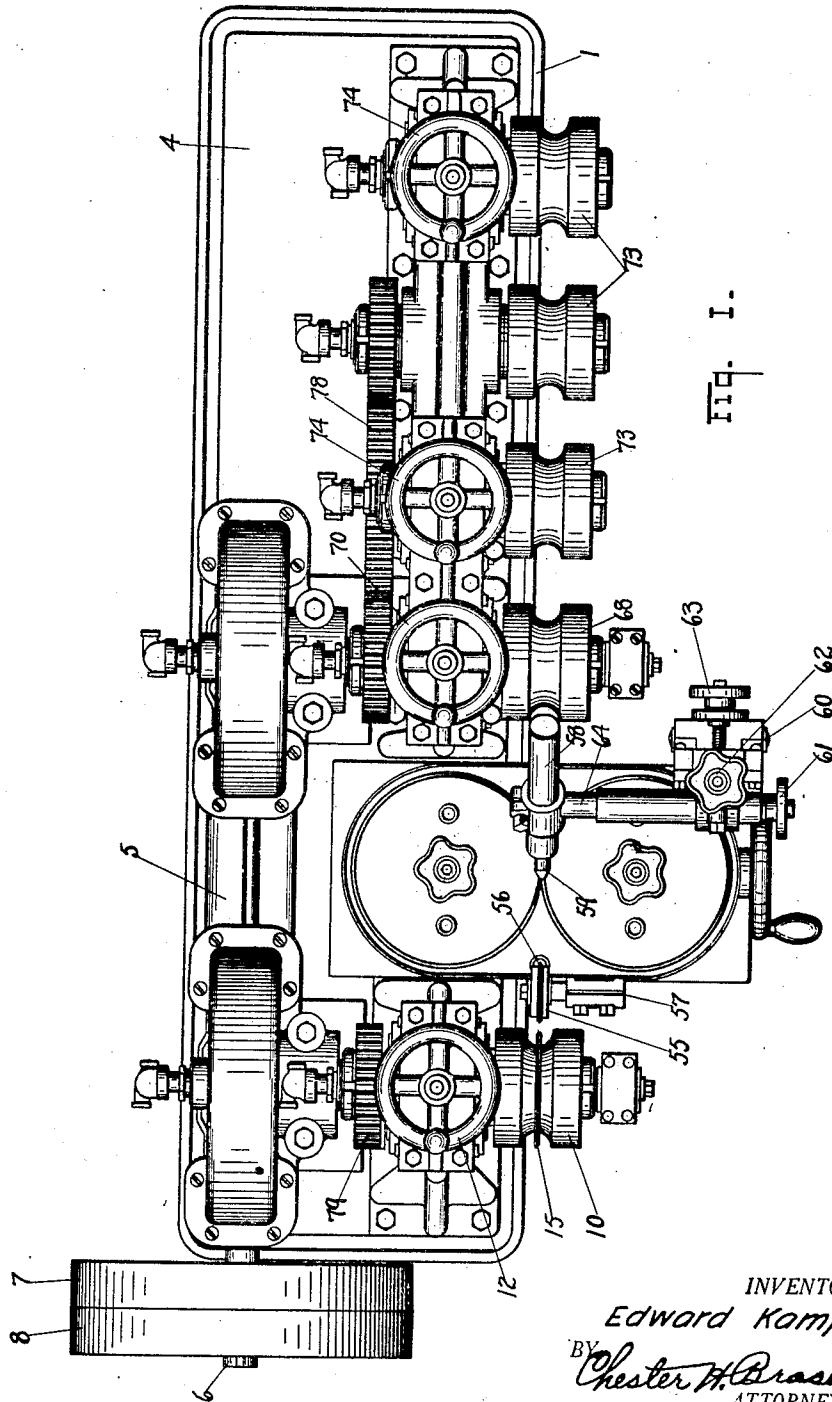


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TUBE WELDING MACHINE.
APPLICATION FILED JUNE 26, 1919.

Patented July 4, 1922.
3 SHEETS—SHEET 1.



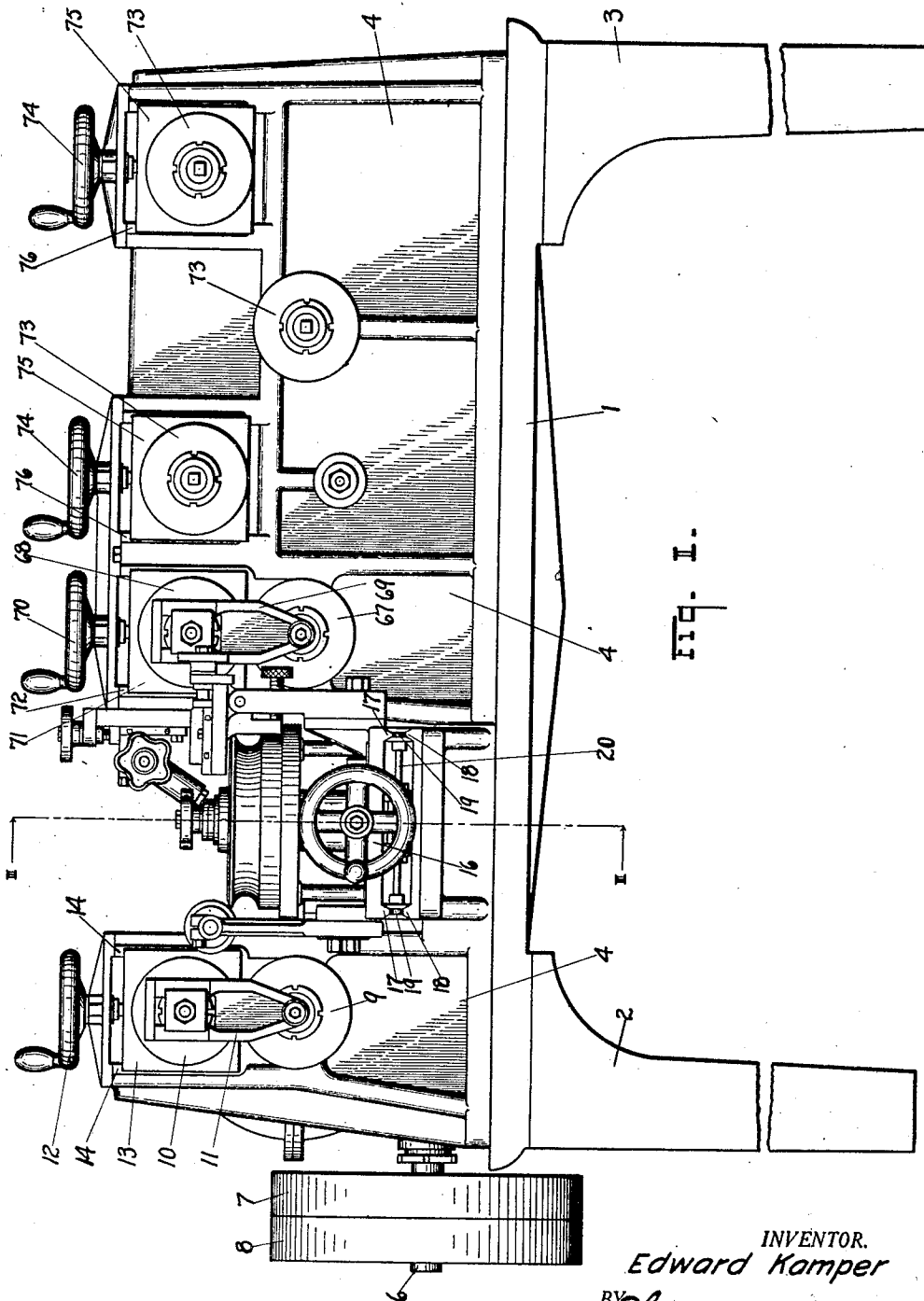
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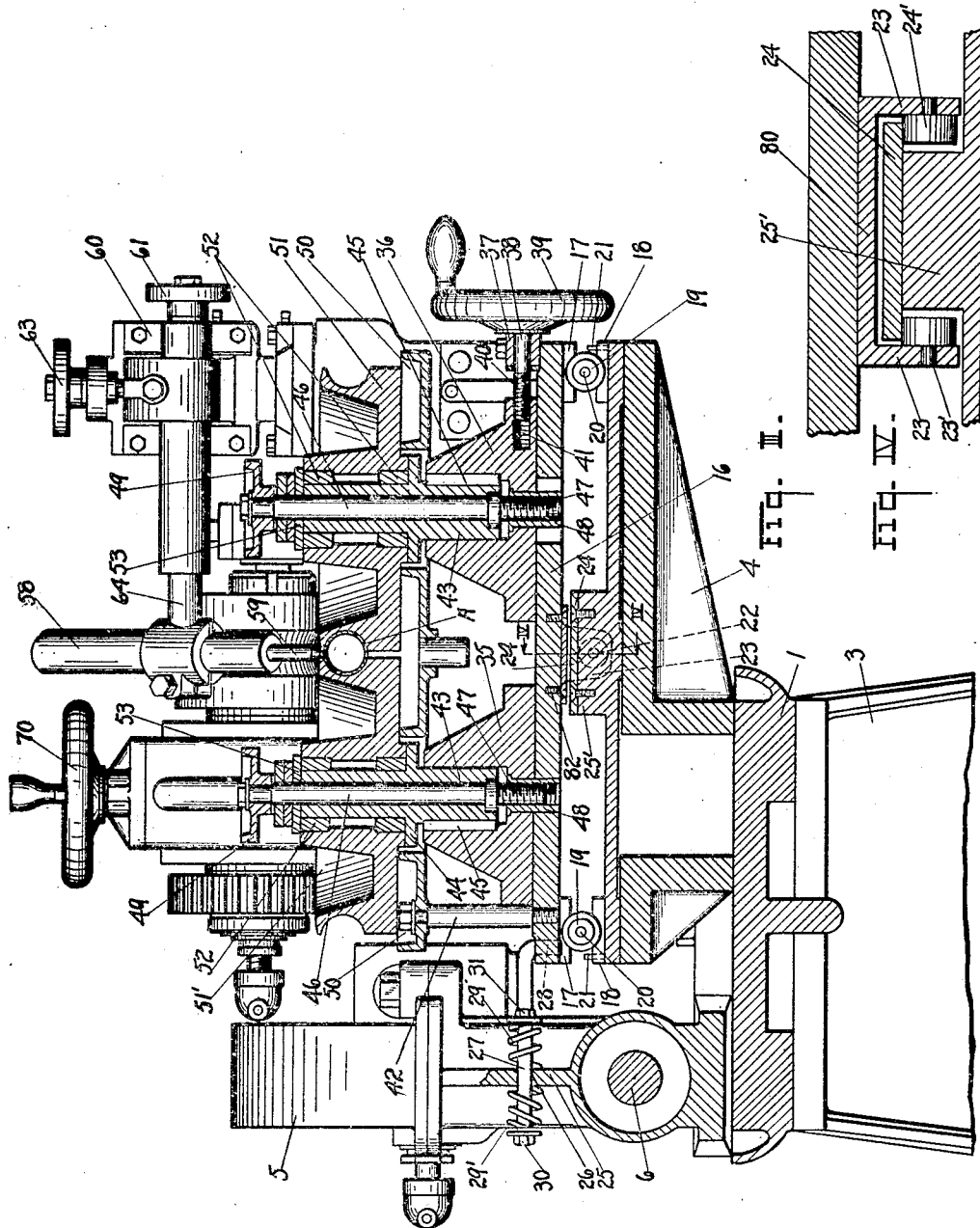
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

EDWARD KAMPER, OF TOLEDO, OHIO, ASSIGNOR TO THE WILLYS-OVERLAND COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

TUBE-WELDING MACHINE.

1,421,786.

Specification of Letters Patent.

Patented July 4, 1922.

Application filed June 26, 1919. Serial No. 306,832.

To all whom it may concern:

Be it known that I, EDWARD KAMPER, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Tube-Welding Machines, of which I declare the following to be a full, clear, and exact description.

This invention relates to tube welding machines and particularly to certain improvements therein adapted to facilitate the operation of the mechanism and secure a more readily effected adjustment of certain of the parts of the operating mechanism.

One object of the invention is to provide a mechanism of this character which is of simple construction and efficient in operation.

A further object of the invention is to provide a mechanism of this character wherein the pressure rolls are automatically adjustable relative to the guide rolls in such a manner as to cause a proper positioning of the pressure rolls at all times with respect to the tube which is to be welded.

A further object of the invention is to provide a mounting for the pressure rolls which will permit a slight automatic adjustment of the rolls transversely of the machine.

A further object of the invention is to mount the pressure rolls in such a manner as to obviate the necessity for adjusting both rolls when changing from one size of tube to another, but enable the mechanism to be changed for a different size tube by adjusting one only of the pressure rolls.

A further object of the invention relates to economies of manufacture and details of construction which will hereinafter appear from the detailed description to follow.

The objects of the invention are accomplished in one instance by the devices and means described in the following specification, but it is evident that the same may be varied widely without departing from the scope of the invention as pointed out in the appended claims.

A structure constituting one embodiment of the invention, which may be the preferred, is illustrated in the accompanying drawings forming a part hereof in which:

Figure I is a top plan view of the machine.

Figure II is a side elevational view of the

machine illustrating the relative position of the pressure rolls with respect to the remaining portions of the operating mechanism.

Figure III is a vertical sectional view taken along the line III—III of Figure II and illustrating the relative position of the pressure rolls and the parts associated therewith.

Figure IV is a detail sectional view taken along the line IV—IV of Figure III.

Referring to the drawings, similar reference characters designate corresponding parts throughout the several views, and the sectional views are taken looking in the direction of the small arrows at the ends of the section line.

In the embodiment of the invention illustrated herewith, 1 indicates the bed portion of the frame which is supported by a pair of upright standards 2 and 3 which are preferably located at opposite ends of the bed. Mounted upon and suitably secured to the upper surface of the bed is a frame 4 constructed in such a manner as to provide means for suitably supporting the various parts of the operating mechanism. Suitably supported upon the bed portion, adjacent the frame 4 is a casing 5 for housing the driving mechanism to support the same in proper position for co-operating with the operating mechanism carried by the frame 4 to drive the same.

A shaft 6 carries upon one end thereof, a fixed pulley 7 and a loosely mounted pulley 8 whereby the shaft may be driven from a power belt in the usual manner and providing means for shifting the power belt so as to render the operating mechanism inoperative when desired. The shaft 6 extends within the casing 5 and any suitable form of gearing is employed in connection therewith for transmitting motion to the operative parts of the mechanism.

A pair of vertical feed rolls 9 and 10 are suitably mounted in the frame 4 near the front of the machine for feeding the tube which is to be welded and guiding the same as it passes between the pressure rolls. The rolls 9 and 10 are each provided with a concave face, and are adapted to be adjusted relative to each other through the connecting link 11, both of said rolls being vertically adjustable through a hand wheel 12 co-operating with a block 13 which

is vertically movable in upright guideways 14. The upper feed roll 10 is provided with a thin bead 15 positioned substantially centrally of the concave groove formed in the face thereof, the bead 15 being adapted to enter the slit formed in the tube and thus prevent turning of the tube as it is fed between the rollers and insure the slit being properly positioned so that the edge portions will be welded together as it passes through the machine.

Positioned rearwardly of the feed roll is a supporting table 16 which is provided upon its under surface with a plurality of tracks 17 so positioned as to co-operate with a plurality of similar tracks 18 carried by the frame and a roller 19 is positioned so as to co-operate with each of the correspondingly positioned tracks 17 and 18 in order to form a mounting for the table which will permit the same to move readily in a direction transverse of the feed rolls. The anti-friction rolls 19 are preferably rotatably mounted upon shafts 20 extending transversely of the table and supported thereby, although any suitable form of mounting for these rollers may be employed. Stops 21 extend upwardly from opposite sides of the base portion of the frame to prevent the table from becoming disengaged therewith. A plate 22 provided with down turned end portions 23 is firmly secured to the under surface of the table 16 in any suitable manner, as by screws 24. Each down turned end portion of the plate is provided with a pin or shaft 25 on which is rotatably mounted a roller 26. The rollers are mounted so as to extend inwardly from the down turned ends of the plate 22 and extend beneath the side edges of a plate 27, which is secured to the upper surface of a rib 28 formed integral with the frame and located substantially midway between the opposite sides thereof. The rollers 26 normally bear against the under surface of the plate 27, thus restraining the table from movement upwardly from the main frame and preventing tilting of the table. It will be seen, however, that the structure just described permits the table to slide freely in a direction transverse of the main frame. In order to give resiliency to the transverse movement of the supporting table and restrain the movement of the same, a rib 29 extends upwardly from the bed portion 1 and is provided at a point near the upper end thereof with an opening 30 in which is slidably located a rod 31 provided at one end thereof with an angular portion 32, which is adapted to be positioned within a suitable opening formed in the end portion of the table. Compression springs 33 and 34 surround the rod 31 upon opposite sides of the rib 29 and these springs 33 and 34 are maintained under a proper degree of

compression by means of nuts 35 and 36 threaded upon the rod 31. Firmly secured to the upper surface of the table in any suitable manner is a block 37, while a block 38 of similar construction is mounted upon the upper surface of the table so as to be capable of movement in a direction longitudinally of the table. Secured to the outer end portion of the table is a block 39 within which is rotatably mounted a shaft 40 carrying a hand wheel 41 and provided throughout a portion of its extent with an external thread 42 adapted to co-operate with a threaded opening 43 formed in one side of the block 38 to adjust the block 38 longitudinally of the table upon rotation of the hand wheel.

Sleeves 44 of similar construction, each of which is provided with an outwardly extending shoulder 45 substantially midway of its length and has a spline 46 formed upon the lower end portion thereof, are adapted to be fitted into openings formed substantially centrally of the blocks 37 and 38, the lower end portions of the sleeves fitting within the openings formed in the blocks so that the splines 46 are received in suitable grooves in the blocks, thus permitting vertical movement of the sleeves relatively to the blocks while preventing the sleeves from rotating relatively to the blocks. As normally positioned within the blocks, the sleeves are located in such position that the shoulders formed thereon are spaced slightly above the upper surfaces of the blocks. A shaft 47 is rotatably mounted within each of the sleeves 44 and each of the shafts 47 is provided with a threaded portion 48 which is adapted to be threaded within a bushing 49 carried by the corresponding block. An adjusting wheel 50 is firmly secured to the upper end portion of each shaft for a purpose which will be hereinafter described. A plate 51 of substantially the same size as the table 16 is firmly secured to the upper surface of the table in spaced relation thereto by means of a plurality of spacing bolts 52. The plate 51 is so positioned that it lies above the blocks 37 and 38 and is provided with openings therein for the reception of the sleeves. A pressure pulley 53 is rotatably mounted upon the upper end of each of the sleeves 44 so as to be freely rotatable thereon, each pulley being provided with a pair of bushings 54 adapted to rotate freely upon the upper portion of the sleeve. The lower edge of each pulley 53 is adapted to rest upon the shoulder 45 formed upon the corresponding sleeve and a plurality of spacing elements 55 may be employed for spacing the upper face of the pulley from the adjusting wheel 49. The pressure pulleys 53 are hollowed out as indicated at 56 to form annular recesses in the upper faces thereof, and water is preferably fed into these recesses during the operation

of the mechanism for the purpose of cooling the pulleys and assisting in dissipating the heat imparted thereto during the welding operation. It will be seen from the above description that the pulleys 51 are mounted to be freely rotatable upon the upper end portion of the sleeves 43 while these rolls are capable of vertical adjustment by rotation of the adjusting wheels 49 by which the shafts 46 can be raised and lowered through their threaded connection with the sleeves or bushings 48. While the sleeves 43 are thus capable of vertical adjustment together with the pressure rolls carried thereby, the sleeves are held against rotation relative to the blocks 35 and 36 by means of the splines 45. Although the block 35 is firmly secured to the upper surface of the table, the block 36 is capable of adjustment in a longitudinal direction by means of the threaded shaft 40 and hand wheel 39, thus providing means for adjusting the pressure rolls relative to each other whenever such adjustment is found to be desirable as when tubes of different sizes are to be welded. By reason of the fact that the table is movable in a direction transversely of the feed roll, this adjustment of one of the pressure rolls relative to the other renders it possible to center the meeting faces of the pressure rolls relative to the feed rolls at all times without thus making it necessary to adjust both pressure rolls relative to each other. Moreover, the flexible mounting of the rod 27 enables the table to move slightly in a longitudinal direction and thus constantly adapt itself to any variations in the edges of the tube which is to be welded.

Upon reference to Figure I of the drawing, it will be seen that a guide roll 55 provided with a bead 56 is secured to the edge of the table by means of a bracket 57 and assists the upper feed roll 10 in properly guiding the tube which is to be welded so that the slit formed therein will be in proper position with respect to the nozzle of the blow-pipe. The guide roll 55 being firmly secured to the table is enabled to control the transverse movement of the table, thus insuring the proper positioning of the slit in the tube with respect to the nozzle of the torch. A blow-pipe 58 provided with a nozzle 59, which normally projects in front of the pressure rolls, is adjustably mounted in a bracket 60 carried by the table, the bracket being so formed that it provides for the various necessary adjustments of the blow-pipe. The hand wheel 61 is adapted to rotate the shaft 64 carrying the blow-pipe to vary the angle of inclination of the blow-pipe as may be desired. The hand wheels 62 and 63 carried by the bracket 60 are connected with the adjusting mechanism for the blow-pipe to provide the necessary vertical and horizontal adjustments respectively for the blow-pipe. As clearly shown in Figure III of the drawings, the pressure rolls 51 are each provided with a concaved outer face which co-operate to bear against the outer surface of the tube A which is to be welded and force the edges thereof into close engagement with each other after the application of heat thereto by means of the blow-pipe.

Positioned directly in the rear of the table are a pair of driven rolls 67 and 68 each of which is provided with a groove formed in the face thereof for the reception of the tube which is to be welded, these rolls being adjustable relative to each other by means of the bracket 69 and both rolls being capable of simultaneous vertical adjustment by means of the hand wheel 70 which controls the movement of the block 71 vertically slidable in upright guideways 72. A plurality of guide rollers 73 are located in the rear of the guide rollers above described for the purpose of suitably guiding the tube which is to be welded as it is fed from the machine. The upper guide rollers 73 are vertically adjustable by means of hand wheels 74 controlling the vertical movement of blocks 75 slidably mounted in upright guideways 76. The lower roller 73 supports the tube as it moves rearwardly from the machine and is fixedly mounted in the frame 4. The rollers 67 and 68 together with the two forward guide rollers 73 are driven in a suitable manner from the shaft 6 through a train of suitably arranged gears 78. It will be seen upon reference to Figure I of the drawings that the feed rolls 9 and 10 are driven in a similar manner from the shaft 6 through a suitable train of gears 79.

The metal sheet forming the tube is rolled into a tube like form prior to the welding operation and the adjacent edges of the sheet meet at a line extending throughout the length of the tube, thus forming a slit in the tube within which the beads 15 and 56 project for the purpose of slightly separating the edges of the sheet and at the same time preventing rotation of the tube as it passes through the feed roll and beneath the nozzle of the blow-pipe. The pressure rolls are suitably adjusted to exert sufficient pressure upon the tube to force the edges of the sheet into close contact with each other directly after the application of heat thereto for the purpose of producing a satisfactory weld. From the pressure rolls the tube passes between the guide rolls 67 and 68, which being driven rolls serve to assist the feed rolls in feeding the tube through the machine. The guide rolls 73 receive the tube from the guide rolls 67 and 68 and serve to maintain the same in proper position while at the same time feeding it rearwardly from the machine.

In operating upon tubes of different sizes, it is necessary to adjust the position of certain of the rolls in order that they will prop-

erly co-operate with the remaining rolls to lead the tube through the machine in proper position for welding. This is particularly necessary in connection with the pressure rolls, since they are mounted in a horizontal plane while the feed rolls with which they co-operate are mounted to rotate in a vertical plane. By providing a table movable transversely of the machine and providing suitable means for adjusting one of the pressure rolls relative to the other, the pressure rolls are so positioned as to properly co-operate with the feed rolls at all times and under all conditions of use. Moreover, it has been found in operation that the slits formed in the tube are of such a nature as to make it desirable to provide means for insuring that the slit will be positioned at all times directly beneath the nozzle of the blow-pipe regardless of any slight variation upon the edges of the sheet. By constructing the table so that it is capable of moving freely within narrow limits in a direction transversely of the machine, the pressure rolls and the blow-pipe adjust themselves automatically to properly act upon the tube to produce a satisfactory weld.

While I have shown and described in considerable detail a specific embodiment of my invention, it is to be understood that this showing and description is illustrative only and for the purpose of rendering my invention more clear and that I do not regard the invention as limited to the details of construction illustrated or described, or any of them, except in so far as I have included such limitations within the terms of the following claims, in which it is my intention to claim all novelty inherent in my invention broadly as well as specifically.

What I claim as new and desire to secure by Letters Patent is:

1. In a tube welding machine, a pair of feed rolls, a pair of co-operating pressure rolls, means for mounting said pressure rolls, means for clamping said pressure rolls together and means engaging said first means for yieldingly positioning said pressure rolls relative to said feed rolls.

2. In a tube welding machine, a pair of feed rolls, a pair of co-operating pressure rolls, a common support for the pressure rolls movable freely in a direction laterally of the feed rolls, and means for automatically controlling the position of the pressure rolls relative to the feed rolls.

3. In a tube welding machine, a pair of feed rolls, a pair of co-operating pressure rolls, a common support for the pressure rolls, means for adjusting one of the pressure rolls relative to the other, and means for automatically controlling the position of the pressure rolls relative to the feed rolls.

4. In a tube welding machine, a pair of feed rolls, a supporting table located adja-

cent the feed rolls and movable in a transverse direction relative to the feed rolls, and a pair of co-operating pressure rolls carried by the supporting table and movable as a unit therewith.

5. In a tube welding machine, a pair of feed rolls, a supporting table located adjacent the feed rolls and freely movable in a transverse direction thereto, a pair of pressure rolls carried by the supporting table and movable therewith, and means for adjusting one of said pressure rolls relative to the other independently of any movement of the table.

6. In a tube welding machine, a supporting table movable transversely of the machine, a pair of pressure rolls carried by the table, and means for adjusting one of said pressure rolls relative to the other independently of any movement of the table.

7. In a tube welding machine, a supporting table movable transversely of the machine, a pair of co-operating pressure rolls carried by the table, a work guiding roll carried by and movable with the table, and a blow-pipe near the adjacent edges of the pressure rolls.

8. In a tube welding machine, a supporting table bodily movable transversely of the machine, a pair of co-operating pressure rolls carried by the table, and a blow-pipe adjustably supported by the table and having the nozzle thereof positioned adjacent the meeting edges of the pressure rolls.

9. In a tube welding machine, a movable table, supporting means for the movable table whereby the table is capable of movement in a direction transversely of the machine, and a pair of pressure rolls carried by the table and movable therewith.

10. In a tube welding machine, a table movable transversely of the machine, supporting means for the table, a pair of co-operating pressure rolls carried by the table and movable therewith, and means for adjusting one of said pressure rolls relative to the other.

11. In a tube welding machine, a table movable transversely of the machine, a pair of co-operating pressure rolls carried by the table and movable therewith, means for adjusting one of said pressure rolls relative to the other, and a guide roll supported by the table substantially in line with the adjacent faces of the pressure rolls.

12. In a tube welding machine, a pair of feed rolls, a pair of pressure rolls, a guide roll, a table for supporting the pressure rolls and the guide roll, said table being movable in a direction transversely of the feed roll.

13. In a tube welding machine, a pair of feed rolls, a pair of pressure rolls, a guide disc, a table for supporting the pressure rolls and the guide disc, said tables being movable in a direction transversely of the feed roll,

and a blow-pipe supported by the table and vertically and horizontally adjustable relative thereto.

- 5 14. In a tube welding machine, a pair of feed rolls, a table movable transversely of the feed rolls, a pair of co-operating pressure rolls carried by the table, each of the pressure rolls being vertically adjustable relative to the table and to each other.
- 10 15. In a tube welding machine, a pair of feed rolls, a table movable transversely of the feed rolls, a pair of co-operating pressure rolls carried by the table each of the pressure rolls being adjustable relative to the table and to each other, and means for horizontally adjusting one of said pressure rolls towards and from the other.
- 15 16. In a tube welding machine, a table movable transversely of the machine, a pair of pressure rolls carried by the table, the said rolls being adjustable vertically.
- 20 17. In a tube welding machine, a pair of pressure rolls, a guiding means for the tube, and a table movable transversely of the machine for supporting the rolls and the guiding means.
- 25 18. In a tube welding machine, a supporting table movable transversely of the machine, a pair of co-operating pressure rolls carried by the table, a pair of feed rolls, and means automatically adjustable and co-operating with the table to bring the opening between the pressure rolls in alignment with the opening between the feed rolls.
- 30 19. In a tube welding machine having a pair of co-operating pressure rolls, a mem-

ber carrying said rolls mounted on said machine to have a limited transverse movement and resilient means to restrain movement of said members in either direction.

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20. In a tube welding machine, a supporting base, a table thereon, said base and table having co-operating guides to permit said table to move freely in opposite directions and means for resiliently restraining said table against movement in either direction from a predetermined position.

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21. In a tube welding machine, a table, oppositely disposed tracks on the table and machine, and rollers placed between the oppositely disposed tracks, the said table being movable transversely of the machine on said rollers.

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22. In a tube welding machine, a table, oppositely disposed tracks on the table and machine, rollers placed between the oppositely disposed tracks, the said table being movable transversely of the machine on said rollers, and stops on certain of said tracks for limiting the movement of the rollers.

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23. In a tube welding machine, a pair of feed rolls, a table, adjustable transversely of the machine, a pair of pressure rolls, a guide roll and a blow pipe carried by said table, and means co-operating with the table for automatically aligning the pressure rolls, the guide roll, and the blow pipe with the feed rolls when the machine is in operation.

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In testimony whereof I affix my signature.

EDWARD KAMPER.