No. 625,990. Patented May 30, 1899.

A. A. STEWARD.

BRAZING MACHINE.

(Application filed Jan. 8, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

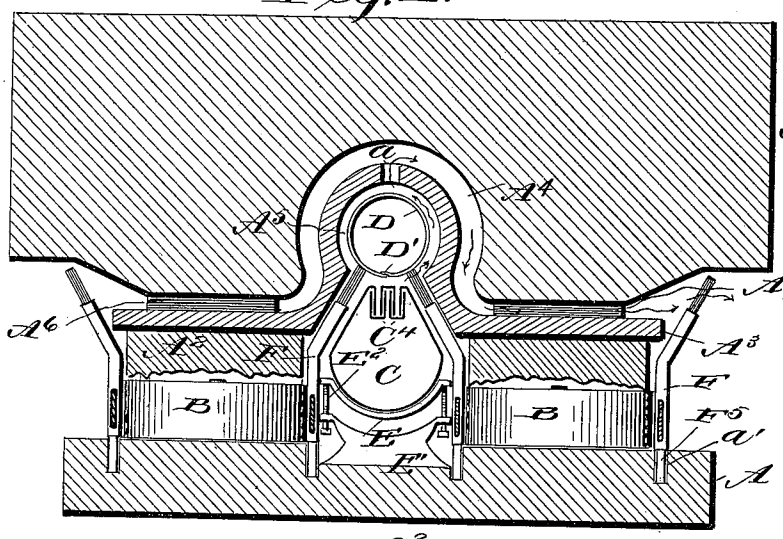
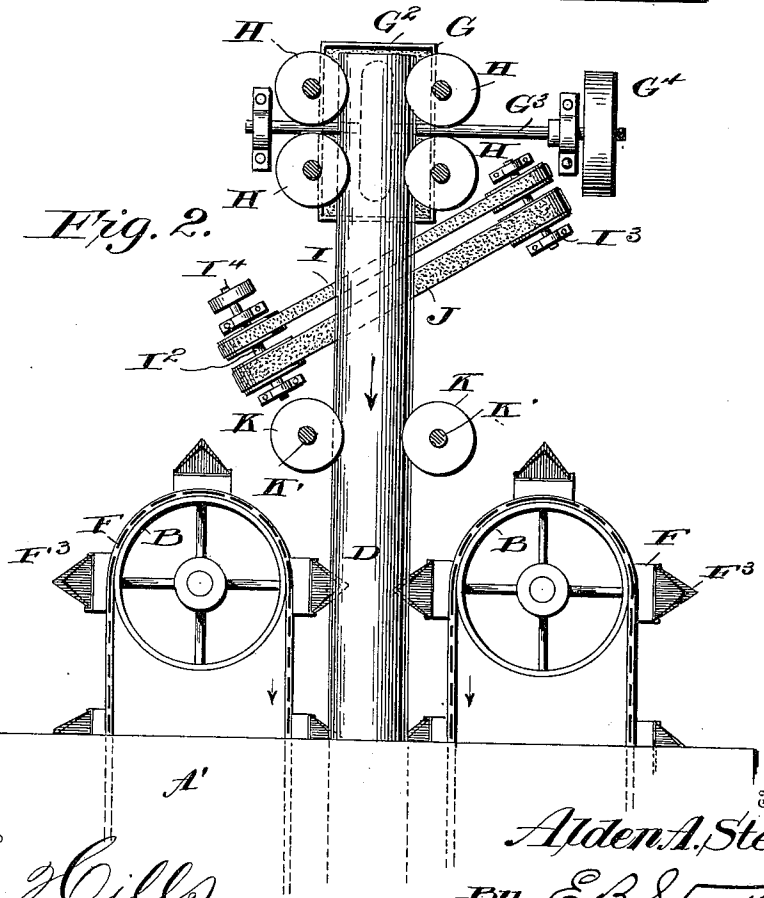


Fig. 2.



Witnesses
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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Fig. 2a.

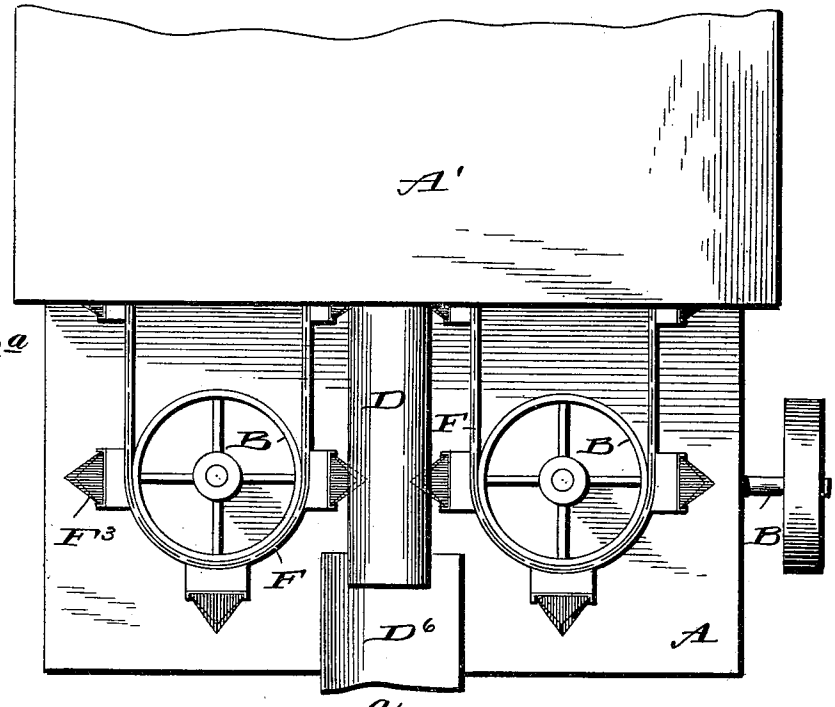
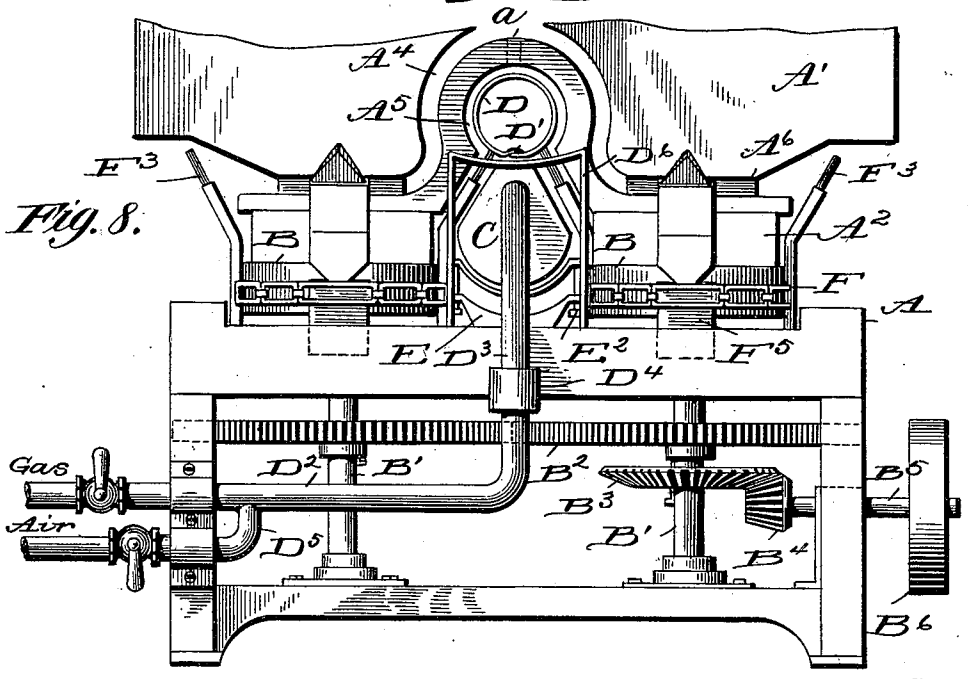


Fig. 8.



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Fig. 3.

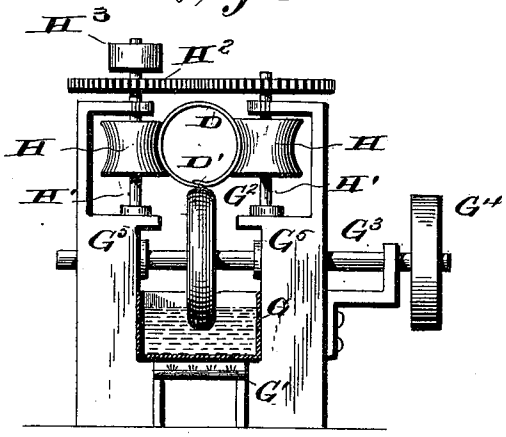


Fig. 6.

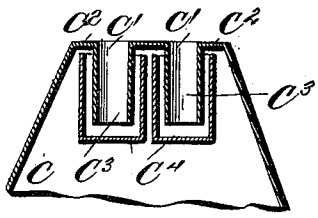


Fig. 7.

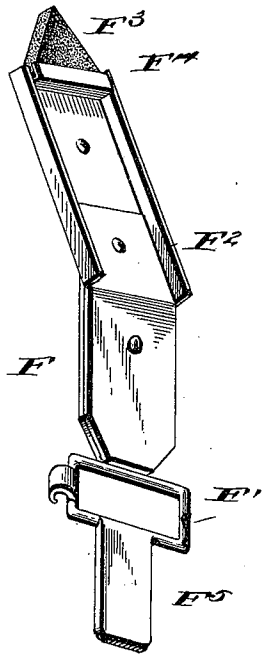


Fig. 4.

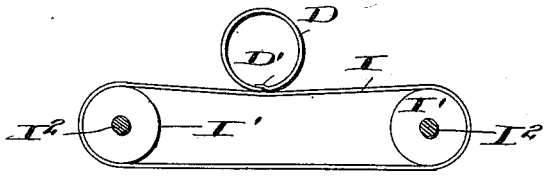
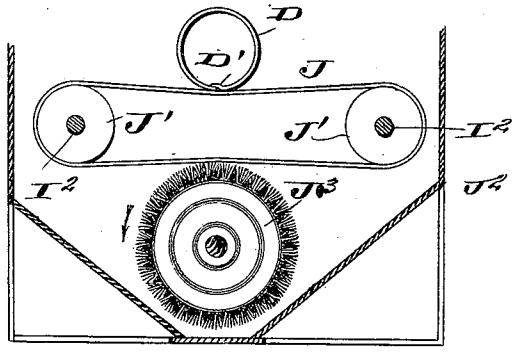


Fig. 5.



Witnesses

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UNITED STATES PATENT OFFICE.

ALDEN AARON STEWARD, OF CLARENDON, VERMONT.

BRAZING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 625,990, dated May 30, 1899.

Application filed January 8, 1898. Serial No. 666,088. (No model.)

To all whom it may concern:

Be it known that I, ALDEN AARON STEWARD, a citizen of the United States, residing at East Clarendon, in the county of Rutland, State of Vermont, have invented certain new and useful Improvements in Brazing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to brazing-machines, and more particularly to a machine for brazing cylindrical articles, such as tubing.

It has for its object to provide a novel and improved construction of heater for fusing the spelter or solder and for moving the article to be brazed through the heater during such operation.

It has as a further object to provide an improved construction of apparatus for the application of the flux, the wiping of the fluxed joint, and the application of graphite to the same before the tube enters the heater.

Other objects and advantages of the invention will hereinafter appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a vertical cross-section through the heater. Fig. 2 is a plan view of the mechanisms located at one end of the heater. Fig. 2^a is a continuation of Fig. 2, illustrating the discharge end of the machine. Fig. 3 is an end elevation, with parts in section, of the flux-applying apparatus. Fig. 4 is a side elevation of the wiping-plate. Fig. 5 is a similar view of the graphite-applying device. Fig. 6 is a detail vertical section through the burner. Fig. 7 is a perspective of the finger and refractory tip composing parts of the endless carrier for supporting the article to be brazed; and Fig. 8 is an end elevation of the discharge end of the machine, illustrating the driving means.

Like letters of reference indicate like parts throughout the several figures of the drawings.

The letter A indicates the base or foundation of the heater, and the letter A′ the top or heat-retaining shield thereof. The portion A′ is supported from the base by means of the body portion A^2, and at opposite ends of the base suitable rollers or sprockets B are provided. Intermediate of the top and base a partition A^3 is arranged so as to leave a heat-conducting passage A^4 between the top and said partition. This partition-plate, at its central portion, extends upward within the recess in the top, so as to form a chamber A^5 to receive the article to be brazed. This chamber may be of any desired shape suitable for the reception of the article to be brazed. Between the partition and the top a series of supporting-blocks A^6 are arranged to carry the weight of the portion A′. An opening *a* is formed in the central portion of the partition A^3, so that the products of combustion may pass from the brazing-chamber into the conducting-passage A^4 and by passing therethrough heat the outer surface of the partition.

Beneath the brazing-chamber A^5 a burner C is arranged, which is adapted for the reception of any suitable fuel, such as air and gas, and is provided at its upper portion with openings C′, which lie beneath the joint D′ of the tube D to be brazed. This burner is provided with a flattened upper surface C^2 and depending walls C^3. These walls are surrounded at their lower portions by an inclosing casing C^4, closed at its lower portion. It will thus be seen that the air and gas passing to the burner-opening C′ will be given a circuitous course, and thus thoroughly mixed, while the portion C′ of the burner will be cooled and prevented from warping by the contact therewith of the fuel before ignition. The fuel in passing to the burner-opening is conducted over the upper end of the inclosing casing C^4, and thus brought in contact with the under surface of the burner-tip C^2. The flames from the two openings C′ will merge together, so as to maintain a zone of heat directly under the point to be brazed without excessively heating the remainder of the tubular article in the brazing-chamber. The heat will pass around the article and thence through the aperture *a* into the passage A^4, thus maintaining an even temperature in the brazing-chamber and protecting the same against the influence of the exterior atmosphere.

The burner may be adjusted to and from the article to be brazed by means of an adjustable yoke E, which is supported from a base E′ by means of adjusting-screws E^2. It

is obvious that this adjusting means may be altered and that in the present form the raising or lowering of the burner will control the amount of contact of the flame with the article brazed.

The tube or other article to be brazed is moved through the heater by means of an endless carrier F, which is composed of a series of links F′, as shown in Fig. 7, having upwardly-extending fingers F^2, provided at their extreme upper ends with removable refractory tips F^3, adapted to contact with and support the articles to be brazed. These tips may be of any desired refractory material and retained upon the finger by means of a socket F^4. The upper portion of the finger is inclined at an angle to the lower part thereof, so that the fingers upon the opposite carriers will incline toward each other, and thus support the article to be brazed without the metallic portion coming into contact with the flame from the burner. The link F′ is provided with a depending lug F^5, which travels in a recess a' formed in the base A of the heater, so that the carriers are positively guided in their movement and in their relation to the other parts of the apparatus. The carriers may be driven by any suitable means—for instance, sprocket-teeth arranged upon the sheaves B or at any other suitable point in the circuit of the conveyers. The sheaves B may be suitably driven by any power mechanism—for instance, such as is illustrated in Fig. 8. As illustrated, each of the sheaves B is mounted upon a spindle B′, which at its lower portion is provided with a meshing gear-wheel B^2. These gears thus drive the opposite carriers, and one of the sheaves B is further provided with a beveled gear B^3, meshing with a beveled pinion B^4, carried by a shaft B^5, which may be suitably driven by any power through the medium of a band-wheel B^6. The heating device C may likewise be supplied by any preferred connection—for instance, an inlet gas-pipe D^2, which is provided with a movable section D^3, connected with the heater, the sections D^2 and D^3 being connected together by a collar D^4, which permits the movement of the section D^3 in the vertical adjustment of the heating device. An air-inlet pipe D^5, communicating with the pipe D^2, is also provided. The work when discharged from the machine may be delivered upon any suitable form of trough or way—for instance, as shown at D^6.

The use of the refractory tips F^3 prevents the fingers of the conveyers from injury due to the high heat used in brazing, and the structure and arrangement of the endless conveyers cause them to support and carry the tubular article to be brazed through the heater at any predetermined speed.

In order to prepare the joint for the proper adhesion of the spelter in the brazing operation, I provide adjacent to the heater a fluxing apparatus to apply flux to the joint and at a suitable distance therefrom a wiper to remove the surplus flux from the joint. In order to prevent the adhesion of the spelter to the tube upon the exterior surface adjacent to the joint, I apply dry graphite or other suitable material by means of an apparatus to be hereinafter described, which prevents the adhesion of the spelter to the exterior of the tube where the graphite has been applied.

As illustrating a desired form of fluxing apparatus I have shown in Fig. 3 a fluxing-tank G, adapted to contain a hot saturated solution of borax and water, which is maintained at the proper temperature by means of a suitable burner G′. The advantage of a hot solution is that a greater quantity of sodium biborate is held in the solution, and consequently the seam more thorougly coated than when the solution is applied cool, and, further, that the solution will not run to a material extent when the temperature is reduced on account of crystallization. The oxidation in brazed joints has been a frequent cause of weakness, as the oxid prevents a close and intermediate union between the spelter and the metal of which the tube is composed. This oxidation is obviated by the application of the hot solution referred to, which also facilitates the flow of the spelter into the joint to be brazed. The solution is applied to the joint D′ of the tube D by means of a suitable roller G^2, which dips into the solution during its revolution, and thus carries the same into contact with the joint. The roller G^2 is supported upon a suitable shaft G^3, driven by any suitable power applied to a band-pulley G^4. The shaft G^3 is supported in oppositely-located standards G^5. For the purpose of guiding and supporting the tube above and in contact with this roller G^2 sheaves H have been provided on opposite sides and are suitably journaled on the standards G^5 by means of shafts H′. These shafts are provided at their upper ends with meshing gear-wheels H^2, and one of said shafts has thereon a driving-pulley H^3 for the application of power in any desired manner. The sheaves H are concaved upon their peripheries and by frictional contact with the tube hold the same in position, while they also move it over the roller G^2 for the application of the flux. The flux is applied by the apparatus just described in sufficient quantity to fill the joint D′, and the fluxing apparatus is located at such a distance from the remaining parts of the apparatus that the flux is allowed to cool and crystallize before being further acted upon.

After the flux is suitably cooled the excess of borax or flux is removed by means of a wiper-belt I, which contacts with the under side of the tube to cleanse the same from any flux which may remain thereon. This belt is located at an oblique angle to the length of the tube, so as to not affect the movement of the same in its travel, which would be the case were the belt arranged at right angles to the tube. The belt is suitably driven by

means of pulleys I′ at each end thereof, which are journaled upon shafts I^2, located in bearing-blocks I^3, and one of said shafts is provided with any desired driving means, such as a pulley I^4. Upon the shafts I^2 there are also located driving-pulleys J′, which carry and move the graphite-applying belt J. This belt is located in the upper part of the casing J^2, and beneath the belt a brush J^3 is suitably journaled in the casing. This brush is adapted to revolve in contact with the graphite contained in the box and apply the same to the under surface of the belt J, which in its movement passes in contact with the joint D′ and applies thereto the graphite. The object of thus applying dry graphite to the joint is that the spelter or solder will not adhere to the surfaces upon which the graphite has been applied, and thus all projections or roughness upon the outer surfaces of the tube is prevented, and as the solder does not escape from the joint the exterior surface of the tube is retained in a clean and polished condition. The graphite also prevents direct application of heat to solder which might cause it to swell, (and probably drop down out of the joint,) thus producing a rough and imperfect joint, and the said graphite applied as described causes an indirect course of heat to the solder by way of convection through the metal to the points which are to be joined.

It may be stated that the solder or spelter can be applied by hand to the interior of the tube to be brazed and will rest upon the inner surface of the joint. The flux is then applied and in its liquid condition saturates the joint, after which the surplus is removed by the wiper-belt. This leaves a slight moisture, which will cause the dry graphite to adhere, or if this moisture is not present the graphite will adhere to the surface of the metal by reason of the slight roughness, which will receive and retain the light coating of dry graphite applied by the belt. The graphite is not applied in sufficient quantities to fill the joint from the outside, and the crystallized flux will also prevent the entrance of graphite into the joint.

Where wet graphite has been employed, the flux becomes spread away from the joint and adheres to the article in such manner as not only to produce a wastage of flux, but to disfigure the resulting work. On the other hand, by the use of dry graphite no such wastage or disfigurement occurs. The cause of this condition in the use of wet graphite is that the water or other medium of the mixture under the influence of the brazing heat boils or bubbles and also dissolves and thins the mixture, so that the spelter is diffused from the joint by the chemical action of ebullition.

The wiping and graphite-applying belts have been illustrated as located upon the same driving-shaft; but it is obvious that the same may be disassociated or may be located at different points, as convenience may dictate. The tube may likewise be suitably guided in its movement to and from the heater by means of guide-sheaves K, journaled upon standards K′, which retain and guide the tube in proper position to enter the heater and to be acted upon by the other apparatuses, hereinbefore described. It may also be stated that the various parts of the heater can be formed of fire-brick or other non-conducting material which will retain the heat in the brazing-chamber.

It is obvious that numerous changes may be made in the construction and location of the several parts hereinbefore described without departing from the spirit of the invention as defined by the appended claims.

Having described my invention and set forth its merits, what I claim as new, and desire to secure by Letters Patent, is—

1. In a brazing-machine, the combination with an inclosed brazing-chamber, of a heating device located adjacent thereto, and a carrier having a member traveling through said chamber to support the article to be brazed adjacent to said heating device; substantially as specified.

2. In a brazing-machine, the combination with a brazing-chamber, of a heating device located adjacent thereto, a carrier provided with fingers adapted to travel through said chamber and to support the article to be brazed adjacent to said heating device; substantially as specified.

3. In a brazing-machine, the combination with a brazing-chamber, of a heating device located adjacent thereto, a carrier adapted to support the article to be brazed in said chamber, and fingers traveling through said chamber and provided with a refractory portion to contact with the article to be brazed; substantially as specified.

4. In a brazing-machine, the combination with a brazing-chamber, of a heating device located adjacent thereto, an endless carrier traveling in a vertical plane and provided with vertically-extending fingers adapted to support the article to be brazed adjacent to said burner; substantially as specified.

5. In a brazing-machine, the combination with a brazing-chamber, of a heating device located adjacent thereto, and an endless carrier composed of links provided with fingers extending at an angle thereto and having refractory tips to support the article to be brazed; substantially as specified.

6. In a brazing-machine, the combination with a brazing-chamber, of a heating device located adjacent thereto, and a conveyer provided with extended fingers having removable refractory tips carried thereby; substantially as specified.

7. In a brazing-machine, the combination with a brazing-chamber provided with an opening extending the length thereof, a heating device extending longitudinally of said opening, and means for conveying the mate-

rial through said chamber; substantially as specified.

8. In a brazing-machine, the combination with a brazing-chamber provided with an opening extending the length thereof, of a heating device extending longitudinally of said opening, means for conveying the material through said chamber, and means for vertically adjusting said heating device; substantially as specified.

9. In a brazing-machine, the combination with a brazing-chamber, of a burner centrally located beneath said chamber and having downwardly-projecting walls at the flame-orifice of said burner, which walls are inclosed at their lower portions; substantially as specified.

10. In a brazing-machine, the combination with a brazing-chamber, of a burner centrally located beneath said chamber, a horizontal top surface to said burner provided with downwardly-projecting walls, and an inclosing cap surrounding the lower portion of said walls and extending adjacent to the top of said burner; substantially as specified.

11. In a brazing-machine, the combination with a brazing-chamber, of a passage in communication with and surrounding said chamber, a heating device located beneath said chamber, and means for supporting the article to be brazed above said heating device; substantially as specified.

12. In a brazing-machine, the combination with a brazing-chamber and a passage in communication with and surrounding said chamber, of a heating device located beneath said chamber, means for supporting the article to be brazed above said heating device, and an endless carrier provided with fingers projecting into said brazing-chamber during a portion of its circuit and traveling across the hot-air outlet from said passage during another portion of their circuit; substantially as specified.

13. In a brazing-machine, the combination with a brazing-chamber, of a burner located adjacent thereto, an endless carrier provided with fingers to support the article to be brazed, a foundation for said heater provided with ways, and projecting lugs extending from said carrier and traveling in said ways; substantially as specified.

14. In a brazing-machine, the combination with a brazing-chamber having an opening at its upper portion, of heat-conducting flues traversing the outer surface of said chamber, a burner beneath said chamber, endless carriers located upon opposite sides of said chamber and provided with fingers extending therein, and means for moving said carriers; substantially as specified.

15. In a brazing-machine, the combination with a brazing-chamber, of a burner beneath said chamber provided with flame-orifices adapted to concentrate the heat therefrom at the central portion of said chamber, and a carrier provided with a refractory portion extending into said brazing-chamber to support the article to be brazed; substantially as specified.

16. A brazing-machine comprising a brazing-chamber, a flux-applying apparatus, a wiper, and a graphite-applying device arranged between said wiper and chamber; substantially as specified.

17. A brazing-machine comprising a brazing-chamber, a flux-applying apparatus, a wiper, and a graphite-applying device arranged obliquely to the line of travel of the article to be brazed; substantially as specified.

18. A brazing-machine comprising a brazing-chamber, carriers traveling therein, a flux-applying device, a wiper located to move in a path obliquely to the line of travel of said carriers, a graphiting device located parallel to said wiper, and means for guiding the article to be brazed into contact with said several devices; substantially as specified.

19. A brazing-machine comprising a brazing-chamber, a flux-applying roller, a receptacle beneath said roller to contain liquid flux, and guiding-sheaves located above said roller to engage the article to be brazed and hold it in contact with said roller; substantially as specified.

20. A brazing-machine comprising a brazing-chamber, a flux-applying roller, a liquid-flux receptacle beneath said roller, guiding-sheaves located above said roller at opposite sides thereof and positively driven for moving the article to be brazed in contact with said roller, and a heater located beneath said flux-receptacle; substantially as specified.

21. A brazing-machine comprising a brazing-chamber, a flux-applying device, a wiper comprising an endless belt located obliquely to the line of travel of the tube to be brazed, and means for guiding and holding said tube in contact with said wiping-belt; substantially as specified.

22. A brazing-machine comprising a brazing-chamber, a fluxing device, a wiping device, a graphite-applying belt located above a graphite-receptacle, means for applying graphite to the under side of said belt, and means for guiding and retaining the article to be brazed in contact with said belt; substantially as specified.

23. A brazing-machine comprising a brazing-chamber, a burner beneath said chamber, an endless carrier adapted to support an article to be brazed in said chamber, a fluxing device, a wiper arranged adjacent thereto, and a graphite-applying device located between said wiper and chamber; substantially as specified.

24. A brazing-machine comprising a brazing-chamber, a burner beneath said chamber, an endless carrier adapted to support an article to be brazed in said chamber, a fluxing device, a wiper arranged adjacent thereto, a graphite-applying device located between the wiper and chamber, and concave guiding-sheaves adapted to guide and retain the tube

to be brazed in contact with said several devices; substantially as specified.

25. A brazing-machine comprising a brazing-chamber, a flue extending adjacent to the outer surface of said chamber and discharging at opposite sides of said heater, an endless carrier provided with refractory portions extending into said brazing-chamber during a portion of their travel and traveling across the hot-air outlets from said flue during another portion of their travel, a burner located beneath said brazing-chamber, means to drive said endless carriers, a fluxing device, and means for transferring the article to be brazed from said fluxing device to said carriers; substantially as specified.

26. An improvement in the art of brazing which consists in the application of a spelter or solder, the application of a flux, the application of dry graphite to the outer surface at the joint of the parts to be brazed and the heating of said joint to fuse said spelter or solder.

27. An improvement in the art of brazing which consists in the application of dry graphite along and over a joint to be brazed.

In testimony whereof I affix my signature in presence of two witnesses.

ALDEN AARON STEWARD.

Witnesses:
CHARLES L. HOWE,
WAYNE BAILEY.