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J. R. LEX

2,237,103

GANG SPOT WELDER

Filed July 5, 1938

3 Sheets-Sheet 1

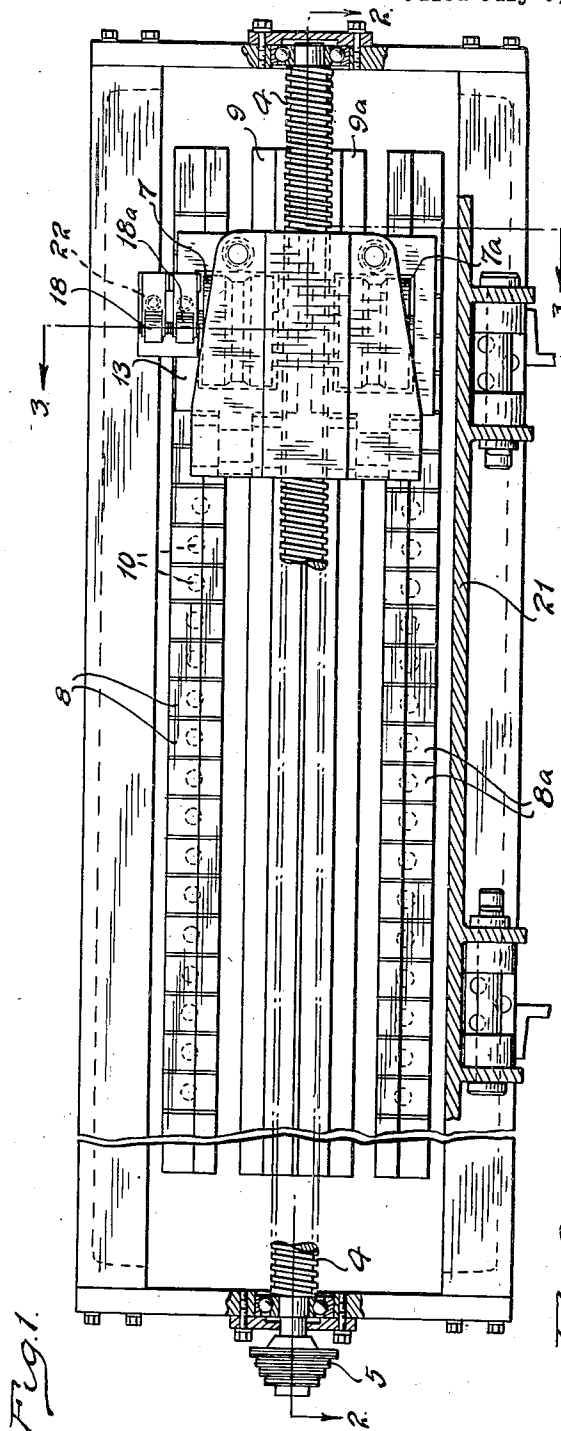
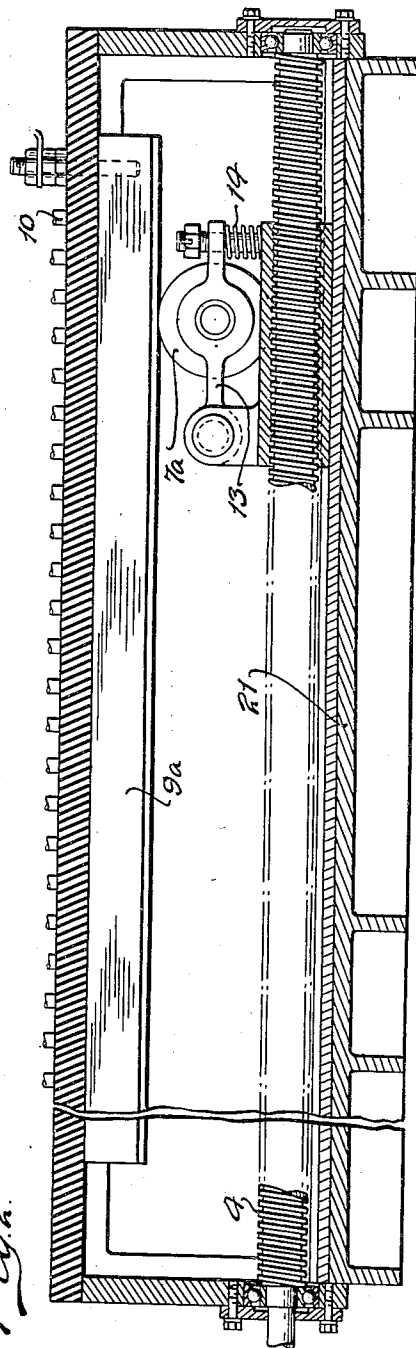


Fig. 2.



INVENTOR.
JOSEPH R. LEX.
BY
Barner, Kisselle, Laughlin & Laich
ATTORNEYS.

April 1, 1941.

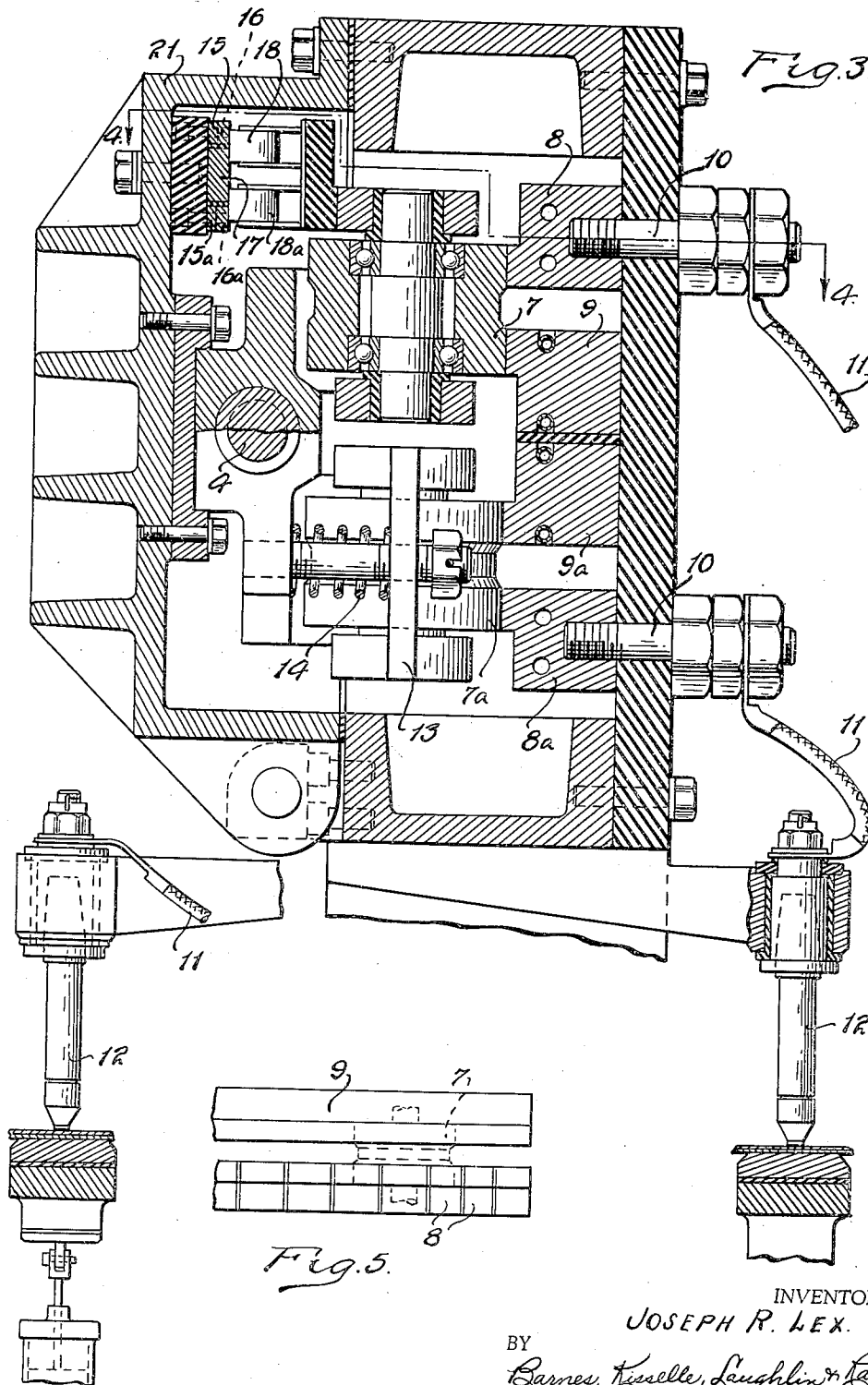
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GANG SPOT WELDER

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3 Sheets-Sheet 2



INVENTOR.

JOSEPH R. LEX.

BY

Carnes, Kessel, Laughlin & Leitch
ATTORNEYS.

April 1, 1941.

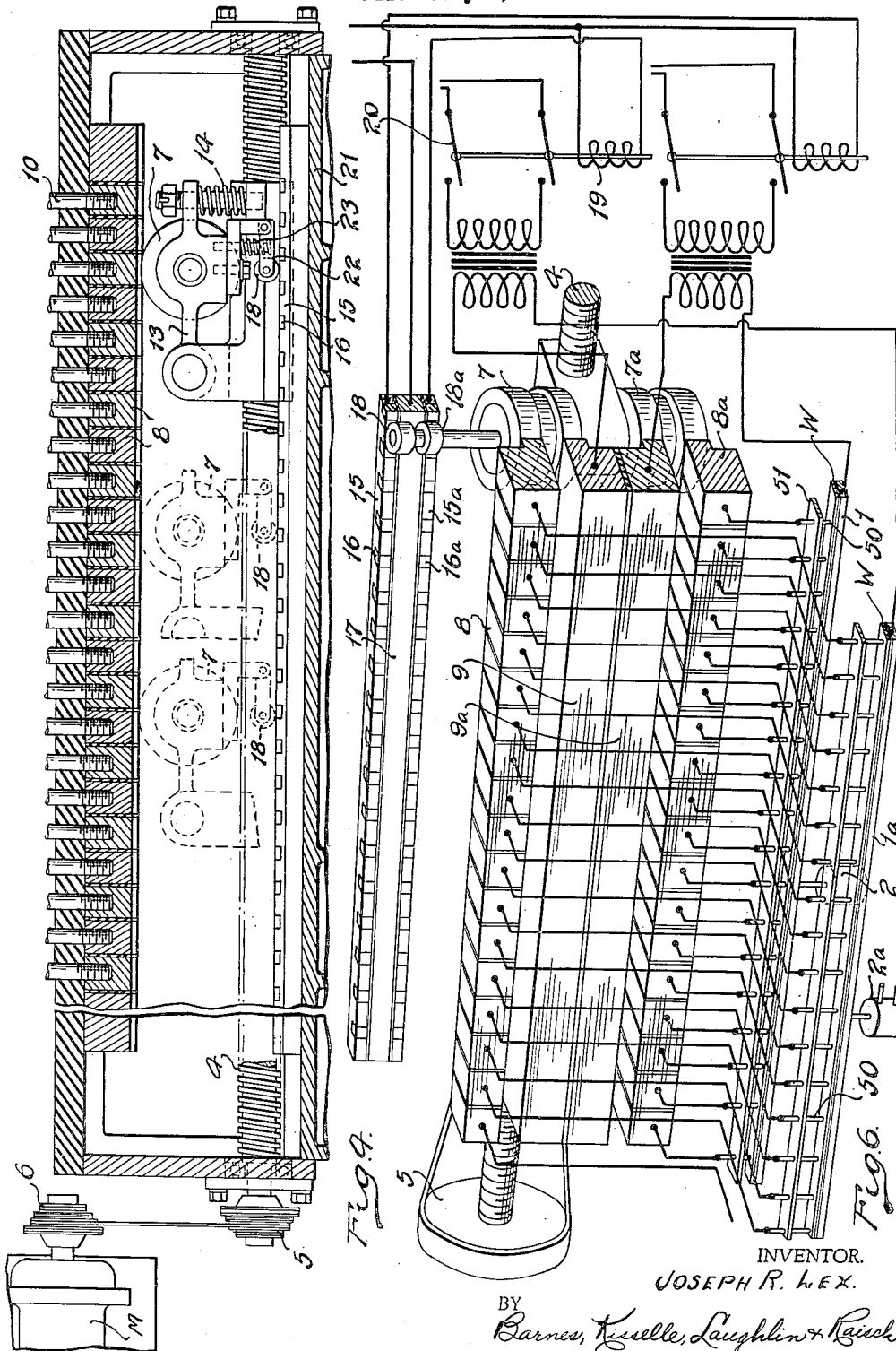
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GANG SPOT WELDER

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UNITED STATES PATENT OFFICE

2,237,103

GANG SPOT WELDER

Joseph R. Lex, Detroit, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application July 5, 1938, Serial No. 217,416

6 Claims. (Cl. 171-97)

This invention relates to gang spot welding. The idea is to rapidly effect successive spot welds without individually reciprocating the electrodes. This is done by successively closing secondary switches and coincidentally closing a circuit breaker switch which is coordinated with the secondary switches so that the secondary switches are always on dead circuits whenever they open or close. This prevents any substantial arcing.

This principle is not broadly new but it is believed that the work-out involved in the apparatus about to be described and claimed is a very considerable improvement over the prior art.

Referring to the drawings:

Fig. 1 is largely a vertical longitudinal sectional view of the machine.

Fig. 2 is a horizontal section on the line 2-2 of Fig. 1.

Fig. 3 is a vertical section taken on the line 3-3 of Fig. 1.

Fig. 4 is a longitudinal section taken on the line 4-4 of Fig. 3.

Fig. 5 is a detail of one of the bridging rolls and the commutator segments and bus bar.

Fig. 6 is a diagrammatic view of the apparatus. Referring to the diagram, Fig. 6, the bus bars are designated 1 and 1a. The stationary electrodes 50 are carried upon the frame 51. Hydraulic or pneumatic cylinders 2 and 2a may be used to raise and lower the bus bars with the work W against the upper set of electrodes. The movement may be gentle so that there is no shock or wear on the electrodes.

The switching apparatus will be seen by viewing Fig. 1. It comprises a carriage or traveler nut 3 which is caused to move rectilinearly by the rotating screw 4 which is driven by the pulley wheel 5 and, in turn, is driven by an electric motor M. It will be seen that the two pulley wheels 5 and 6, that connect the motor and the screw shaft, are provided with graduated or reversed cone pulley wheels so that the belt can be shifted from one to the other to vary the speed of travel of the traveling nut 3.

This traveling nut 3 carries a roll which is a circuit bridging member. It successively bridges the numerous secondary circuits which are afforded by the numerous sets of electrodes and another roll bridges a control circuit for a timer each time a secondary switch is closed.

This bridging is accomplished in the secondary circuit by the large circuit bridging rolls 7 and 7a. Each one of these copper rolls bears against track 8 or 8a of commutator segments and a bus bar 9 or 9a. These commutator segments are

separated one from one another by suitable insulation. Each segment is connected by means of a bolt 10 with a large cable 11 which leads to a welding electrode 12. These bridging rolls are journaled on arms 13 and are pressed by springs 14 onto the commutator tracks and bus bars. It will be seen that every time the commutator rolls leave one pair of segments and encounter another pair of segments, they open and close respectively two pairs of branch secondary circuits. So far as the understanding is concerned, it would be simpler to have only one roll and one circuit closed each time. The machine that happens to be illustrated is a double one.

Referring to the diagrammatic view, Fig. 6, it will be seen that there is a pair of tracks 15 and 15a consisting of control circuit commutator segments separated by insulation 16. The segments 15, however, are all connected together electrically, as are segments 15a. In the center is a common bus bar 17. A pair of bridging rolls 18 and 18a connect together the control circuit commutator segments and the bus bar. Now, each one of these control circuit commutator segments represents a segment that companions a commutator segment on the secondary circuit tracks but is slightly shorter in length (compare the respective segments in Fig. 4). The control circuit segment is so placed that the circuit is closed slightly later than the secondary circuit through the companion commutator segment and the control circuit is opened slightly before the companion secondary circuit is opened (compare the position of the segments in Fig. 4).

Referring to Fig. 6 again, it will be seen that the single control circuit includes a solenoid 19 which controls the circuit breaking switch 20 which is in the primary circuit. Hence, each time the secondary bridging roll leaves a secondary segment, that segment is dead and, each time it touches the next segment, that segment is dead, so that there is no destructive arcing here because, when the secondary circuits are made and broken, they are dead circuits.

Referring to Fig. 3, it will be seen that the control circuit rolls and the control circuit tracks are carried on the cover 21 of the switch box, while the secondary tracks are carried on the side of the switch box. Referring to Fig. 1, it will be seen that the control circuit rolls 18 and 18a are carried on arms 22 and, referring to Fig. 4, it will be seen that these arms are spring-pressed towards the tracks by springs 23.

For purposes of illustration, the commutator

segments are shown with their faces vertical and attached to the side walls of the commutator box or casing. It may be preferable, in some cases, to locate the commutator segments so that they are suspended from the top or door of the box and turn the roll axes around 90-degrees. This will be better so far as collecting dust or other foreign particles that may separate the rolls from the segments and cause arcing.

I claim:

1. An electrical timer comprising a plurality of insulated secondary circuit segments arranged in a row, each segment arranged to be connected to an energy consuming device, a secondary circuit bus bar for connection to the secondary coil of a transformer and the said energy using devices, a plurality of spaced and insulated primary segments arranged in a row, the primary segments pairing with the secondary segments, a bus bar included in the same circuit with the primary segments, said primary segments associated with the energization of the primary coil of said transformer, and a circuit bridging member arranged to travel along the secondary segments and act as an electrical bridge between the same and the secondary bus bar and at the same time act as a primary circuit closing member by bridging the primary segments and the companion bus bar, the secondary circuit segments and the primary segments being so dimensioned and so located that the bridging member opens the primary circuit each time before it opens the secondary circuit as each pair of segments and bus bars is bridge by the said bridging member.

2. An electrical timer comprising a plurality of insulated secondary circuit segments arranged in a row, each segment arranged to be connected to an energy consuming device, a secondary circuit bus bar for connection to the secondary coil of a transformer and the said energy using devices, a plurality of spaced and insulated primary segments arranged in a row, the primary segments pairing with the secondary segments, a bus bar included in the same circuit with the primary segments, said primary segments associated with the energization of the primary coil of said transformer, and a circuit bridging member arranged to travel along the secondary segments and act as an electrical bridge between the same and the secondary bus bar and at the same time act as a primary circuit closing member by bridging the primary segments and the companion bus bar, the primary segmen' of

each pair being shorter than the secondary circuit segment and so located that the bridging member closes the secondary circuit first and opens the primary circuit first as each pair of segments and bus bars is bridged by the said bridging member.

3. The combination claimed in claim 1 in which the primary segments are part of a control circuit including a solenoid and in which the primary circuit has a switch opened and closed by said solenoid.

4. The combination claimed in claim 1 in which the bridging member comprises a pair of rolls which roll over the said segments and bus bars.

5. The combination claimed in claim 1 in which the bridging member is caused to travel along and over the segments and bus bars by means of a rotating screw and a traveling nut.

6. In combination, a plurality of energy using devices, an energized control circuit, a transformer having primary and secondary windings, a plurality of commutator segments having insulating spaces therebetween, a bus bar, a movable bridging means between the bus bar and segments, means for connecting each segment to an energy using device; means for connecting the bus bar to one side of the secondary winding, means for connecting the other side of the secondary winding to the energy using devices, a switch having an operating winding and contacts, said contacts adapted to connect the transformer primary to a source of a. c., a timer having a plurality of commutator segments corresponding in number to but shorter in length than and with insulating spaces longer in length than those of the first mentioned commutator segments, a second bus bar, a second bridging means between said second bus bar and second mentioned commutator segments, said second bus bar being connected to the control circuit, means for connecting an end of the winding of the switch to each of the second mentioned segments, means for connecting the other end of said winding of the switch to the control circuit, means for simultaneously moving both bridging means over their respective commutator segments whereby the secondary winding is successively first connected to the respective energy using device, then the primary winding is connected to the source as the bridging means are successively moved over the segments.

JOSEPH R. LEX.