Jan. 20, 1953

R. C. MANN ET AL

APPARATUS FOR UNITING A PLURALITY OF METAL PARTS BY MELTING METAL

2,625,897

Filed Sept. 25, 1948

3 Sheets-Sheet 1

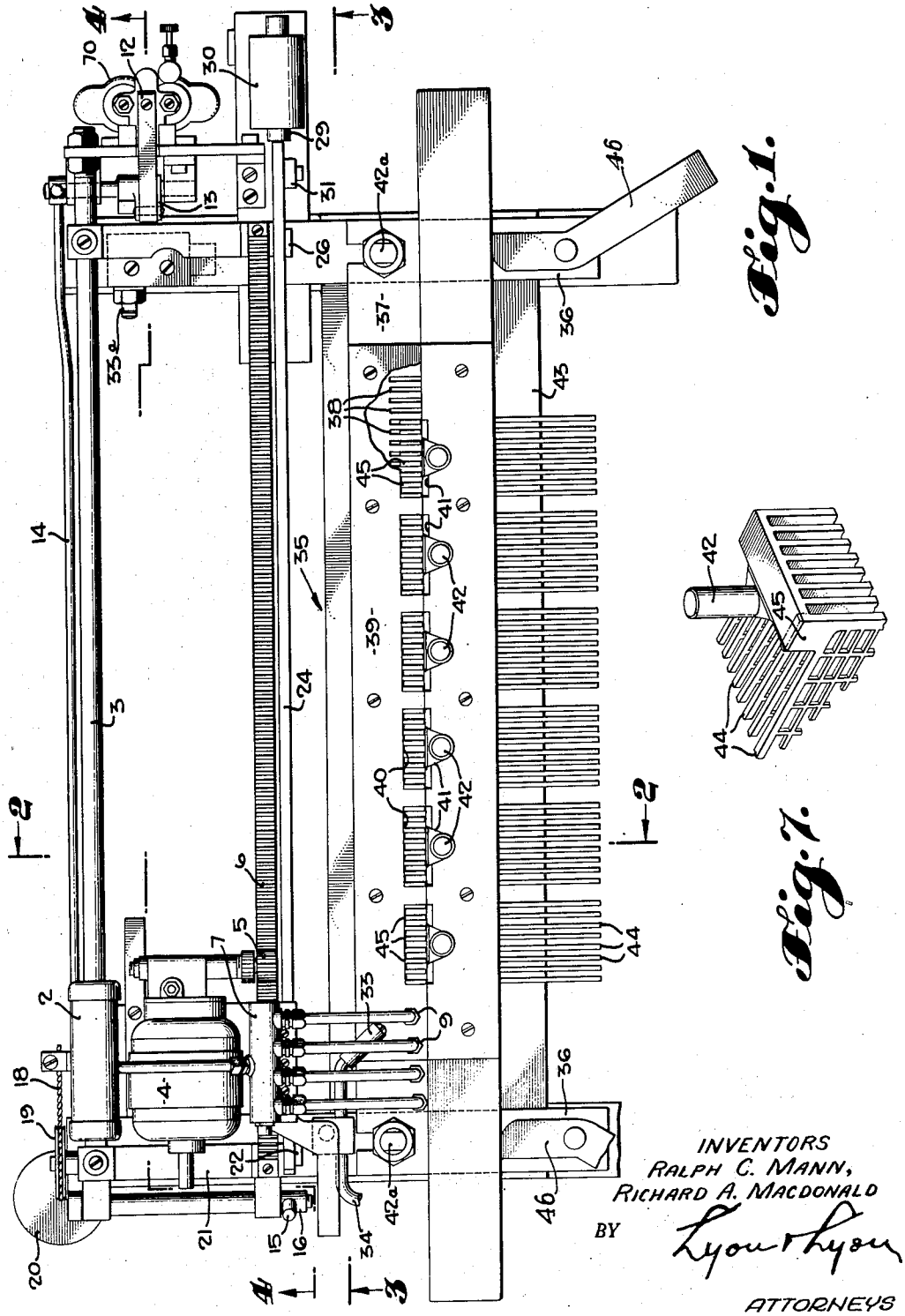


Fig. 1.



Fig. 7.

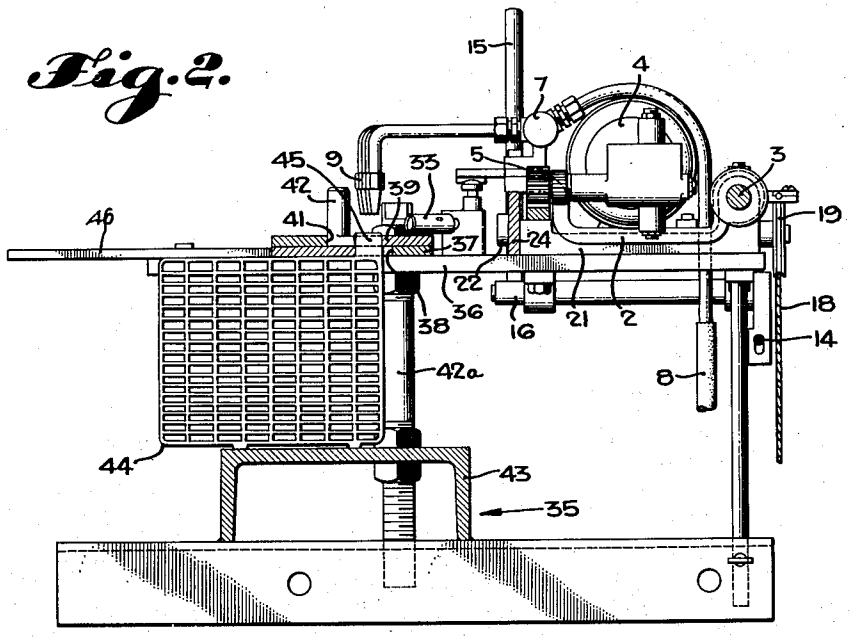
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Fig. 2.



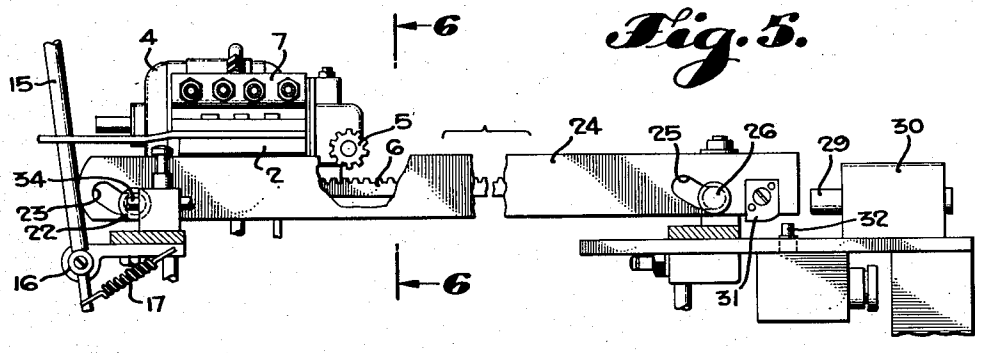




Fig. 5.

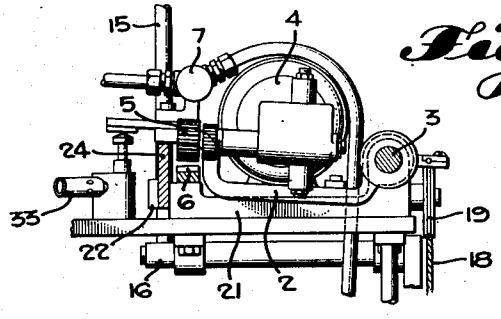



Fig. 6.

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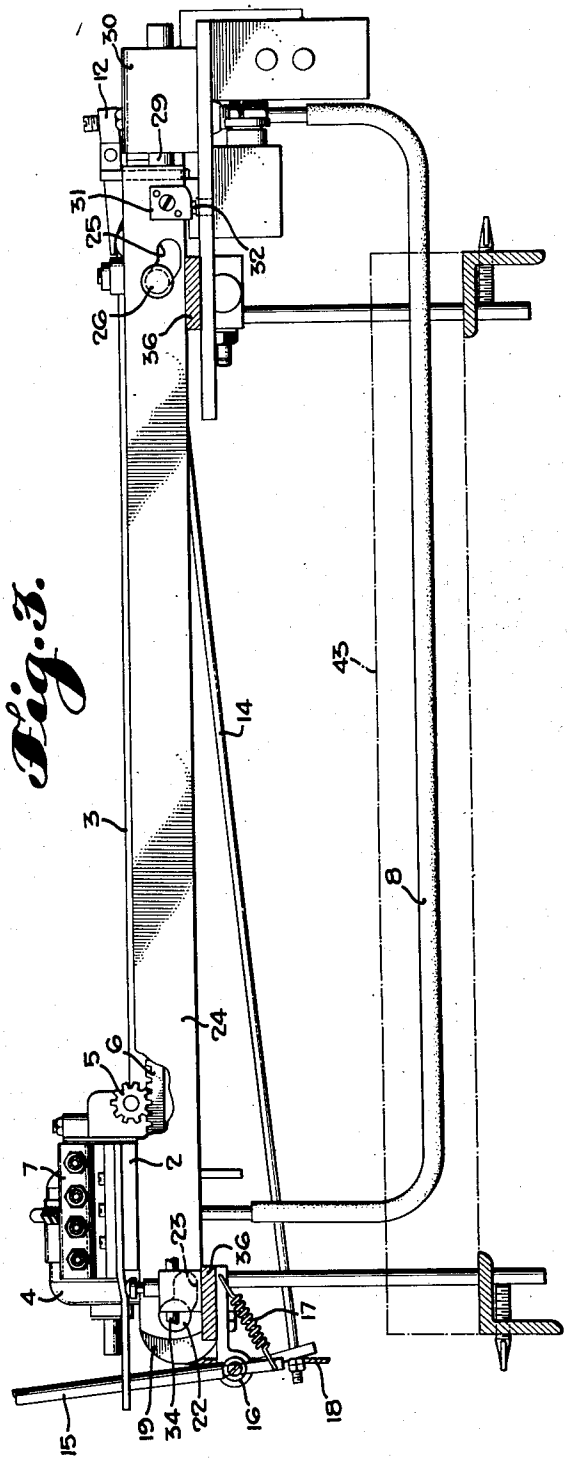



Fig. 3.

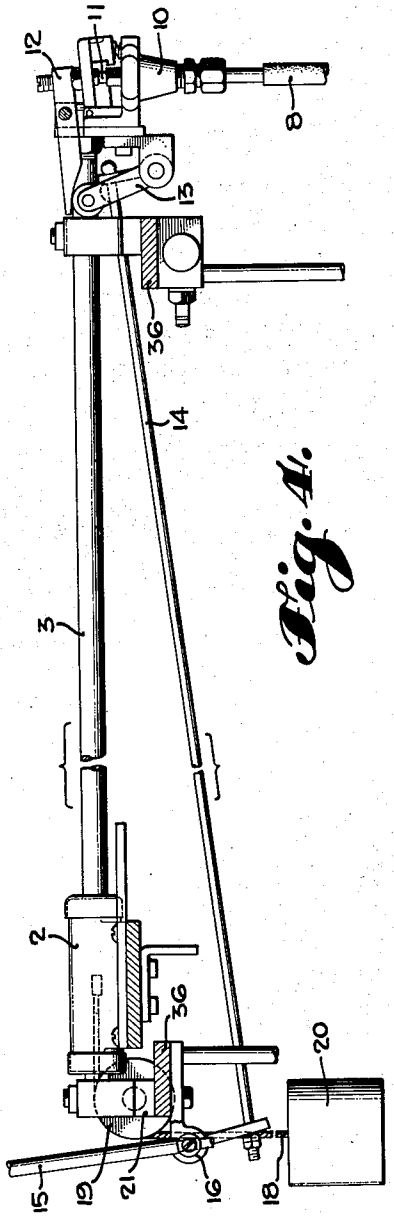



Fig. 4.

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Patented Jan. 20, 1953 2,625,897

# UNITED STATES PATENT OFFICE

2,625,897

## APPARATUS FOR UNITING A PLURALITY OF METAL PARTS BY MELTING METAL

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Application September 25, 1948, Serial No. 51,216

6 Claims. (Cl. 113—59)

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This invention relates to an apparatus for uniting a plurality of metal parts by melting metal, particularly where projections of the metal parts are melted in the operation of uniting the parts.

The invention is of particular value for the purpose of uniting the plates of a storage battery in which a lead lug is melted and united to projections on the blades which are also melted in the operation.

It is the general object of the present invention to provide an apparatus capable of automatic operation for effecting a succession of unions in a single operation of the apparatus. By means of the present invention a plurality of uniting operations are effected automatically by the machine, which is so constructed as to then automatically return to its initial position in preparation for a second series of operations.

By means of the present invention a plurality of batteries may have their plates united by one operation of the machine.

The apparatus of the present invention comprises a carriage which is mounted to move with respect to a row of plates of a number of different batteries. Upon the carriage there is provided gas burners or nozzles for projecting a flame directly on the battery plates. The operation of turning on the burners and igniting the same is entirely automatic as well as the movement of the carriage so as to progressively cause the jets from the burners to be properly directed in succession on to a line of battery plates. Moreover, the apparatus is provided with means to effect an automatic return movement at the end of each operation and to automatically shut off the gas supply.

By means of the apparatus of the present invention it is therefore required only that a single lever be utilized both to effect the burning of a multiplicity of batteries and also to return the apparatus to the initial starting position and shut off the apparatus until needed for further operation.

A particular feature of the apparatus of the present invention is that it is constructed and arranged so as to automatically bring a succession of nozzles into operation on the same zone or same part to be melted. This operation is of particular value in uniting the plates of storage battery cells, since it achieves what may be termed a puddling operation. The metal to be melted becomes melted by the operation of the first nozzle or nozzles which are acting in succession on the particular zone, while the following nozzles act to puddle or stir the molten lead so as to assure a more proper union.

Figure 1 is a plan view.

Figure 2 is a section substantially on the line 2—2 of Figure 1.

Figure 3 is a section substantially on the line 3—3 of Figure 1.

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Figure 4 is a fragmentary section substantially on the line 4—4 of Figure 1.

Figure 5 is a fragmentary elevation similar to Figure 3, with the control bar moved to off position.

Figure 6 is a section on the line 6—6 of Figure 5.

Figure 7 is a perspective view of one of the completed units.

The apparatus comprises a carriage 2, the rear end of which is mounted on a horizontal rod 3 for a sliding movement. The carriage 2 is pivoted on the rod 3 and mounts an electric motor 4 which drives a pinion 5, which in one position engages the horizontal rack 6. The carriage 2 mounts a manifold 7, to which is connected a plurality of pipes which lead to nozzles 9. The nozzles 9 are positioned facing downwardly at progressively greater distances from the carriage, so that in operation the zones affected by each nozzle 9 partially overlap and a broader area is covered than if the nozzles were in alignment.

The manifold 7 is connected by a flexible hose 8 to a valve 10 which is connected to a source of gas for the nozzles 9. The valve 10 is adapted to control the flow of gas into the hose 8. A stem 11 of the valve 10 is in contact with an adjustable rocker member 12 which engages a roller and a pivoted arm 13 connected to a rod 14. The rod 14 is in turn connected to a lever 15 pivoted to the frame of the machine as indicated at 16, the lever 15 being normally urged by spring 17 in the direction to close the valve 10. The carriage 2 is indicated as attached to a cable 18, passing around a pulley 19 to a weight 20 which, as hereafter described, is effective for returning the carriage to the starting position.

There is provided a control bar 24 which at its left end, as viewed in the drawings, is provided with an angled slot 23 within which there is a roller 22 supported by a bracket 21 from the arm. The angled slot allows the bar to drop when the bar is moved to the right, but causes the bar to be elevated when it is moved to the left. The bar is moved to the right by contact with a projection from the lever 15, when the lever is moved clockwise. The control bar when it moves to its elevated position contacts the carriage 2 to pivot the carriage about the rod 3 and disengage the drive pinion 5. The control bar when it is moved to its lower position allows the carriage to pivot back into position to bring the pinion 5 back in contact with the rack 6. Near the opposite end of the control bar 24 is provided an angled slot 25 similar to slot 23, and the frame supports a roller 26 operating in that slot for elevating and raising the right end of control bar 24.

In Figure 3 the control bar is indicated as having been moved to the right or operating position. The right end of the bar in lowered or oper-

ating position, contacts plunger 29 of a solenoid 30 which operates, as hereafter described, for the purpose of returning the control bar to the left, or off position. The control bar also carries a contact member 31, which in the lowered position of the control bar, as shown in Figure 3, is adapted to close the electric switch 32. This electric switch is connected by an electric lead line (not shown), to the motor 4 so that the closing of such switch energizes the motor 4.

By this construction, when the lever 15 is turned clockwise, through rod 14 valve 10 is turned to the on position to cause the flow of gas to the nozzles 9. The gas from such nozzles is ignited by a pilot 33 connected to the gas supply lines by pipe 34 and supported by the frame. Simultaneously, the control bar 24 is moved to the right and lowered. This operation lowers the carriage 2 so that the pinion 5 now engages the rack 6 and the motor 4 starts the carriage moving slowly to the right of the apparatus, the switch 32 being closed by the lowering of the bar to energize the motor. The carriage moves to the end of the apparatus where a portion of the carriage contacts a switch 33a, which is connected by lines (not shown) to the solenoid 30. The solenoid 30 thrusts the control bar 24 to the left, thereby elevating the bar and opening the switch 32 to stop the motor 4. The carriage is then drawn back to the left or starting position by the weight 20. Furthermore, the movement of the control bar 24 through the rod 14 shuts off the flow of gas to nozzles 9. Through contact the gas is shut off from nozzle 9 because when the control bar 24 is moved to the left it again contacts the projection of lever 15 rotating the lever 15 counter-clockwise, which in turn moves bar 14 in direction to close valve 10.

From the frame 35 there extends bars 36 which support a plate 37, which plate is provided with a plurality of slots 38 for receiving the plates of the lead storage battery. On the top of the plate 37 is provided a second plate 39 which has a plurality of recesses 40, one for each storage battery to be produced. These recesses 40 align and are provided with notches 41 for receiving a lug 42, which is composed of lead, and also furnishes the lead which is to be melted in uniting the storage plates together. Bolts 42A are provided, which space the bars 36 from a base member 43 which serves as a support for the lower end of the usual lead cells 44 of a storage battery. By this construction the usual lead cells of the storage battery may be supported on the base 43 with their upper terminals 45 fitted in the slots 38 and thereby held properly spaced apart and in position for the lead melting operation. The lugs 42 are then positioned as indicated and serve, along with the terminals 45 to provide the lead which is melted into the openings 40 and thereby unite the cells of the battery together, as indicated in Figure 7, likewise uniting these to the lug 42.

It will be seen that when the lead plates 44 and the terminals 45 are assembled as described, it requires only a single movement of the lever 15 to turn on the machine. As the carriage moves horizontally, the terminals 45 are heated and the lead runs down, uniting with the plates of the batteries. Due to the offset relation of the successive nozzles 9, a puddling action on the melted lead is effected to insure complete and proper union of the lead with the plates. When the carriage automatically returns to the starting position, clamps 46 are released and the battery cells removed, allowing for the installation of a further set for further operation. By the apparatus herein described, I have found it possible to burn storage batteries very rapidly and satisfactorily in a machine that is automatic in its operation.

While the particular form of the machine herein described is well adapted to carry out the objects of the present invention, various modifications and changes may be made and this invention is of the scope set forth in the appended claims.

We claim:

1. A lead burning apparatus for melting lead in a series of connecting molds and uniting said lead to battery plates, which includes a carriage, a frame including a member along which said carriage is horizontally movable and to which said carriage is pivoted, a rack mounted by said frame parallel to said member, a motor mounted on said carriage connected to a pinion engaging said rack on pivoting of said carriage for horizontally moving said carriage, gas nozzles mounted on said carriage in position for operation on said molds during movement of said carriage, gas supply means connected to said nozzles, including a valve, a control bar mounted by said frame parallel to the path of said carriage and movable into contact with said carriage for pivoting said pinion to and from contact with said rack, a switch for said motor operated on the movement of said control bar to permit said pinion to engage said rack, said control bar having projections to actuate said switch, and means to move said control bar including an operating member for said control bar, said operating member being connected to said valve for opening said valve on the movement of the control bar by said operating member.

2. A lead burning apparatus for melting lead in a series of connecting molds and uniting said lead to battery plates, which includes a carriage, a frame including a member along which said carriage is pivoted, a rack mounted by said frame parallel to said member, a motor mounted on said carriage connected to a pinion engaging said rack on pivoting of said carriage for horizontally moving said carriage, gas nozzles mounted on said carriage in position for operation on said molds during movement of said carriage, gas supply means connected to said nozzles, including a valve, a control bar mounted by said frame parallel to the path of said carriage and movable into contact with said carriage for pivoting said pinion to and from contact with said rack, a switch for said motor operated on the movement of said control bar to permit said pinion to engage said rack, said control bar having projections to actuate said switch, and means to move said control bar including an operating member for said control bar, said operating member being connected to said valve for opening said valve on the movement of the control bar by said operating member, and a solenoid having a plunger for returning said control bar to position to release said pinion from said rack.

3. A lead burning apparatus for melting lead in a series of connecting molds and uniting said lead to battery plates, which includes a carriage, a frame including a member along which said carriage is horizontally movable and to which said carriage is pivoted, a rack mounted by said frame parallel to said member, a motor mounted on said carriage connected to a pinion engaging

said rack on pivoting of said carriage for horizontally moving said carriage, gas nozzles mounted on said carriage in position for operation on said molds during movement of said carriage, gas supply means connected to said nozzles, including a valve, a control bar mounted by said frame parallel to the path of said carriage and movable into contact with said carriage for pivoting said pinion to and from contact with said rack, a switch for said motor operated on the movement of said control bar to permit said pinion to engage said rack, said control bar having projections to actuate said switch, and means to move said control bar including an operating member for said control bar, said operating member being connected to said valve for opening said valve on the movement of the control bar by said operating member, a solenoid having a plunger for returning said control bar to position to release said pinion from said rack, and a switch for said solenoid contacted by said carriage at the end of its movement for energizing said solenoid.

4. A lead burning apparatus for melting lead in a series of connecting molds and uniting said lead to battery plates, which includes a carriage, a frame including a member along which said carriage is horizontally movable and to which said carriage is pivoted, a rock mounted by said frame parallel to said member, a motor mounted on said carriage connected to a pinion engaging said rack on pivoting of said carriage for horizontally moving said carriage, gas nozzles mounted on said carriage in position for operating on said molds during movement of said carriage, gas supply means connected to said nozzles, including a valve, a control bar mounted by said frame parallel to the path of said carriage and movable into contact with said carriage for pivoting said pinion to and from contact with said rack, a switch for said motor operated on the movement of said control bar to permit said pinion to engage said rack, said control bar having projections to actuate said switch, and means to move said control bar including an operating member for said control bar, said operating member being connected to said valve for opening said valve on the movement of the control bar by said operating member, and weight-actuated means connected to said carriage for automatically returning said carriage to starting position on pivoting of said carriage to disconnect said pinion and rack.

5. A lead burning apparatus for melting lead in a series of molds and uniting the same to battery plates, which comprises a combination, with means for holding a number of storage battery plates and lugs in position to form molds in which lead may be melted and united to said plates and lugs, of a carriage, a frame including a rod, said carriage being pivotally and slidably movable relative to said molds on said rod, said carriage mounting a plurality of spaced-apart gas nozzles in position to act on said molds on movement relative thereto, said carriage having a motor provided with a pinion, a rack mounted by said frame parallel to said rod in position to be contacted by said pinion on pivoting of said carriage to provide driving means for said carriage, a weight-actuated return for said carriage, gas supply means for said nozzles, including a valve, a control bar mounted by said frame parallel to the path of said carriage and movable to pivot said carriage to bring said pinion into contact with said rod, a starting switch for said motor closed on such movement of said control bar, said control bar having projections to actuate said switch, and means to move said control bar including an operating member for said control bar connected to said valve for opening said valve on movement of said control bar to so pivot said carriage, and means contacted by said carriage on the end of its movement for automatically moving the control bar to pivot the carriage to release the pinion from said rack and permit automatic return of the carriage by said weight-actuated means.



6. A lead burning apparatus for melting lead in a series of molds and uniting the same to battery plates, which comprises a combination, with means for holding a number of storage battery plates and lugs in position to form molds in which lead may be melted and united to said plates and lugs, of a carriage, a frame including a rod, said carriage being pivotally and slidably movable relative to said molds, on said rod, said carriage mounting a plurality of spaced-apart gas nozzles in position to act on said molds on movement relative thereto, said carriage having a motor provided with a pinion, a rack mounted by said frame parallel to said rod in position to be contacted by said pinion on pivoting of said carriage to provide driving means for said carriage, a weight-actuated return for said carriage, gas supply means for said nozzles, including a valve, a control bar mounted by said frame parallel to the path of said carriage and movable to pivot said carriage to bring said pinion into contact with said rod, a starting switch for said motor closed on such movement of said control bar, said control bar having projections to actuate said switch, and means to move said control bar including an operating member for said control bar connected to said valve for opening said valve on movement of said control bar to so pivot said carriage, means contacted by said carriage on the end of its movement for automatically moving the control bar to pivot the carriage to release the pinion from said rack and permit automatic return of the carriage by said weight-actuated means, said control bar being mounted parallel to said rod for a limited horizontal movement, and means for vertically moving the control bar on its limited horizontal movement to effect pivoting of the carriage.

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