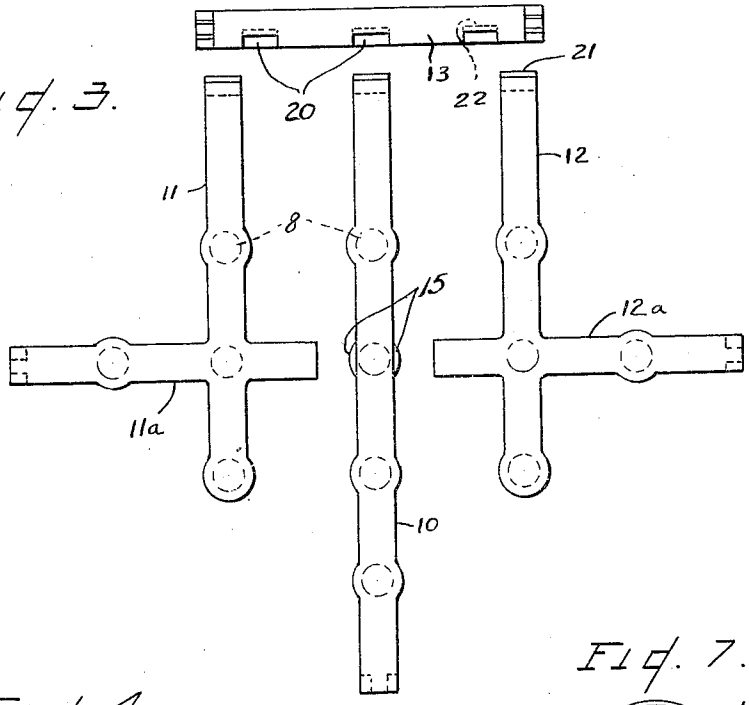


Fig. 4.

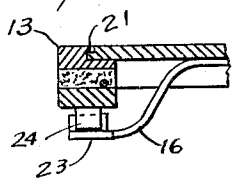


Fig. 7.

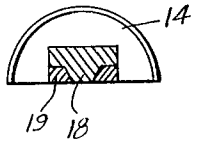


Fig. 5.

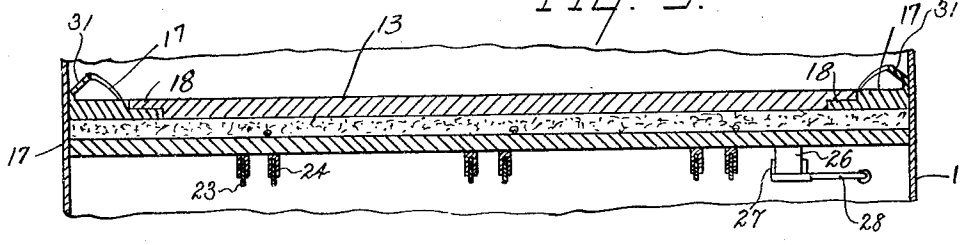
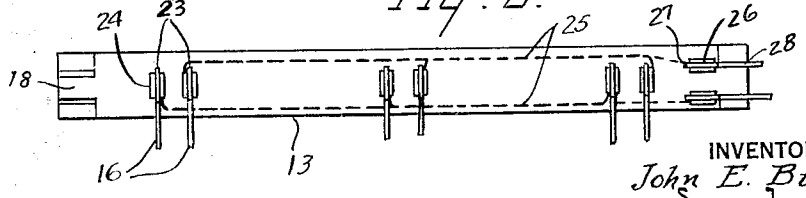


Fig. 6.



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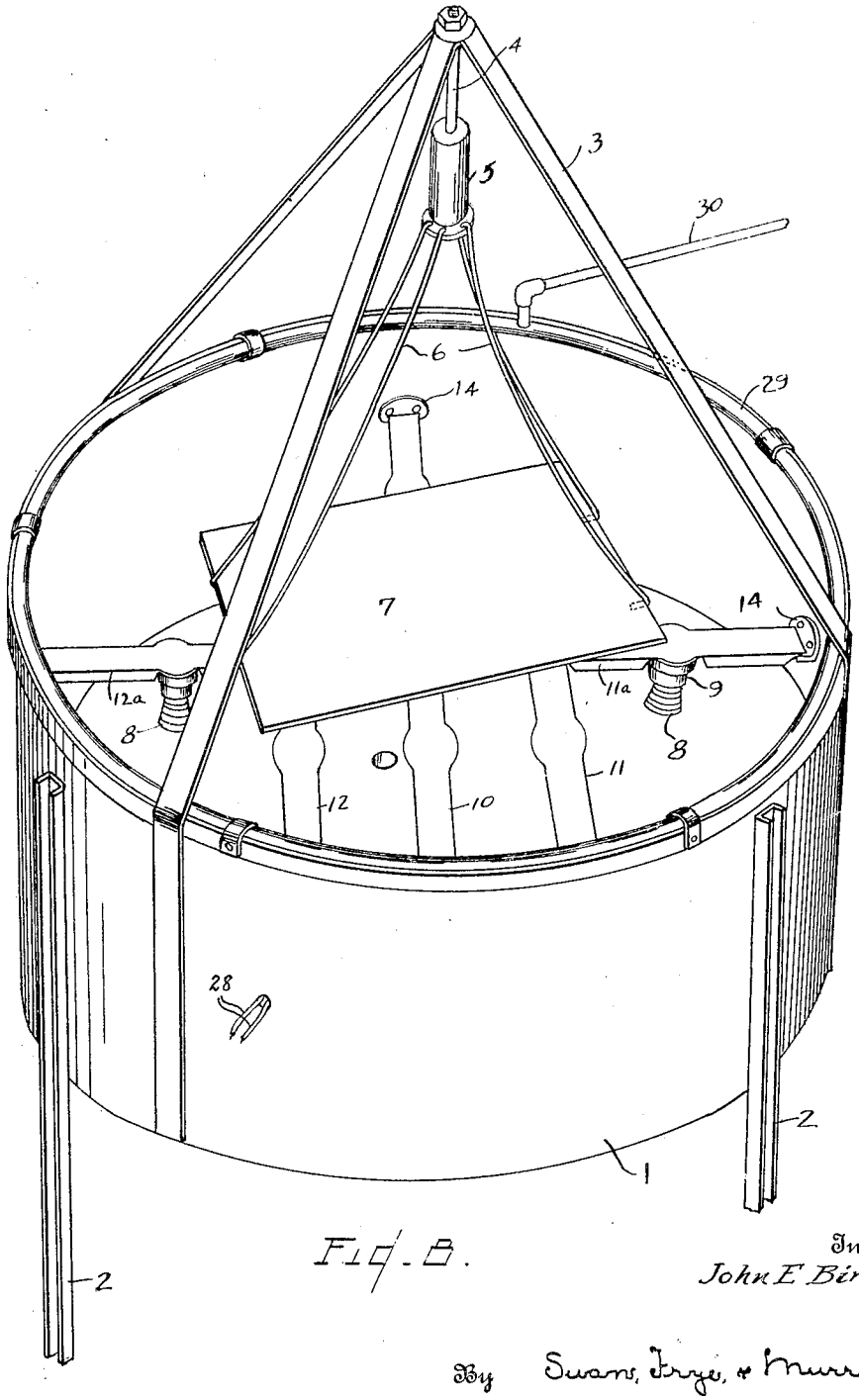


Fig. 8.

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UNITED STATES PATENT OFFICE

JOHN E. BIRCH, OF DETROIT, MICHIGAN

ENAMEL DRIER

Application filed August 29, 1927. Serial No. 216,097.

This invention relates to enamel driers, and more particularly to apparatus for drying coatings of enamel, lacquer or the like, applied to plates of sheet metal or other material.

An object of the invention is to arrange a plurality of electric heating units within a tank or other receptacle so that a plate having a coating to be dried may be arranged above and in heated relation to said units, and to provide within said tank a support for said units comprising a number of sections readily removable from said tank to facilitate their repair or replacement.

Another object is to provide for quickly making or breaking the electrical connections between branch conductors carried by said sections for delivering current to said units and supply mains for conductors.

A further object is to provide for spinning a coated plate of sheet metal or the like within a tank above a number of electric heating units to dry the coating on said plate, to provide a removable supporting frame for said units, to provide for flowing water or the like downwardly upon the interior wall of said tank to remove such portions of the coating material as may be thrown from said plate upon said wall during the spinning operation, and to interiorly mount upon said wall a plurality of brackets for carrying said frame, so fashioned as to prevent delivery of water from the wall to the frame, and possible resultant short-circuiting of the electrical connections to said units.

These and various other objects the invention attains by the construction hereinafter described and illustrated in the accompanying drawings, wherein:—

Figure 1 is a view in vertical section and partial side elevation of an enamel-drying tank in which an electric heater is installed in accordance with the present invention.

Figure 2 is a cross sectional view of the same taken on line 2—2 of Figure 1, showing the under side of said heater.

Figure 3 is a top plan view of the sections comprising the frame of said heater, showing said sections disassembled.

Figure 4 is a detail sectional view of the joint between two of the sections of said frame, taken upon the line 4—4 of Figure 2.

Figure 5 is a sectional view of one of the members of said frame, taken upon the line 5—5 of Figure 2.

Figure 6 is a bottom plan view of the frame members illustrated in Figure 5.

Figure 7 is a detail sectional view taken on the line 7—7 of Figure 2, showing the mounting of one of the frame sections on a supporting bracket.

Figure 8 is a perspective view of the complete apparatus.

In these views the reference character 1 designates an open-topped tank supported at a convenient elevation by a plurality of legs 2 or other suitable means. Said tank is spanned by an arched spider 3 of inverted V-shape to the apex of which is secured, preferably rigidly, a vertically depending shaft 4. Upon the lower end portion of said shaft is journaled a hub member 5 supporting a plurality of downwardly divergent flexible arms 6, the lower extremities of which are hooked or otherwise adapted to engage and horizontally support a plate 7 of sheet metal or other material. It is to be understood that said plate preliminary to its engagement with the hooked arms 6 is coated with enamel or some other facing material requiring to be dried by an application of heat.

As a provision for heating the plate 7, there are disposed within the tank 1, below the hooked arms 6, a plurality of spaced electric heating units 8 disposed in substantially the same horizontal plane and preferably detachably engaged in a well-known manner with sockets 9. Said sockets are carried upon the underside of a suitable frame extending horizontally across the tank and in order to facilitate access to the units for the purpose of repairs or replacement said frame comprises a plurality of quickly removable sections, preferably formed of some light metal such as aluminum. Thus said frame comprises a bar 10 extending diametrically across the tank, a pair of similar substantially cruciform members 11, 11ª and 12, 12ª, disposed one at each side of the bar 10 and supported jointly by said bar and by the tank wall, and

a fourth frame member 13 which extends transversely to the bar 10 and to the elements 11 and 12 and supports corresponding ends of said bar and elements. The elements 11 and 12 at their other ends project freely some distance beyond the members 11^a and 12^a, and the other extremity of the bar 10 is quick-detachably mounted upon a bracket 14 interiorly secured to the tank wall. A pair of similar brackets 14 support the outer ends of the elements 11^a and 12^a, the inner ends of which are adapted to rest freely and quick-detachably upon a pair of lugs 15 oppositely projecting laterally from the bar 10. (See Figure 3). Said bar and the elements 11, 11^a, 12 and 12^a, are of inverted channel form, and within the channel of each thereof are extended conductors 16 delivering current to the heating units 8. These units may vary as their number and their particular location upon the sectional frame. In the disclosed embodiment of the invention, four units are mounted upon the bar 10 and four are carried by each of the frame elements 11, 11^a and 12, 12^a. The bar 13 is adapted for quick removal from the tank similarly to the other frame sections, being terminally mounted upon a pair of brackets 17 interiorly secured to the tank wall, and preferably somewhat closer together than the brackets 14. The supported extremities of all of the described frame sections are preferably flat, omitting the channel-forming side flanges, and are adapted to be held in proper engagement with the brackets 14 and 17 by forming upon their under faces central tongues 18 having their side edges downwardly beveled convergently, as best seen in Figure 7, for engagement with the correspondingly beveled edges of forked supports 19 on said brackets between which said tongues engage. Thus it is apparent that the frame sections, while held from lateral or longitudinal shifting with respect to the supporting brackets, are freely upwardly removable. The bar 13 preferably has notches 20 in its top face to receive and position the engaged ends of the bar 10 and elements 11 and 12, and preferably said ends are formed with slightly projecting tongues 21 which are engageable in pockets 22 formed by under-cutting the end walls of the notches 20. This assists in more definitely holding the sections 11, 11^a, and 12, 12^a in their proper positions without impeding the free upwardly removal of said sections. The conductors 16 have free flexible end portions adjacent to the bar 13 which end portions individually carry contact plates 23 frictionally engageable with paired spring contacts 24 carried upon the underface of the bar 13. The contacts 24 are engaged by conductors 25 which extend from a pair of contacts 26 upon one end of the bar 13, quick-detachably engageable by a pair of contact plates 27 carried by the flexible end portions of conductors 28 leading into the tank from any suitable source of electrical energy.

The mounting of the plate 7 upon the rotatable support comprised by the hub 5 and arms 6 adapts said plate to be spun about a vertical axis so as to expose its entire surface substantially uniformly to the heated air current created by the units 8. When thus spun, said plate centrifugally throws off a portion of its coating upon the interior wall of the tank, and it is desirable to continuously remove such deposits from the tank wall. For this purpose there may be mounted upon the rim portion of the tank a circular pipe 29 having a suitable water supply main 30 leading thereto, said pipe being perforated to discharge downwardly upon the interior surface of the tank wall. If the water thus flowing is diverted to an appreciable extent upon the described sectional frame, short-circuiting of the electrical connections would be likely to result. Therefore the brackets 14 and 17 have upwardly curved semi-circular portions engaging the tank wall, as best seen in Figure 7, and the arcuate edges 31 of these portions are beveled at an upward and lateral inclination to the wall (see Figures 1 and 2) so as to form shields restraining the water descending upon the tank wall from delivery to the unit-carrying frame.

In the use of the described construction, after a coated plate 7 has been engaged with the lower ends of the arms 6, the support comprised by said arms and the hub 5, is rotated manually or otherwise at a suitable velocity to equalize the exposure of said plate to the heated air current rising from the heating units 8. The time ordinarily required to accomplish a complete drying of the coating upon such plate is between one and two minutes. The length of this time, however, is obviously dependent upon the size, number and location of the heating units. The primary advantage achieved by the described construction is the establishment of such a relation between the heating units and the coated plates as to effect a drying of the coating in the minimum time and with a minimum application of electrical energy.

It is a further decided advantage of the described construction that the frame sections which carry the heating units are very quickly and easily removable from the tank so that any necessary repairs or replacements of the heating units may be accomplished with a minimum of effort and of time lost.

While it will be apparent that the illustrated embodiments of my invention herein disclosed are well calculated to adequately fulfill the objects and advantages primarily stated, it is to be understood that the invention is susceptible to variation, modification and change within the spirit and scope of the subjoined claims.

What I claim is:

1. In a device of the character described, the combination with an open-topped receptacle, and a plurality of heating units within said receptacle, of a frame supporting said units comprising a plurality of sections independently removable from the receptacle, a member removably mounted within the receptacle detachably carrying corresponding ends of said sections, electrical conductors extending respectively upon said member and upon said sections for delivering current to said units, and means for establishing a quick detachable connection between the conductors on said member and on said sections.

2. The combination with an open topped receptacle, of a frame disposed in said receptacle comprising a plurality of sections independently removable from said receptacle, and a plurality of electrical heating units carried by said sections.

3. In a device of the character described, the combination with an open topped receptacle, of a frame mounted in said receptacle comprising a bar extending across said receptacle, and a pair of members disposed one at each side of said bar, said bar and members being independently removable from said receptacle, and a plurality of heating units carried by said bar and companion members.

4. In a device of the character described, the combination with an open topped receptacle, of a frame arranged within said receptacle comprising a bar extending across the receptacle, and removably carried by the receptable wall, and further comprising a pair of cruciform members arranged one at each side of said bar and jointly supported by said bar and the receptacle wall, and a plurality of heating units carried by said bar and members.

5. In a device of the character described, the combination with an open topped receptacle, of a removable frame detachably mounted within said receptacle upon the wall thereof, said frame providing openings for upward circulation of air, and a plurality of electrical heating units carried by said frame.

6. In a device of the character described, the combination with an open topped receptacle, of a plurality of heating units within said receptacle, a frame carrying said units, and brackets interiorly secured to the receptacle mounting said frame and fashioned to shield the frame from a down-flow of water upon the receptacle wall.

In witness whereof I hereunto set my hand.

JOHN E. BIRCH.