No. 815,569.

PATENTED MAR. 20, 1906.

J. J. TYNAN.

ANNEALING APPARATUS.

APPLICATION FILED JUNE 18, 1903.

2 SHEETS—SHEET 1.

FIG. I.

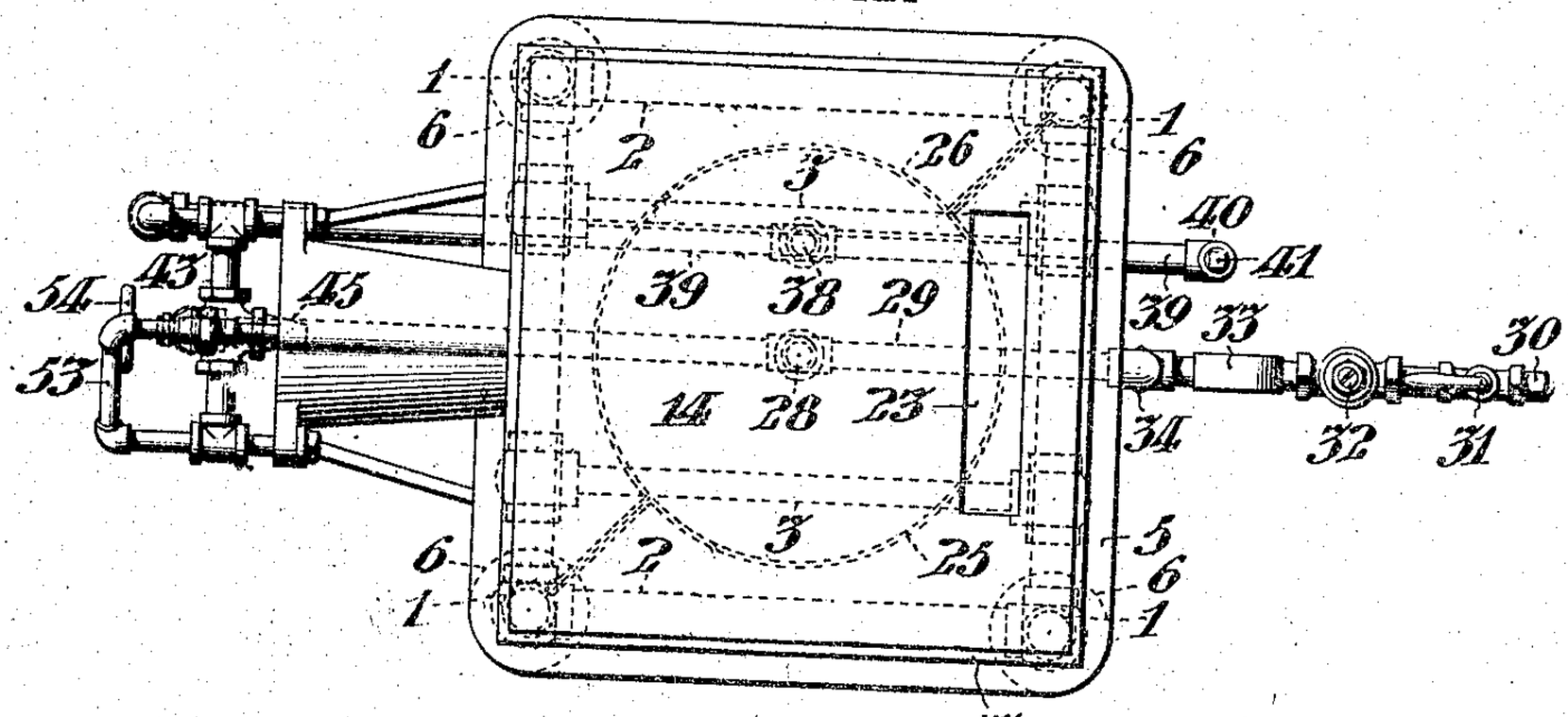
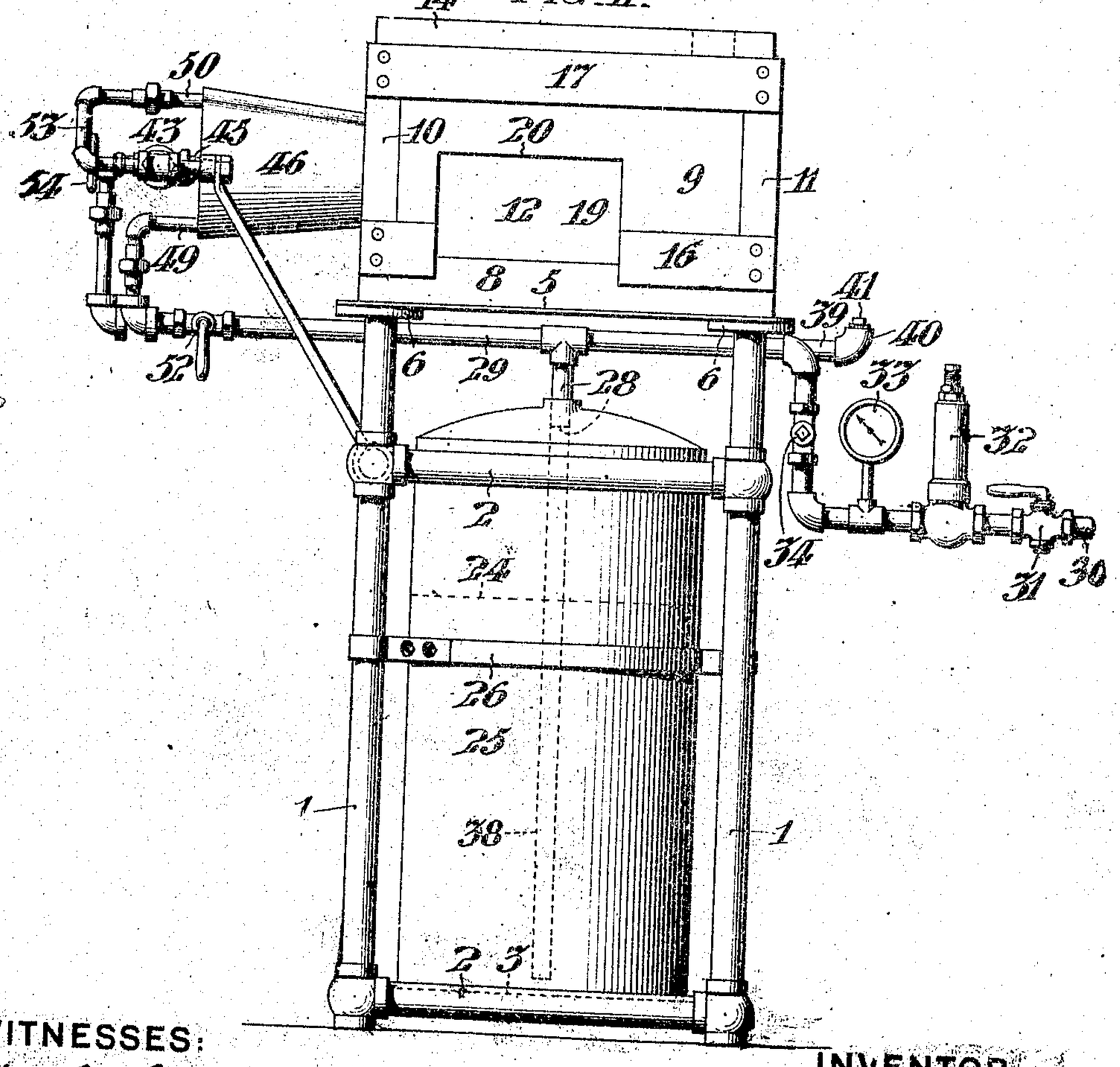


FIG. II.



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2 SHEETS—SHEET 2.

FIG. III.

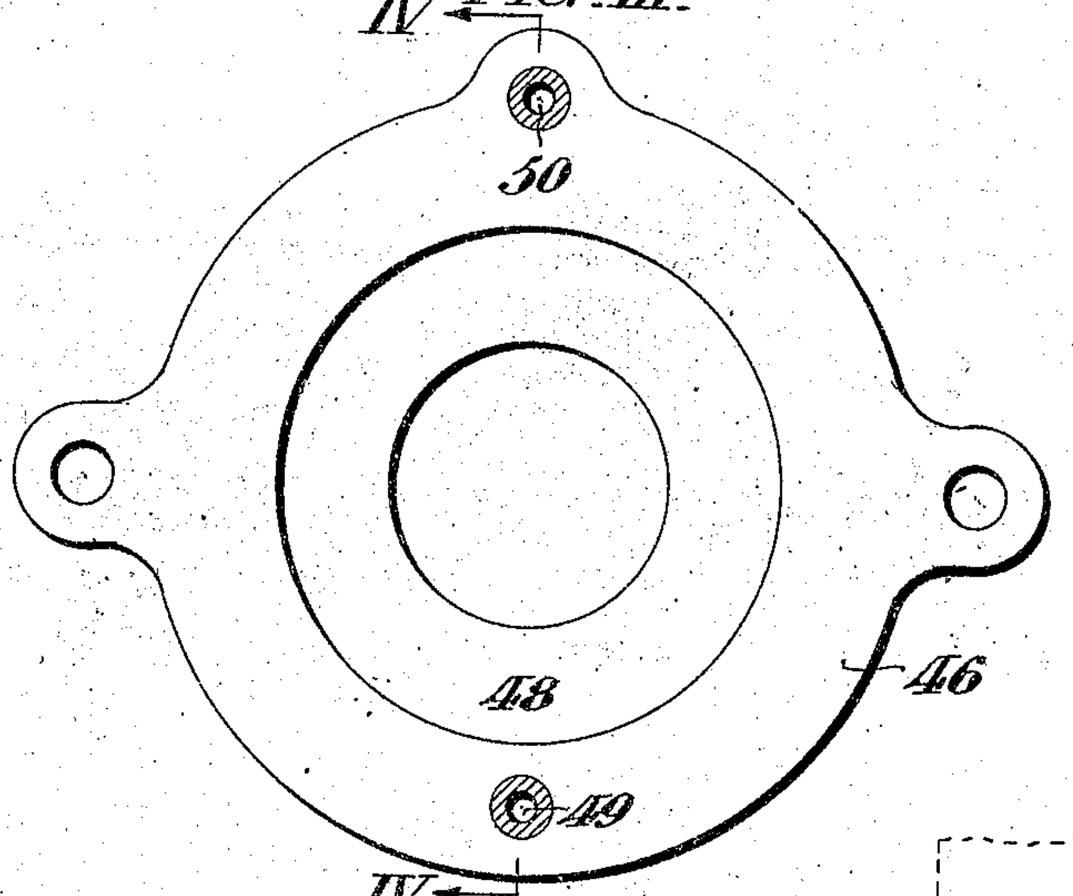


FIG. IV.

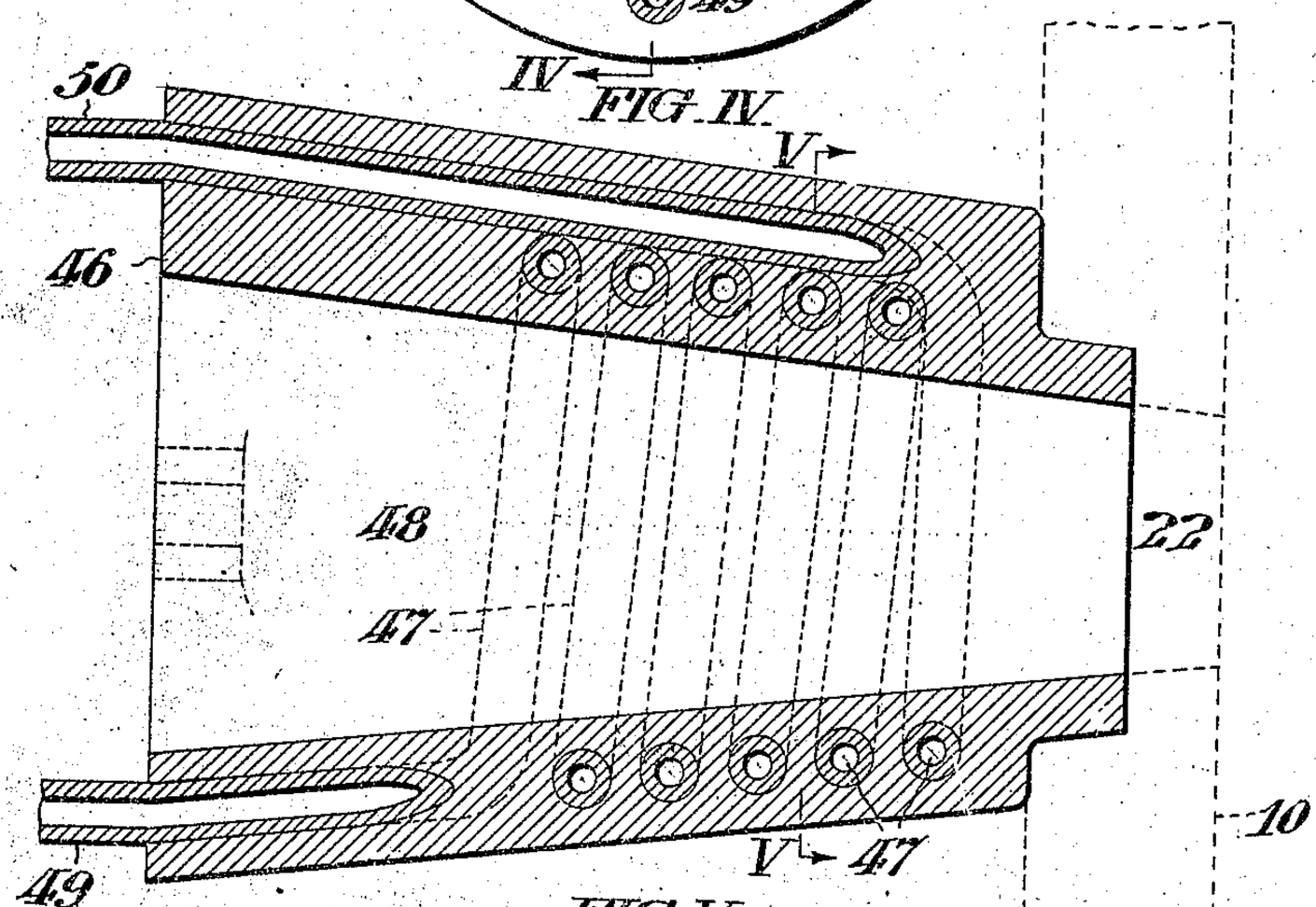
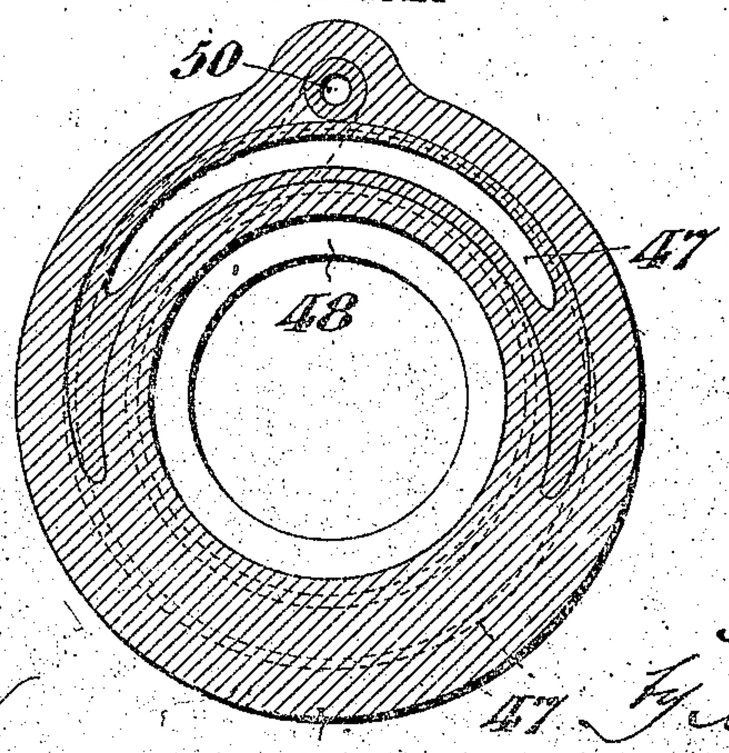


FIG. V.



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UNITED STATES PATENT OFFICE.

JOSEPH JAMES TYNAN, OF PHILADELPHIA, PENNSYLVANIA.

ANNEALING APPARATUS.

No. 815,569. Specification of Letters Patent. Patented March 20, 1906.

Application filed June 18, 1903. Serial No. 161,956.

To all whom it may concern:

Be it known that I, JOSEPH JAMES TYNAN, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Annealing Apparatus, whereof the following is a specification, reference being had to the accompanying drawings.

My invention is particularly designed for use in the erection of structural metal frames—such as ship-hulls, bridges, and the like—in the open air; and it is the object thereof to provide an apparatus which is readily portable from one region to another of such a frame and which despite its exposure to the weather is capable of annealing rivets and other small articles with maximum rapidity preparatory to their embodiment in said frame.

Although the operation of annealing articles of the character contemplated may be effected by prolonged exposure to a comparatively low temperature, it is the purpose of my invention to produce an extremely high temperature, so that such operation is facilitated to the highest degree, with a consequent reduction in the cost for time and labor of the operator.

It is characteristic of the apparatus hereinafter described that the required high temperature is produced by the combustion of a mixture of hydrocarbon and compressed air, of which the latter is preheated before its mixture with the hydrocarbon to approximately the temperature at which combustion of the latter is to be effected, so that practically instantaneous and perfect combustion is attained, the flame being concentrated and the extreme heat localized, as hereinafter described, in a definitely-limited region immediately adjacent to the burner and accessible to the operator.

My invention comprehends the various novel features of construction and arrangement hereinafter more definitely specified and claimed.

In the accompanying drawings, Figure I is a plan view of an apparatus conveniently embodying my improvements. Fig. II is a side view of said apparatus. Fig. III is an outer end view of the localizer indicated in Figs. I and II. Fig. IV is a longitudinal sectional view of said localizer, taken on the line IV IV in Fig. III. Fig. V is a transverse sectional view of said localizer, taken on the line V V in Fig. IV.

In said figures the frame of the apparatus comprises the four vertical standards 1, connected by the cross-bars 2 3 and provided with the table 5, which rests upon the annular flanges 6 at the tops of said standards. The hearth 8 is secured upon said table 5, and, with the vertical walls 9, 10, 11, and 12 and the cap-slab 14, (retained in proper relation by the metal bands 16 17,) forms a casing inclosing the furnace-chamber 19. Said chamber is provided with the work-inlet 20 in the front wall 9, a blast-inlet 22 in the wall 10, and the outlet 23 in the cap-slab 14 for the products of combustion.

The receptacle 25 is secured beneath said furnace-casing within said frame by the strap 26, which encircles said receptacle and is connected with diagonally opposite standards 1, as indicated in Fig. I. Said receptacle 25 is provided with a compressed-air-inlet pipe 28 in communication with the conduit 29, whose outer extremity 30 is connected in any suitable manner with a source of compressed air. Between said source and said inlet 28 said conduit 29 is provided with the stop-cock 31, the automatic pressure-reducing valve or regulator 32, the pressure-gage 33, and the check-valve 34. Said receptacle 25 is also provided with a hydrocarbon-inlet pipe 38, which terminates within said receptacle, immediately adjoining the bottom thereof. Said inlet-pipe is in communication with the conduit 39, whose outer extremity 40 constitutes the hydrocarbon-inlet for said receptacle, being normally closed by the plug 41, which may be removed to charge the receptacle with hydrocarbon. Said conduit 39 extends to a suitable oil-port in the burner 43, which latter is provided with the mixing-nozzle 45 in alinement with the blast-opening 22 in the furnace-casing. Said burner is surrounded by the localizer 46, which is arranged to concentrate the flame projected from said mixing-nozzle and to heat compressed air supplied to said burner. Said localizer comprises a tubular conical body inclosing a tortuous air-duct, which, as shown in Figs. III, IV, and V, comprises a spirally-wound pipe 47, embedded in the wall of the localizer, encircling the opening 48 therethrough, and is provided with the terminals 49 and 50, extending exterior to said wall. Said terminal 49 is in communication with the conduit 29, and the latter is provided with the stop-cock 52 between the receptacle 25 and the localizer 46. The terminal 50 is

connected by the conduit 53 in communication with a suitable air-port in the burner 43, and the pressure of oil and air from said conduits is coöperatively controlled by means of a suitable valve in the burner-casing provided with the rotary handle 54.

The apparatus above described operates as follows: The plug 41 being removed from the conduit 39, the receptacle 25 is charged with hydrocarbon, (conveniently gasolene or light oil,) as indicated by the dotted line 24 in Fig. II, and said plug 41 is returned to the position shown in said figure. The free end 30 of the conduit 29 being connected with a source of compressed air, the presssure-regulator 32 is set to deliver the required pressure through the conduit 29 and inlet-pipe 28 into said receptacle above the level of said hydrocarbon, the particular pressure being indicated by the gage 33. The stop-cock 52 being then opened, hydrocarbon and compressed air are delivered together at any desired pressure through the mixing-nozzle 45 within the localizer 46 in accordance with the rotary position of the valve-handle 54. Said mixture being delivered through the blast-opening 22 in the furnace-chamber 19 is ignited therein, and the products of combustion escape through the opening 23 at the top of said chamber. The preliminary heating of the compressed air preparatory to its mixture with the hydrocarbon, as above described, not only insures complete combustion of the hydrocarbon, but also insures that such combustion shall begin in immediate proximity to the burner 43, and the construction specified is such that the greatest heat is manifested in the chamber 19 intermediate of the length of the hearth-slab 8, which supports the rivets or other articles introduced through the work-inlet 20. Despite the fact that said chamber 19 is in communication with the atmosphere through said openings 20 and 23, it is found in practice that if wrought-iron rivets are allowed to remain on said hearth 8 in the region of concentrated heat for a few minutes they may be fused, and consequently the time required to merely heat them to proper riveting temperature is reduced to the minimum.

The apparatus aforesaid is particularly advantageous for riveting in the field in that it not only enables the operator to heat the rivets to the required temperature in less time than is possible with ordinary soft-coal or charcoal furnaces, but also enables the operator to deliver a rivet at a higher temperature than is attainable by said ordinary means, so that the rivet may be completely closed and headed in the structure while at a temperature most favorable for such deformation.

Although I find it convenient to provide the tortuous conduit within the wall of the localizer 46 by bending wrought-iron pipe in a spiral coil and making said wall of iron cast around said pipe, as shown in section in Fig. IV, I do not desire to limit myself to this particular method of construction. Moreover, I do not desire to otherwise limit myself to the precise arrangement and construction of the apparatus herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of my invention.

I claim—

1. In an annealing apparatus, the combination with a casing comprising a chamber for the articles to be annealed, provided with a blast-inlet; a frame comprising vertical columns supporting said casing; a hydrocarbon-burner supported in registry with said inlet by connection with said frame; a localizer arranged to concentrate the flame of said burner, comprising a tubular conical body seated in said inlet surrounding said burner and supported by connection with said frame; a tortuous duct in the wall of said localizer; a receptacle for hydrocarbon supported beneath said casing within said frame, and provided with pneumatic pressure; conduits arranged to convey hydrocarbon from said receptacle to said burner; conduits arranged to convey compressed air from said receptacle to said duct and through the latter to said burner; and valves in said conduits arranged to control the pressure of delivery of said hydrocarbon and of said air, substantially as set forth.

2. In an annealing apparatus, the combination with a casing comprising a chamber for the articles to be annealed, provided with a blast-inlet; a frame comprising vertical columns supporting said casing; a hydrocarbon-burner supported in registry with said inlet by connection with said frame; a localizer arranged to concentrate the flame of said burner, comprising a tubular conical body seated in said inlet, surrounding said burner and supported by connection with said frame; a spiral duct in the wall of said localizer; a receptacle for hydrocarbon supported beneath said casing within said frame and provided with an inlet for hydrocarbon and an inlet for pneumatic pressure; a pressure-regulator between said pressure-inlet and the souce of compressed air; conduits arranged to convey hydrocarbon from said receptacle to said burner; conduits arranged to convey compressed air from said receptacle to said duct and through the latter to said burner; and valves in said conduits arranged to control the pressure of delivery of said hydrocarbon and of said air, substantially as set forth.

3. In an annealing apparatus, the combination with a frame comprising a table; of a casing of refractory material mounted upon said table and comprising a chamber for the articles to be annealed, provided with a blast-inlet, a work-inlet and an outlet for products

of combustion; a hydrocarbon-burner supported by said frame in registry with said blast-inlet and comprising a mixing-nozzle; an oil-port in said nozzle; an air-port in said nozzle; a receptacle secured within said frame beneath said casing and arranged to contain oil and compressed air together; a localizer, supported by said frame, surrounding said burner in registry with said blast-inlet and inclosing a tortuous duct; conduits connecting said receptacle and said nozzle, arranged to convey oil from said receptacle to said oil-port; conduits connecting said receptacle and said nozzle, arranged to convey compressed air from said receptacle to said air-port through said duct in said localizer; and means to coöperatively control the pressure of oil and air from said conduits, substantially as set forth.

4. In an annealing apparatus, the combination with a hydrocarbon-burner; of a receptacle for oil; an air-pressure-supply pipe; a branch from said supply-pipe leading to said receptacle; a branch from said air-pressure-supply pipe leading to said burner; means to control the air-pressure to said burner, independently of the pressure to said receptacle; and, means to preheat the air supplied through said branch pipe, before it reaches the burner, substantially as set forth.

5. In an annealing apparatus, the combination with a hydrocarbon-burner; of a receptacle arranged to contain oil and air together, the former being beneath the latter; an air-pressure-supply pipe; a branch from said supply-pipe leading to said receptacle; a branch from said air-pressure-supply pipe leading to said burner; means to control the air-pressure to said burner, independently of the pressure to said receptacle; and, means to preheat the air supplied through said branch pipe, before it reaches the burner, substantially as set forth.

6. In an annealing apparatus, the combination with a frame; of a casing of refractory material supported by said frame; a hydrocarbon-burner supported by said frame in operative relation with said casing; a receptacle for oil supported by said frame; an air-pressure-supply pipe; a branch from said supply-pipe leading to said receptacle; a branch from said supply-pipe leading to said burner; means to control the air-pressure to said burner independently of the pressure to said receptacle; and, means to heat the air supplied to the burner before it reaches the latter, substantially as set forth.

In testimony whereof I have hereunto signed my name, at Philadelphia, Pennsylvania, this 17th day of June, 1903.

JOSEPH JAMES TYNAN.

Witnesses:
ARTHUR E. PAIGE,
CLIFTON C. HALLOWELL.