Nov. 20, 1945. A. PEDLEY 2,389,324

SPOT-WELDING MACHINE

Filed June 10, 1943 3 Sheets-Sheet 1

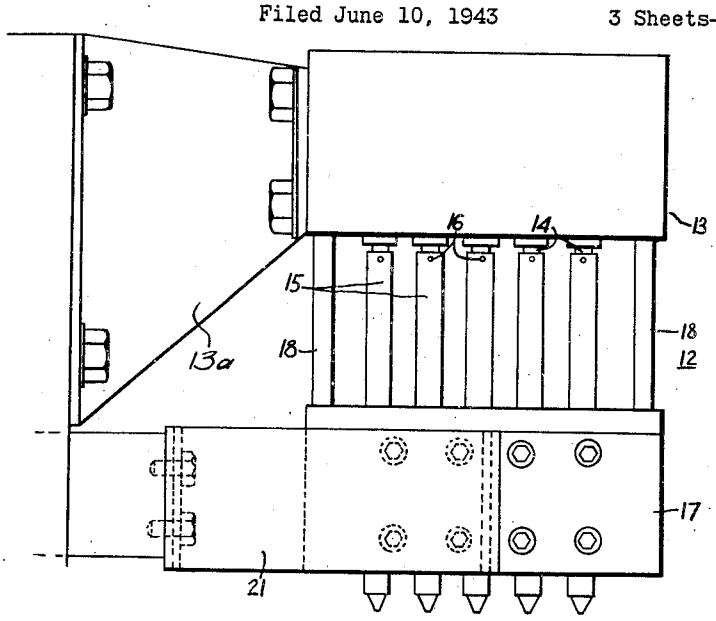


Fig. 1.

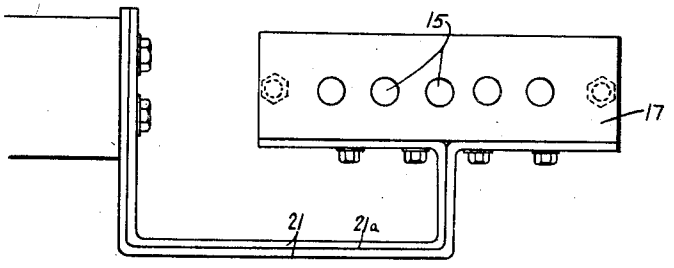


Fig. 2.

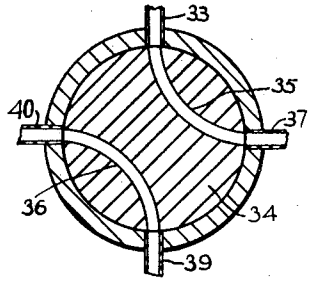


Fig. 6.

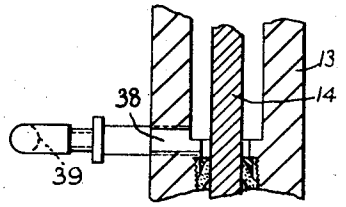


Fig. 5.

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SPOT-WELDING MACHINE

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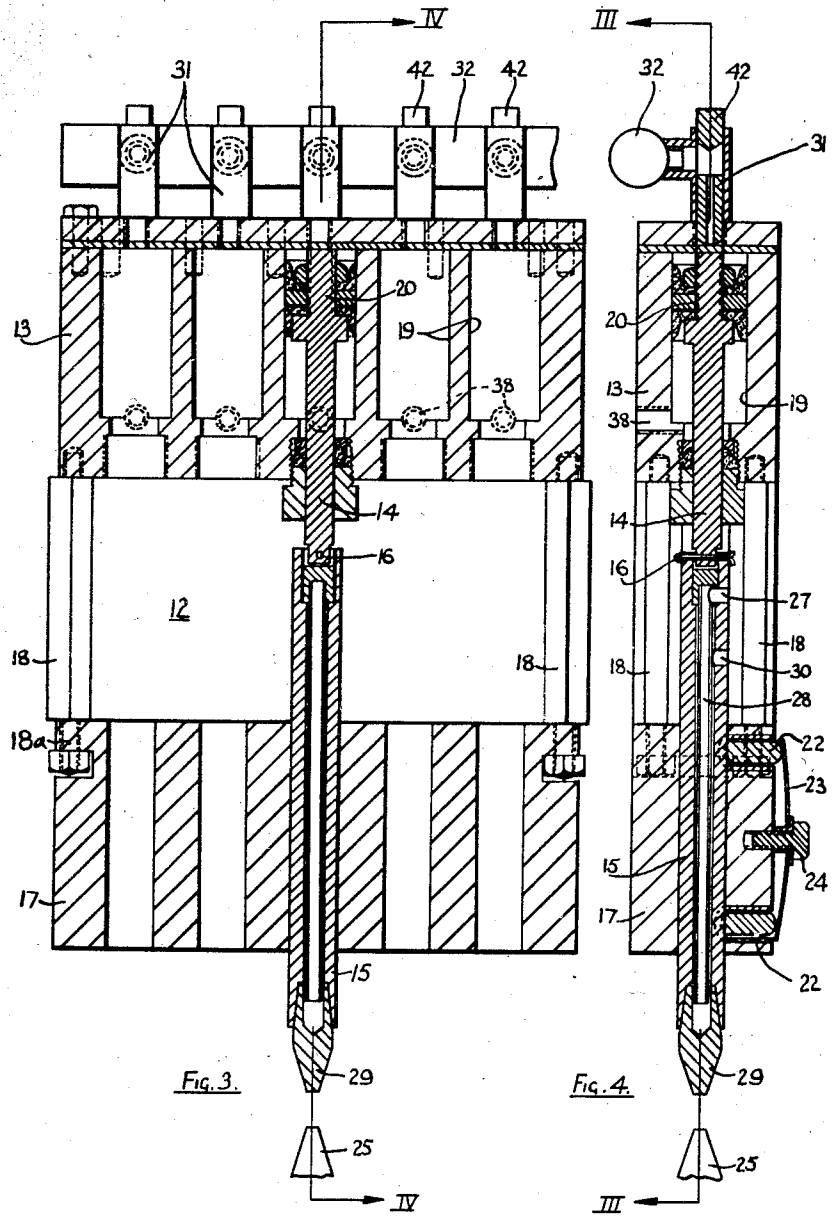


Fig. 3. Fig. 4.

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SPOT-WELDING MACHINE

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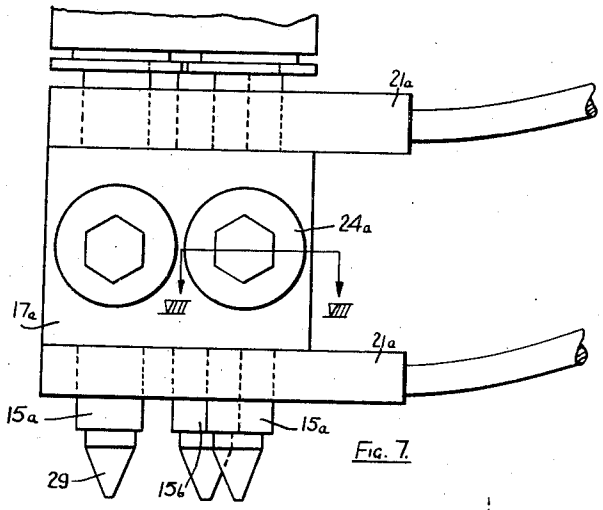


Fig. 7.

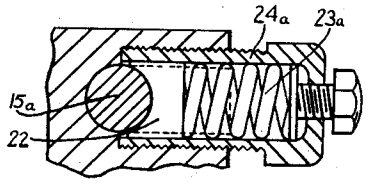


Fig. 8.

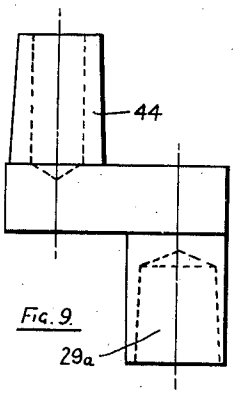


Fig. 9.

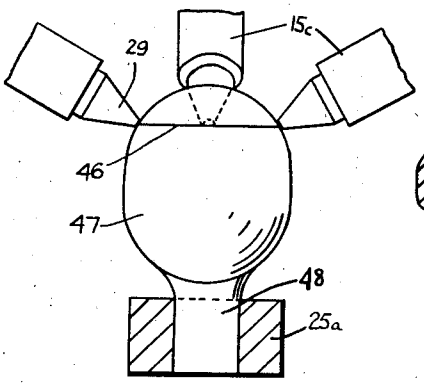


Fig. 10.

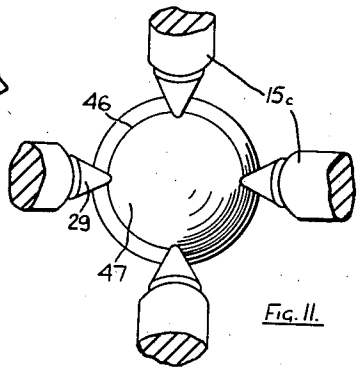


Fig. 11.

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Patented Nov. 20, 1945 2,389,324

UNITED STATES PATENT OFFICE

2,389,324

SPOT-WELDING MACHINE

Arthur Pedley, Bentley, near Walsall, England, assignor to Rubery Owen & Co. Limited, Darlaston, England

Application June 10, 1943, Serial No. 490,345
In Great Britain June 18, 1942

5 Claims. (Cl. 219—4)

This invention relates to spot-welding machines, my main object being to provide improvements whereby a machine (which may be of standard design as regards its main parts) can be adapted for the satisfactory welding of a group of spot-welds at the same time.

A further object of the invention is to arrange that the coacting electrodes of a multiple spot-welding machine will be urged towards one another by separate fluid-pressure means, respectively, whereby uniformity of pressure can be ensured.

A further object of the invention is to arrange that the electrodes of one group, which are slidingly supported in bores in a block to which current is supplied, will be spring-pressed towards one side of the bores for contact purposes.

For an understanding of these and other objects and advantages of my invention attention may be directed to the following description in which reference is made to the accompanying drawings, wherein:

Figure 1 is an outline elevation of a fixed welding head according to the invention;

Figure 2 is an outline plan of the lower block of the head;

Figure 3 is a fragmentary sectional elevation, to a larger scale, taken on the line III—III of Figure 4;

Figure 4 is a sectional elevation taken on the line IV—IV of Figure 3;

Figure 5 is a fragmentary sectional elevation corresponding to Figure 4;

Figure 6 is a diagrammatic represenation of a control valve for the machine;

Figure 7 is an elevation of the lower block of an alternative form of head according to the invention;

Figure 8 is a fragmentary sectional plan thereof;

Figure 9 is an elevation of an electrode adapted for a different work operation;

Figure 10 is a diagrammatic fragmentary elevation of the electrodes of another form of head according to the invention; and

Figure 11 is a fragmentary plan of Figure 10.

In the construction of Figures 1 to 6 there is an upper welding head 12 comprising two spaced blocks. The upper block 13 is bolted to a rigid supporting bracket 13*a* and carries pressure-operated rods 14 to which the electrodes 15 are hinged at 16, and the other 17 slidably supports the electrodes. The blocks are held spaced by spacers 18 and bolts 18*a*. The upper block 13 has a plurality of relatively-large parallel cylinder bores 19 in it the spacing of which may correspond to the spacing of the spots to be welded, and in each bore is a piston 20 connected to the associated rod 14. Current is brought to the lower block by rigid connectors 21, with insulating material 21*a* between them, and spring plungers 22 entered from the side of the block engage the electrodes to press them against the sides of the bores nearest the introduction of the current. Figure 4 shows a pair of plungers 22 pressed by a leaf spring 23 held to the block by a screw 24. The lower stationary electrodes are indicated at 25.

The movable electrodes may be water-cooled by means of individual flexible pipes (not shown) connected to inlet openings 27 communicating with tubes 28 in the interior of the electrodes, each tube directing the cooling water to the electrode tip 29, whence it returns outside the tube to the outlet 30. Obviously the cooling flow may if desired be in series through the upper electrodes.

Fluid-pressure can be led from an appropriate source to the upper ends of each main cylinder bore 19 in the upper block, whereby the associated electrode would be biassed downwardly to exert a predetermined pressure on the work, or, alternatively, to the lower ends of the main bores to raise the electrodes. Thus, I show elbow-shaped inlet pipes 31 all communicating with a supply pipe 32 of relatively-large bore, the supply pipe being connected with a pipe line 33 (Figure 6) leading to a valve. This is shown as including a cylindrical casing with a rotary element 34 therein which can be turned from the position shown through a right angle, as by means of a pedal (not shown) biassed to return it to the other position. The rotary element 34 has two passages 35, 36 in it, and in the position shown the passage 35 interconnects the pipe line 33 with a main supply pipe 37. Meanwhile the lower ends of the main bores 19 communicate through openings 38 with a pipe line 39 (Figures 5 and 6) leading to the valve, and in the illustrated position of the rotary element 34 the pipe line 39 is connected by the passage 36 to the exhaust pipe 40. Thus, in this position of the valve the movable electrodes are forced downwardly to effect a welding operation.

Actuating the pedal to turn the rotary element to the other position will place the main supply pipe 37 in communication with the pipe line 39, whereby the movable electrodes will be raised, the upper sides of the pistons 20 being exhausted through the pipe line 32 and the pipe 33 which

is connected with the exhaust 40 when the rotary element 34 is in this other position.

In this way I can ensure that equal pressures will be applied to force the movable electrodes downwardly, and individual adjustment can be effected by means of screws 42 associated with each elbow inlet pipe 31.

In the construction of Figures 1 to 5 the five electrodes are shown as having their axes in a common plane. Obviously, however, the invention is equally applicable to a rectangular or other form of welding head in which the points of the electrode tips form a rectangle, trapezium or other polygon. This is indicated by Figure 7, which shows a rectangular lower block 17*a* with two electrodes 15*a* adjacent one edge, whilst behind them—partly screened by one of them—is shown another electrode 15*b*. Incidentally, in this arrangement the current is brought to the lower block 17*a* through massive plates 21*a* secured to the upper and lower faces of the block and having openings to receive the electrodes. Furthermore, in this arrangement the plunger 22 (Figure 8) pressing an electrode 15*a* against one side of its bore is urged by a coil spring 23*a* which is held in position by a cap 24*a* screwed to the block.

In some cases a standard form of upper welding head with electrodes positioned in a certain way will not quite fit a job of work, and in this event I may mount an offset tip to the end of an electrode rod. Figure 9 shows such an arrangement, the bracket shown having a Morse taper socket 29*a* to receive a known form of welding tip offset from a Morse tapered shank 44 adapted to be secured in the socket at the end of an electrode rod 15.

It will also be obvious that the invention is not restricted to an arrangement in which the electrodes are disposed to be parallel to one another. For example, it may be applied to a machine in which the electrodes act radially on the surface of a cylinder, the electrodes being supported for circumferential adjustment if desired but being spring-pressed and pressure-actuated individually as described above. Figures 10 and 11 disclose electrodes 15*c* inclined to one another to be at rightangles to a part-spherical surface 46 which is to be spot-welded at four points, or if at more points the member 47 can, of course, be turned after one spot-welding operation. The member 47 in this case is shown as having a shank 48 engaged with the lower electrode 25*a* in the form of a ring.

What I claim as my invention and desire to secure by Letters Patent of the United States is:

1. In a multiple spot-welding machine, a plurality of movable electrodes, a block having bores to slidingly receive the electrodes, a rigid current-conducting bar bolted to said block, spaced plungers carried by said block and coacting with one of said electrodes, and spring means urging said plungers to press said one electrode into contact with one side of its associated bore, whereby to ensure good conductivity between said bar and said one electrode.

2. In a multiple spot-welding machine, a stationary head including upper and lower spaced blocks, means rigidly supporting said upper block, bolts supporting said lower block from said upper block, a plurality of movable electrodes, said lower block having bores to slidingly receive said electrodes, current-conducting means connected to said lower block, spring means urging said electrodes into contact with one side of said bores, said upper block having in it a plurality of cylinder bores, pistons reciprocable in said cylinder bores, means connecting said pistons to said electrodes whereby the latter will be reciprocated when said pistons are reciprocated, and means for supplying fluid pressure to adjacent ends of said cylinder bores so as to actuate said electrodes in one direction with uniformity of pressure.

3. In a multiple spot-welding machine, a stationary head including upper and lower blocks, a rigid bracket to which said upper block is bolted, bolts supporting said lower block from said upper block, a plurality of movable electrodes with their axes substantially parallel to one another, said lower block having bores to slidingly receive said electrodes, current-conducting means connected to said lower block, spring-pressed plungers mounted in holes in said lower block to coact with said electrodes respectively and urge them into contact with one side of said bores, said upper block having in it a plurality of similar cylinder bores, pistons reciprocable in said bores, means including hinge pins connecting said pistons to said electrodes whereby the latter will be reciprocated when said pistons are reciprocated, and means for simultaneously supplying fluid pressure to adjacent ends of said cylinder bores so as to actuate said electrodes in one direction with uniformity of pressure.

4. In a multiple spot-welding machine, a stationary head including upper and lower blocks held in spaced relation by spacers and bolts, a rigid bracket to which said upper block is bolted, a plurality of movable electrodes, said lower block having bores to slidingly receive said electrodes with slight clearance, current-conducting means bolted to said lower block, spring means urging said electrodes into contact with one side of said bores, and said upper block having similar fluid-pressure responsive means therein hingedly connected to said electrodes whereby the latter can be reciprocated in one direction with uniformity of pressure.

5. In a multiple spot-welding machine, a stationary head comprising spaced blocks, a plurality of movable electrodes of circular cross-section, one of said blocks having bores to slidably receive said electrodes, current conducting means connected to said one block, a sleeve mounted in said block, a plunger in said sleeve, said plunger having a part-cylindrical end in contact with one of said electrodes, a spring in said sleeve urging said plunger in contact with said electrode, the other of said blocks having a plurality of cylinder bores, pistons reciprocable in said bores, hinge pins connecting said electrodes to said pistons, and means for supplying fluid pressure to adjacent ends of said cylinder bores to actuate said electrodes.

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