

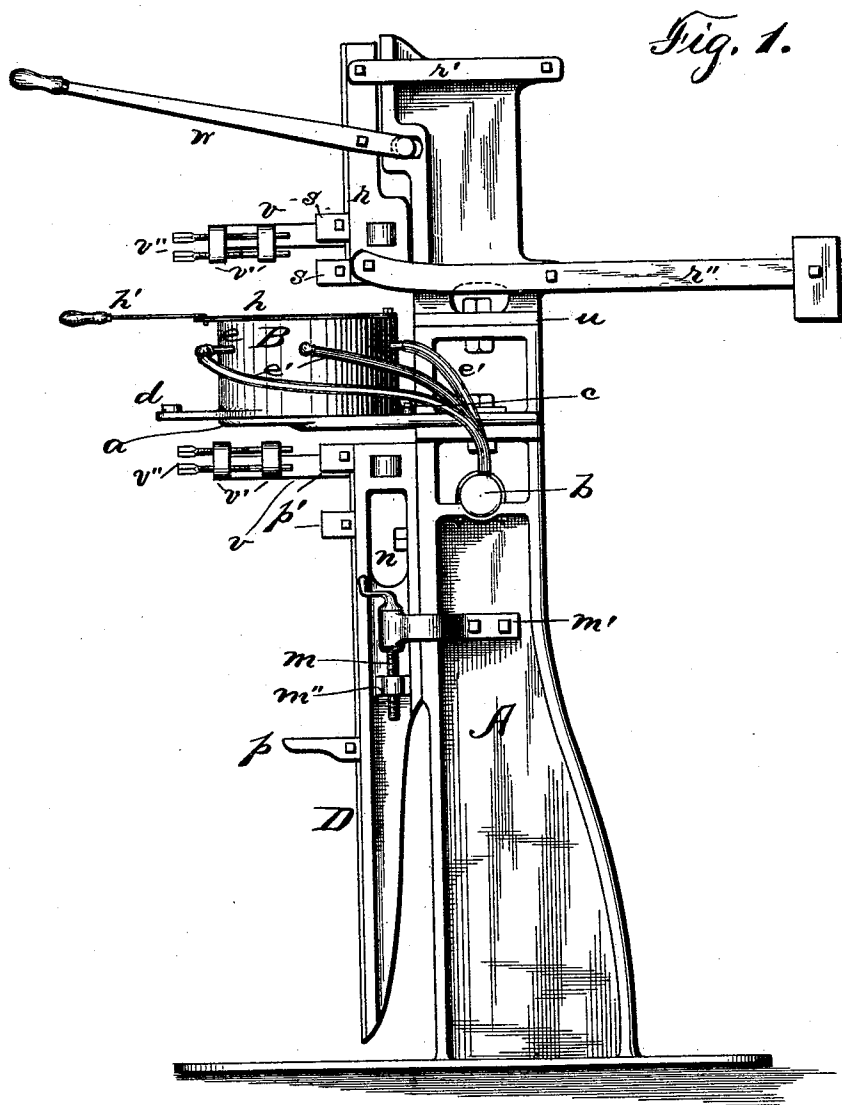
(No Model.)

3 Sheets—Sheet 1.

J. A. PROSS & C. E. LIPE.
WELDING APPARATUS.

No. 495,947.

Patented Apr. 18, 1893.



WITNESSES:

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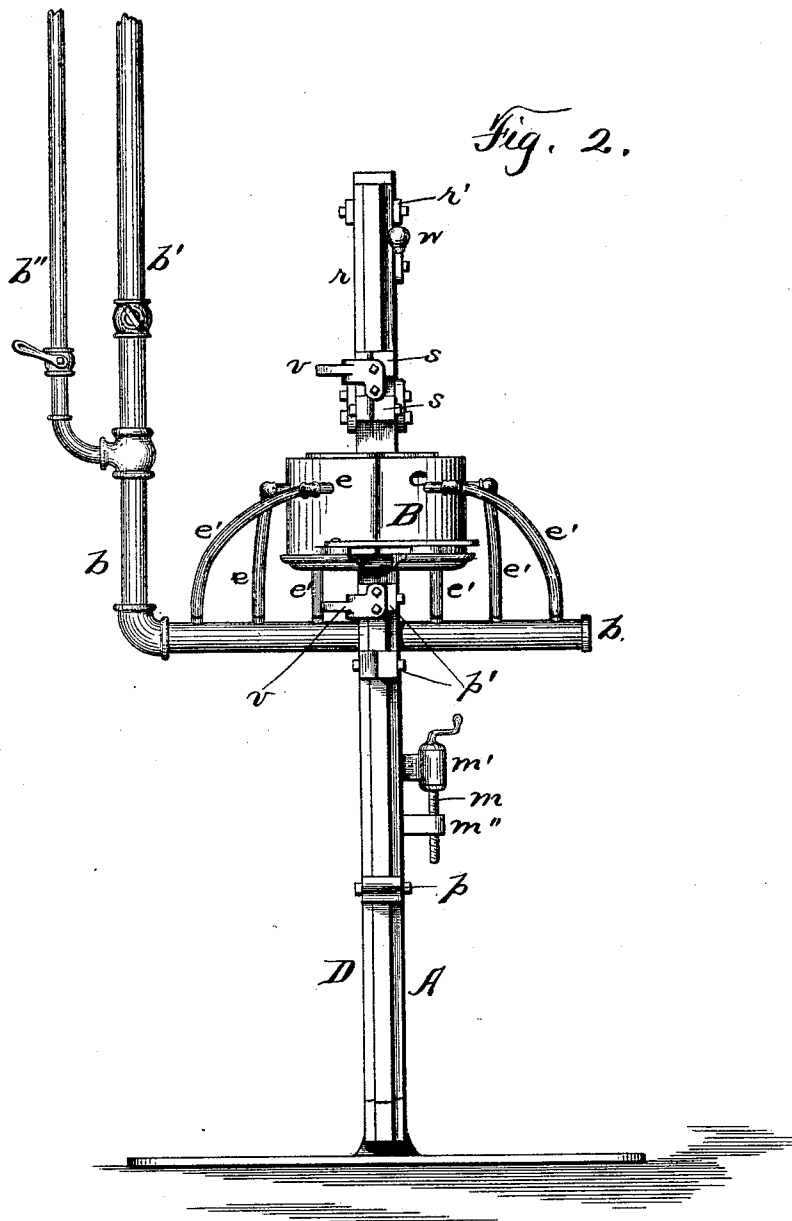
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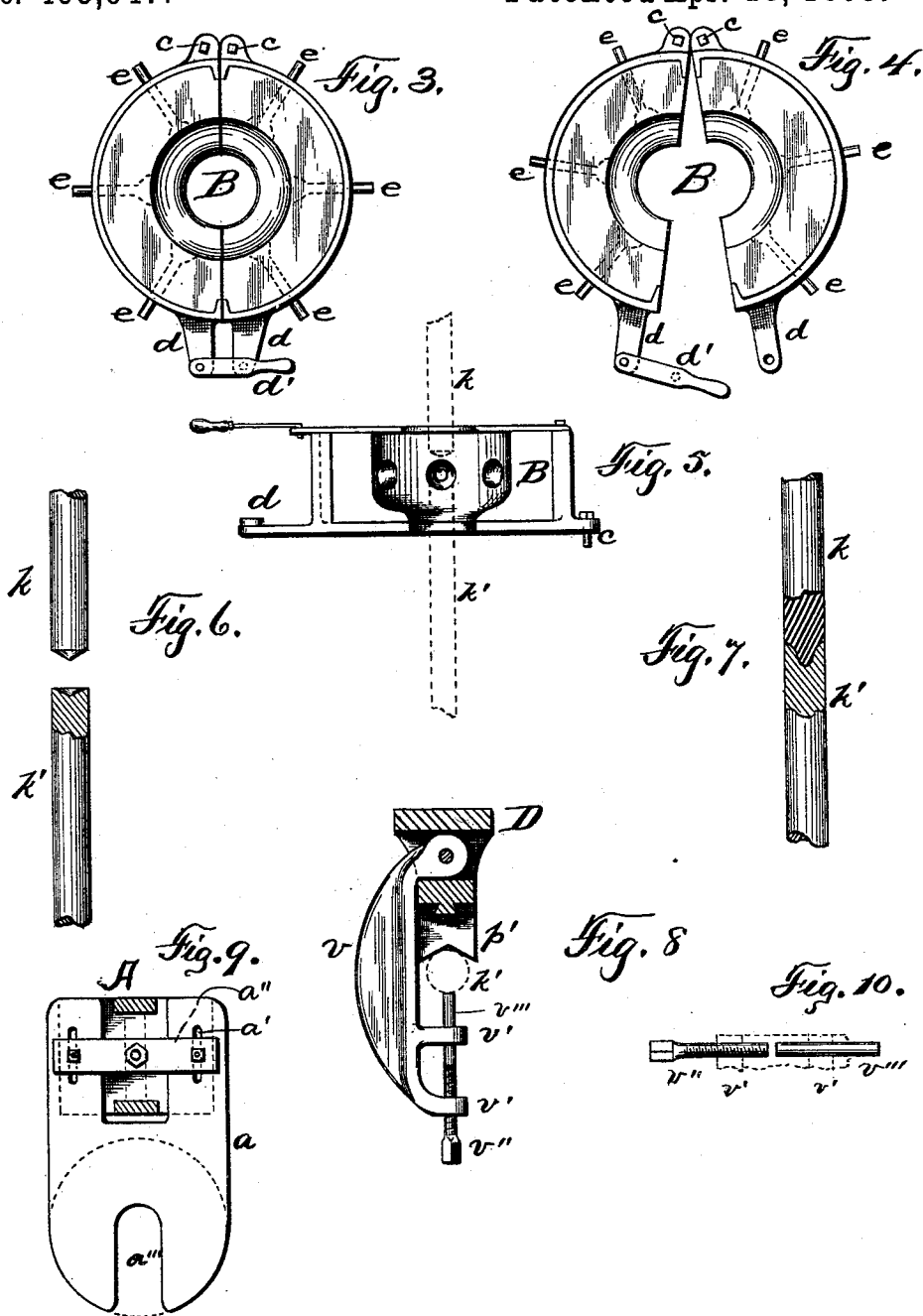
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UNITED STATES PATENT OFFICE.

JOHN A. PROSS AND CHARLES E. LIPE, OF SYRACUSE, NEW YORK.

WELDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 495,947, dated April 18, 1893.

Application filed April 1, 1892. Serial No. 427,335. (No model.)

To all whom it may concern:

Be it known that we, JOHN A. PROSS and CHARLES E. LIPE, of Syracuse, in the county of Onondaga, in the State of New York, have
5 invented new and useful Improvements in Welding Apparatus, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

10 Our invention relates to apparatus for welding bars of metal, and which is adapted to heat and weld, in a single furnace, metals which fuse at different temperatures, as well as those which fuse at equal temperatures.

15 Our object is to produce a novel welding apparatus for butt welding, either of metals fusing at the same or different temperatures, the heating being done in a single furnace, and in which the furnace is constructed in
20 segments adapted to be swung laterally, to open or close the furnace, and in which the bars to be welded are held in vertically adjustable and vertically movable clamps or grips, which are also adapted to be swung laterally to adjust the bars within the furnace;
25 in which the furnace is provided with a swinging cover and is also contracted at the bottom.

Our invention consists in the several novel features of construction and operation herein-
30 after described and which are specifically set forth in the claims hereunto annexed.

It is constructed as follows, reference being had to the accompanying drawings, in which—

35 Figure 1, is a front elevation of the apparatus, closed. Fig. 2, is a side elevation of the same. Fig. 3, is a top plan of the furnace closed. Fig. 4, is a like view of the same, opened. Fig. 5, is an elevation of the inner face of one of the furnace sections. Fig. 6, is
40 a sectional elevation of two bars prepared for welding. Fig. 7, is a sectional elevation of two bars welded. Fig. 8, is a top plan of one of the grip jaws, and its pivotal mounting in one of the vertical slides, which is
45 shown in transverse section. Fig. 9, is a horizontal section of the standard and top plan of the table. Fig. 10, is a detail of one of the set screws in a clamp and the rod extension.

50 A—, is the standard erected upon a suitable bed, and provided with a table—a—, mounted upon flanges upon the sides thereof, its arms straddling the standard and pro-

vided with slots—a'— and adjustably held in position by a cross bar—a''— secured transverse to the standard, or by any equivalent attachment, and also adapted to receive
55 and carry the transverse pipe—b—, which is closed at one end, and at the other is connected to an air pipe—b'— leading to a source of air supply and—b''— is a gas pipe
60 connected to a source of supply, and also connected to the air pipe as shown. Both of these pipes are provided with suitable shut-off valves or cocks, as shown.

B—, is the furnace shown as constructed in
65 two segments, each provided with a rearward and perforated lug, through which a pivot bolt or pin—c— is inserted into the table; and each segment is also provided with a forward and perforated arm—d—, one of which is
70 provided with a swinging lever—d'— adapted to detachably engage with the perforation in the other arm. The table—a— is also provided with a central opening, concentric with the bore of the furnace, and with a slot
75 opening out therefrom radially through which the bars are inserted and removed.

The furnace is provided in its vertical walls with a series of radial openings, shown in dotted lines, in each of which a nipple
80 —e— is mounted, to which one end of the flexible hose—e'— is connected, the other being connected to the pipe—b—.

For the purpose of concentrating and retaining the heat in the furnace, we provide it
85 with a sectional cover—h—, the opening through which is a little larger than the upper bar—k—, shown in Fig. 5, in dotted lines, which is inserted through it into the furnace, one end of each cover section being
90 pivoted upon the furnace segment, and the other end is provided with a handle—h'— by which either one, or both of the cover sections, can be opened to permit of visual inspection of the bars in the furnace. A
95 vertically movable slide—D— is connected by a tongue and groove joint to the front of the standard, below the table, and it is vertically adjustable by means of the hand screw—m— inserted through the arm—m'— upon
100 the standard and the lug—m''— upon the slide. A bolt—n—, inserted into the standard through a slot (not shown) in the slide, operates both as an auxiliary guide and also

to secure the slide in the position desired by the tightening up of the nut. Upon the front of the slide we mount the vertically adjustable foot—*p*—, by a tongue and groove joint and a tightening bolt, which operates to support the bottom of the lower bar; and adjacent to the top we mount in like manner one or more jaws—*p'*—although the upper one may be stationary.

Above the furnace we mount a vertically movable work-holder—*r*—, by means of the connecting link—*r'*—and the weighted counterbalance lever—*r''*—, and—*s*—*s*— are one or more vertically adjustable jaws connected thereto by a tongue and groove joint. This construction is somewhat similar to the sliding work-holder shown in the Letters Patent granted to us April 29, 1892, No. 473,884, for improved process of and apparatus for welding metals, but has been found in practice to obviate the serious trouble of the rusting and sticking together of the sliding parts. The heat from the furnace destroys the lubrication at this point, and the gases or products of combustion attack and oxidize the surfaces to such an extent as to seriously interfere with the free working of the parts. A similar construction may be used in place of the lower slide, but as the gases and heat tend to flow upward rather than downward, the same difficulties have not been met with on the lower mechanism. In each of these slides we pivot a clamp consisting of a body—*v*—, arms—*v'*—, and a set screw or screws—*v''*— and the loose bar extensions thereof—*v'''*— which are adapted to engage with the bar and grip it against one or more of said jaws, and hold it concentric with the furnace, when the screws are operated. The function of this loose belt is to remove the point of the set screw from the heated bar, so that the threaded portion may not be heated while under strain, which would soon compress and alter the pitch of the thread, and thus prevent its free action in the nut. A lever—*w*— pivoted upon the work-holder and slotted as shown at the bearing upon the standard, is the means by which the heated ends of the bars are forced together in the furnace to make the weld.

The bars—*k*— and —*k'*— are usually made respectively more or less convex and concave upon the ends to be welded, the flux being placed in the concavity.

The standard—*A*— is composed of two parts having a flat joint at—*u*— the two parts being held together by the bolt which passes through an enlarged opening in the base of the upper section. It will be observed that the lower section supports the lower bar, while the upper section supports the upper bar. The object of this joint is to provide means for laterally adjusting the alignment of the two bars after they are severally clamped in the holders. This adjustment sometimes becomes necessary if the bars are unequal in di-

ameter. It also allows of the eccentric welding of the bars when desired. Similarly, the table supporting the furnace is adjustably secured on flanges *a''* projecting from the standard, for the purpose of centering the furnace about bars of different sizes.

The operation is as follows: The largest bar, or the bar which fuses at the highest temperature, is usually placed below with its upper end somewhat above the point of entrance of the gases, which is the hottest part of the furnace. The upper bar is now secured in such position that the lever is convenient to the operator when the bars are in contact. The counter-weight is now adjusted so that the preponderance of weight is slightly in favor of the bar, so that there will be a slight pressure on the joint. The furnace is then closed, the gas lighted, and the air blast adjusted to the required pressure. The heating of the bars now progresses rapidly, the operator watching the process carefully, which may be done by occasionally moving the cover plate. When nearing the point of fusing great care and skill are required to bring both bars to the proper welding heat at the same instant. If the upper bar is heating too fast the adjustment must be operated to raise the joint farther from the direct flame, or vice versa, as the conditions vary. When fusion is about to take place, the operator, who has now hold of the lever, will "feel" the gradual breaking down of the metal, which is immediately followed by the fusing and "upsetting" of the metal at the joint. At this instant, sudden pressure is brought to bear on the lever to insure a solid weld and the gas shut-off when the blast of air which continues chills the heated metals and checks any further displacement. The operation is now completed and the furnace may be opened and the bar taken out through the gap as soon as sufficiently cooled.

It will be readily seen that by the use of the rod extensions, —*v'''*— of the set screws—*v''*— such rods can be readily changed when damaged from their exposure to the intense heat, especially above the furnace.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination with the standard and the horizontal table thereon, of a furnace consisting of segments independently pivoted to and resting upon the table, and each provided with a forward arm, and means to lock the arms together when the segments are closed.

2. The combination with the standard and the table thereon, of a furnace consisting of segments pivotally mounted upon the table, and a cover perforated centrally and pivoted upon the furnace.

3. The combination with the standard, the table thereon and the furnace consisting of segments independently pivoted upon the table, of a vertically movable work-holder above the furnace, and a vertically movable

slide below the furnace, clamps upon said holder and slide and means to operate them vertically.

4. The combination with the standard, the table thereon and the furnace consisting of segments independently pivoted upon the table, of a vertically movable work-holder above the furnace, a vertically movable slide below the furnace, means to operate them vertically, and the swinging clamps pivoted upon said work-holder and slide and provided with jaws, and means to hold the bars therein.

5. The combination with the standard and the furnace supported thereby, of vertically adjustable jaws and laterally swinging clamps independently connected to the standard in sets, one above and the other below the furnace, said clamps being provided with means to grip the bar in the jaws.

6. The combination with the standard, the table thereon, and the furnace consisting of segments independently pivoted upon the table, of a vertically movable work-holder above the furnace, a vertically movable slide below the furnace, and means to operate them independently and a main pipe leading to sources of air and gas supply supported by said standard, and flexible branch pipes leading therefrom and connected to the furnace segments.

7. The combination with the standard, the table thereon, and a furnace composed of segments independently pivoted upon said table, of a main pipe leading to sources of air and gas supply, and flexible pipes leading therefrom and connected to said furnace segments.

8. The combination with the standard, the table thereon, and a furnace composed of segments pivotally mounted upon said table, of a main pipe leading to sources of air and gas supply, flexible pipes connecting said furnace segments to said main pipe, and a cover pivotally mounted upon said furnace and provided with a central opening of less diameter than that of the furnace.

9. The combination with the standard, the table thereon, the furnace composed of segments pivoted thereon, the main pipe leading to a source of air and gas supply, and flexible pipes leading therefrom to said furnace, of vertically adjustable slides mounted upon the standard, vertically adjustable jaws mounted upon the slides, and swinging clamps pivoted upon the slides.

10. The combination with the furnace and the standard, of the slide connected to the standard below the furnace and adjustable vertically, the holder connected to the standard above the furnace by links, the counter-balance connected to said holder, the lever pivoted to the standard and connected to the holder, and the grip jaws upon said holder and slide.

11. The combination with the furnace and the standard, of the slide connected to the standard below the furnace and adjustable vertically, the holder connected to the standard above the furnace by links, the counter-balance connected to said holder, the lever pivoted on said standard, and connected to the holder, the grip jaws upon said holder and slide, and the swinging clamps pivoted upon said holder and slide.

12. The combination with the standard and the table of a furnace composed of segments independently pivoted on the table and piping leading therefrom to sources of air and gas.

13. The combination with a furnace composed of segments independently pivoted upon the supporting table and means to support it, of swinging grip clamps above and below it, and normally in line with the center thereof and jaws movably secured to the furnace support.

14. In a welding machine, the combination of a standard in two sections, a furnace carried by the standard independent work-holding devices for each section, and means for adjustment between the two sections with reference to the alignment of the bars to be welded.

15. In a welding machine, a standard supporting a laterally-adjustable furnace support a furnace supported thereby and a vertically adjustable work-holder in combination with a superimposed standard, provided with a vertically movable work-holder and means for lateral adjustment between both sections of said standard.

In witness whereof we have hereunto set our hands this 25th day of March, 1892.

JOHN A. PROSS.
CHARLES E. LIPE.

In presence of—

H. P. DENISON,
C. W. SMITH.