Jan. 31, 1933. M. ROSENKRANZ 1,895,732

PIPE WELDING APPARATUS

Filed Nov. 18, 1930 3 Sheets-Sheet 1

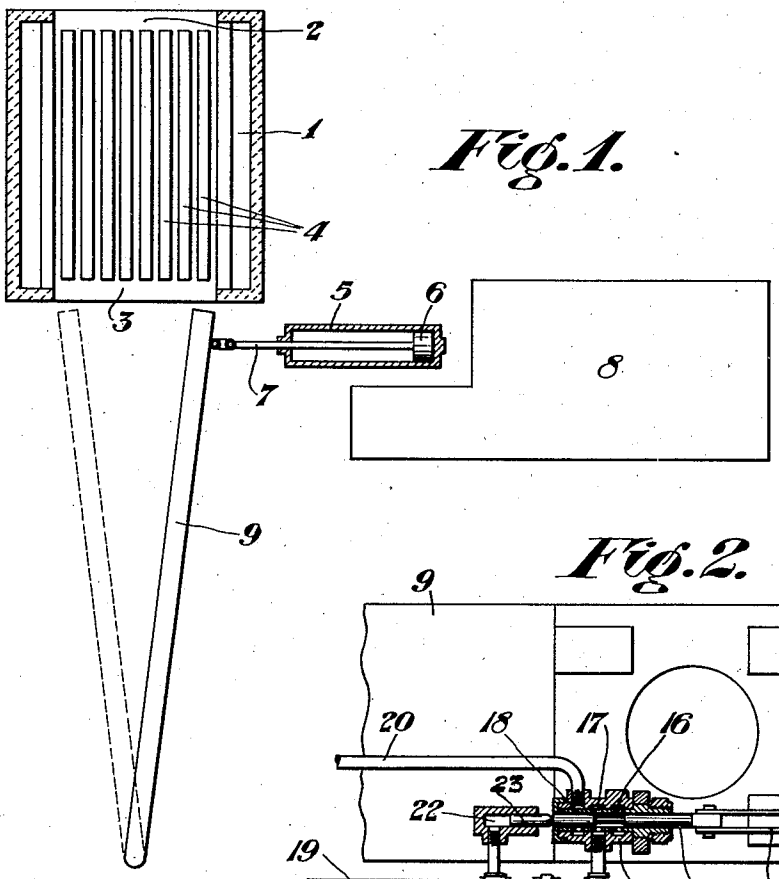


Fig. 1.

Fig. 2.

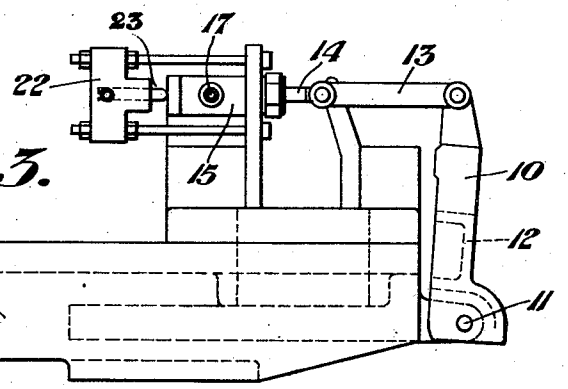


Fig. 3.

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PIPE WELDING APPARATUS

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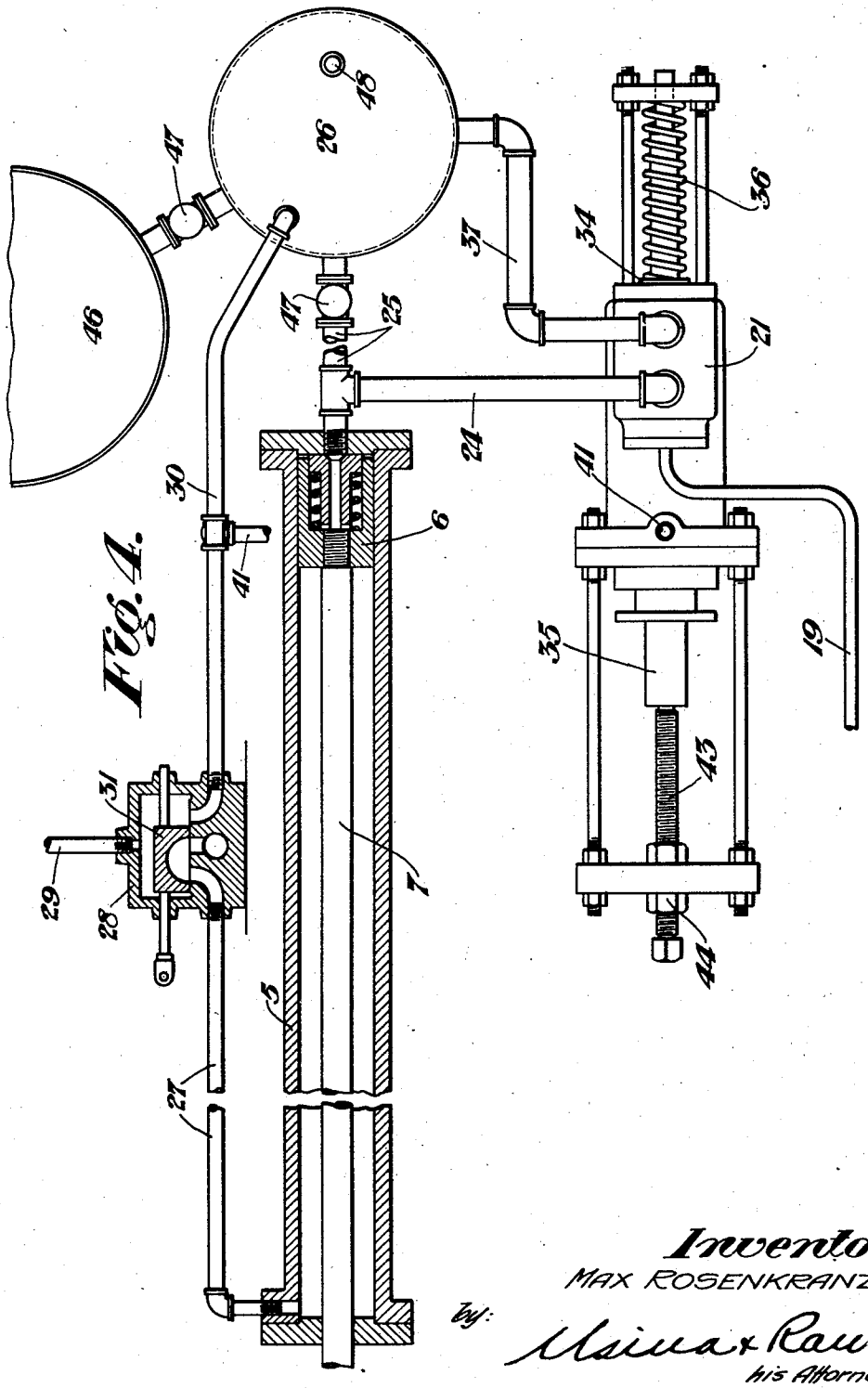


Fig. 4.

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PIPE WELDING APPARATUS

Filed Nov. 18, 1930 3 Sheets-Sheet 3

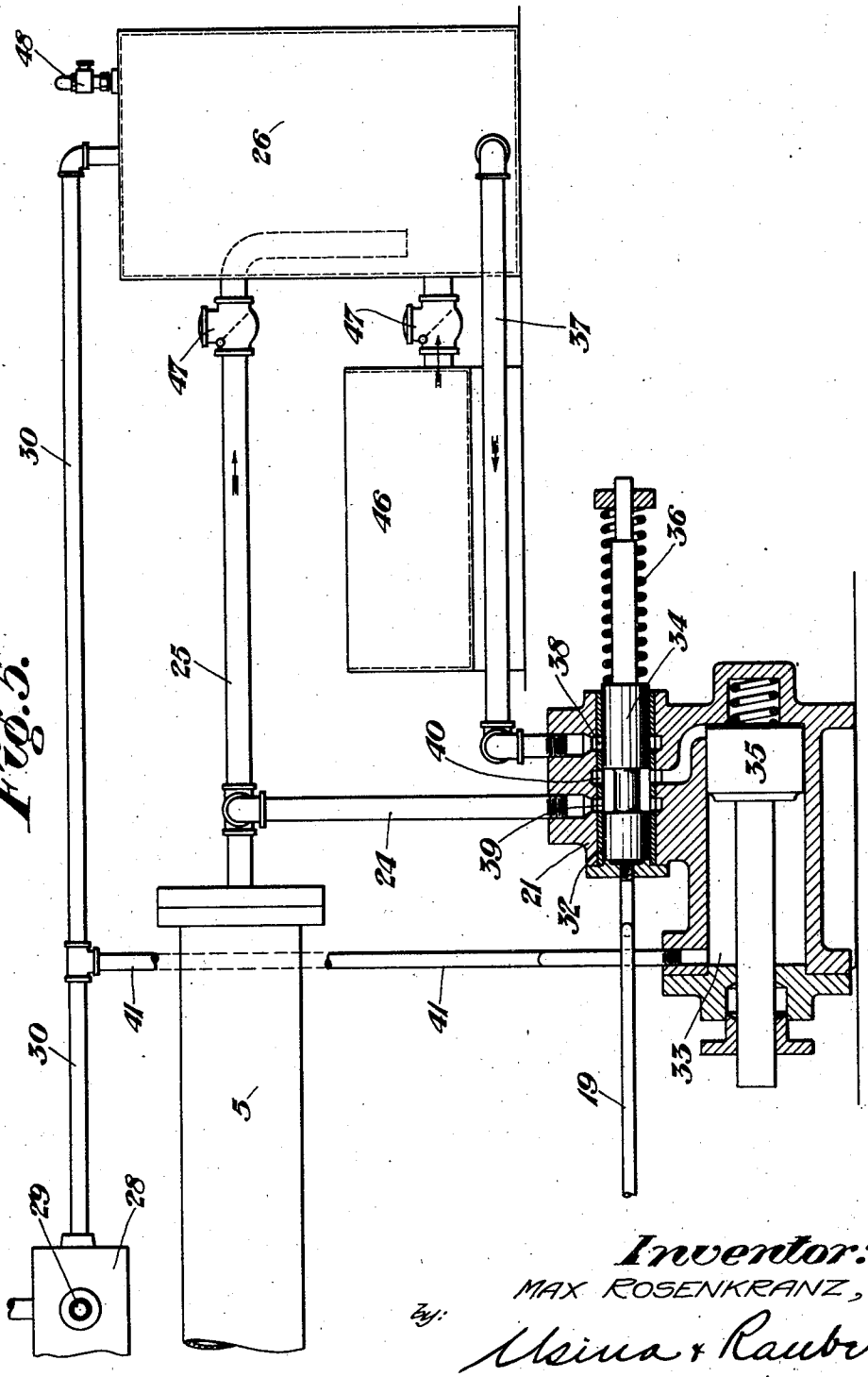


Fig. 5.

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Patented Jan. 31, 1933 1,895,732

UNITED STATES PATENT OFFICE

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PIPE WELDING APPARATUS

Application filed November 18, 1930. Serial No. 496,492.

This invention relates to apparatus for butt-welding pipe and more particularly to apparatus for automatically shifting the pipe draw bench to predetermined successive positions at the welding end of the heating furnace for the purpose of drawing out the skelp from the furnace.

Heretofore the draw bench for drawing skelp was hand controlled in its movement transversely of the heating furnace and the proper location of the draw bench with respect to the position of the skelp in the furnace was dependent upon the skill of the operator who moved the draw bench in response to signals from the welder.

The present invention provides for automatically moving the draw bench along the welding end of the furnace to predetermined successive positions, thereby providing for accurate spotting of the draw bench in proper alinement with the skelp to be welded.

It is one of the major objects of the invention to provide apparatus for measuring the amount of movement of the draw bench and to automatically produce such movement in response to the movement of the skelp through the welding bell, and which shall be further adapted to be returned to its original position after it has completely traversed the welding end of the furnace.

The invention provides for shifting the draw bench by means of a racking cylinder and piston which shifts the bench by having measured quantities of water forced into the cylinder and which provides a measuring device for measuring the charge of water from a pressure tank and to force it into the racking cylinder.

In the accompanying drawings constituting a part hereof, and in which like reference characters designate like parts, Figure 1 is a diagrammatic view illustrating a heating furnace and the relative position of the racking cylinder and shifting apparatus embodying the principles of this invention; Figure 2 is a top plan view of a portion of the draw bench: Figure 3 is a side elevational view thereof; Figure 4 is a top plan view, partially in section, illustrating the racking cylinder, the charging cylinder, water supply tank and the pressure tank; and Figure 5 is a side elevational view thereof showing the measuring and charging cylinder in cross-section.

With reference to Figure 1 of the drawings, 1 designates a heating furnace in which skelp is charged at the end 2 and withdrawn from the welding end 3, the skelp 4 being placed in a row transversely of the furnace. The skelp is withdrawn from the welding end of the furnace by positioning the draw bench in line with the skelp on the extreme right-hand side of the furnace, as viewed from the bottom of the figure, and is then moved into position in alinement with each successive skelp until it has traversed the entire welding end of the furnace and all of the skelp has been successively drawn through the welding bell.

The draw bench may be of the well known type which travels in parallel lines across the front of the furnace instead of the swivel type shown.

As the skelp is withdrawn it is replaced by the charger and the draw bench is then returned to its original position, as shown in the drawings. The draw bench is moved by means of a racking cylinder generally designated at 5 and a piston 6, the rod 7 of which is attached to the draw bench. The shifting apparatus is diagrammatically shown at 8 to illustrate its relative position to the racking cylinder and furnace.

With reference to Figures 2 and 3 of the drawings, 9 designates the draw bench on which a rocker 10 is mounted, the rocker being pivoted to a swivel at 11 and provided with a bell block 12 for receiving the welding bell (not shown). The upper end of the rocker 10 is connected by a link 13 to a plunger 14 of an air valve 15 provided with ports 16, 17 and 18, the ports 17 and 18 being respectively connected by pipe lines 19 and 20 to the measuring cylinder 21 and a source of air supply. An air cylinder 22 operating a plunger 23 is provided at the rear of the plunger 14 to return the plunger to the starting position after each welding operation.

With reference to Figures 4 and 5 of the drawings, the racking cylinder 5 is connected

at the piston end by pipe line 24 to the charging or measuring cylinder 21 and by a pipe 25 to the main pressure tank 26. The front end of the racking cylinder is connected by pipe 27 to a steam chest 28 having a connection to a source of steam supply at 29 and a connection at 30 leading to the main pressure tank 26. The steam chest is provided with a sliding valve 31 which is operated by the welder to return the draw bench to its original position.

The charging or measuring cylinder is provided with two bores 32 and 33 respectively having pistons 34 and 35, the piston 34 being normally biased by a coil spring 36 to the position shown in Figure 5 of the drawings. The piston 34 is the water valve plunger which controls the flow of water from the pressure tank 26 through pipe line 37 that communicates with the port 38 and it further controls the flow of the measured volume of water to the racking cylinder by passages through ports 39 communicating with pipe 24 and the port 40 communicating with the measuring cylinder 33.

The measuring cylinder is connected through pipe line 41 with the steam line which is the pressure source for displacing piston 35 to force the measured volume of water from the cylinder 33 through port 40 and ports 39. The length of movement of the piston 35 is controlled by an adjusting screw 43 and lock nuts 44, the position of the screw determining the distance the piston moves from the position shown in Figure 5 of the drawings to the other end of the cylinder.

The water supply tank 46 is connected to the pressure tank to replenish the water which may be lost due to leakage of the system. The pressure tank being a closed tank, is filled with water, and steam pressure is applied through the line 30. The pipe line 25 and the connection of the water supply tank with the pressure tank are both provided with check valves 47 to permit the flow of water in the direction of the tank only. The top of the pressure tank is provided with a safety valve generally designated at 48.

The operation of the device for automatically shifting the draw bench is briefly as follows: The draw bench is placed in the position shown in Figure 1 of the drawings, and the end skelp is charged into the welding bell and drawn therethrough, causing the rocker 10 to swivel and depress the plunger 14 through its connecting link 13. The resistance of the skelp passing through the welding bell maintains the rocker in the depressed position and the plunger 14 when depressed opens the ports 17 and 18 to permit air pressure from the line 20 to pass to the pipe line 19 and thence to the cylinder 32, where it works against water plunger 34 causing it to move in the direction to compress the coil spring 36 and bring ports 38 and 40 into communication. In this position of the plunger, water under pressure is conducted from tank 26 to the measuring cylinder 33, displacing the piston 35 an amount determined by the position of the adjusting screw 43, this amount determining the measured volume of water which is conducted to the racking cylinder in the following manner:

When the skelp has been drawn through the welding bell air pressure against the plunger 23 returns the plunger 14 to the position where the connection of the air line 19 with the source of supply 20 is broken and the air pressure against water plunger 34 is removed. Spring 36 then acts to change the plunger to the position shown in Figure 5, thereby establishing communication between the ports 39 and 40. The steam pressure in the measuring cylinder then acts upon the piston 35 and displaces the measured volume of water through the ports 39 and 40, through pipe line 24 to the racking cylinder where it displaces the piston 6 and causes the draw bench to move a given amount in the direction to bring it in alinement with the adjacent skelp in the furnace. The operator withdraws the skelp and the operation of welding is repeated with the cycle of operation of the shifting apparatus carried out in the manner explained, and this operation is repeated for the welding of skelp until all of the skelp has been welded and the draw bench has reached the other end of its travel. At this time, the welder through suitable control linkage will shift the slide valve 31 of the steam box to the position where the steam supply communicates through the pipe line 27 with the rod end of the piston 6 causing it to travel in the reverse direction to the opposite end of the cylinder, from which the water is forced to the pressure tank, thereby returning the draw bench to its original position.

With reference to the displacement of water by piston 35 from the measuring cylinder 33, it is to be noted that the unit pressure of the steam forcing the water into the measuring cylinder and the unit pressure of the steam working against the forward motion of the measuring piston 35 is the same, but the total of pressure of the water against the piston head is greater than the total steam pressure against the piston head because the effective area of the steam pressure is less than the effective area of the water pressure by an amount equal to the area of the cross section of the piston rod of piston 35. For this reason the piston 35 will move forward against the steam pressure when acted upon by the water under pressure.

It will be seen from the foregoing description of this invention that the use of an entirely automatic apparatus to spot the draw bench to predetermined successive positions

at the welding end of the furnace is much faster and more accurate than the present method of spotting the draw bench in these positions by hand controlled apparatus depending upon the skill of the operator.

Although one embodiment of the invention has been herein illustrated and described, it will be obvious to those skilled in the art that various modifications may be made in the details of construction without departing from the principles herein set forth.

I claim:

1. Apparatus for automatically spotting the draw bench at predetermined successive lateral positions at the welding end of a furnace, comprising a rocker adapted for rocking movement on the draw bench and having a block for mounting the welding bell, an air valve controlled by said rocker, a racking cylinder and piston the latter being attached to the draw bench, a measuring cylinder and piston adapted to discharge into said racking cylinder, a pressure tank, and a control valve for said measuring cylinder, said control valve being operative by said air valve in response to movement of the rocker on the draw bench to alternately connect the measuring cylinder and pressure tank and the measuring cylinder and the racking cylinder.

2. Apparatus for automatically spotting the draw bench at predetermined successive lateral positions at the welding end of a furnace, comprising a racking cylinder and a piston, the latter being attached to the draw bench, a measuring cylinder and piston for charging fluid under pressure to said racking cylinder, a source of fluid under pressure, and means responsive to the resistance of the skelp passing through the welding bell for controlling the operation of the measuring piston to measure a predetermined volume of fluid and to charge the same into the racking cylinder.

3. Apparatus as set forth in claim 2 characterized by manually controlled pressure operated means for returning the draw bench to its starting position.

4. The combination with a draw bench of a pipe welding apparatus, of means for automatically spotting the draw bench at predetermined successive lateral positions at the welding end of a furnace, said means comprising fluid pressure operated means for moving said draw bench, means for supplying measured quantities of fluid to said fluid pressure operated means, and means operable by the pipe being welded for controlling the operation of said last named fluid supply means.

5. The combination with a draw bench of a pipe welding apparatus, of means for automatically spotting the draw bench at predetermined successive lateral positions at the welding end of a furnace, said means comprising a racking cylinder and piston, the latter being attached to the draw bench, a measuring cylinder and piston adapted to discharge into said racking cylinder, a pressure tank, a control valve for said measuring cylinder and means operable by the pipe being welded for alternately connecting the measuring cylinder and pressure tank and the measuring cylinder and racking cylinder.

6. The combination with a draw bench of a pipe welding apparatus, of means for automatically spotting said draw bench at predetermined successive lateral positions in the welding end of a furnace, said means comprising power means for moving said draw bench, and fluid operated means actuated by the pipe being welded for controlling said power means.

In testimony whereof, I have hereunto set my hand.

MAX ROSENKRANZ.