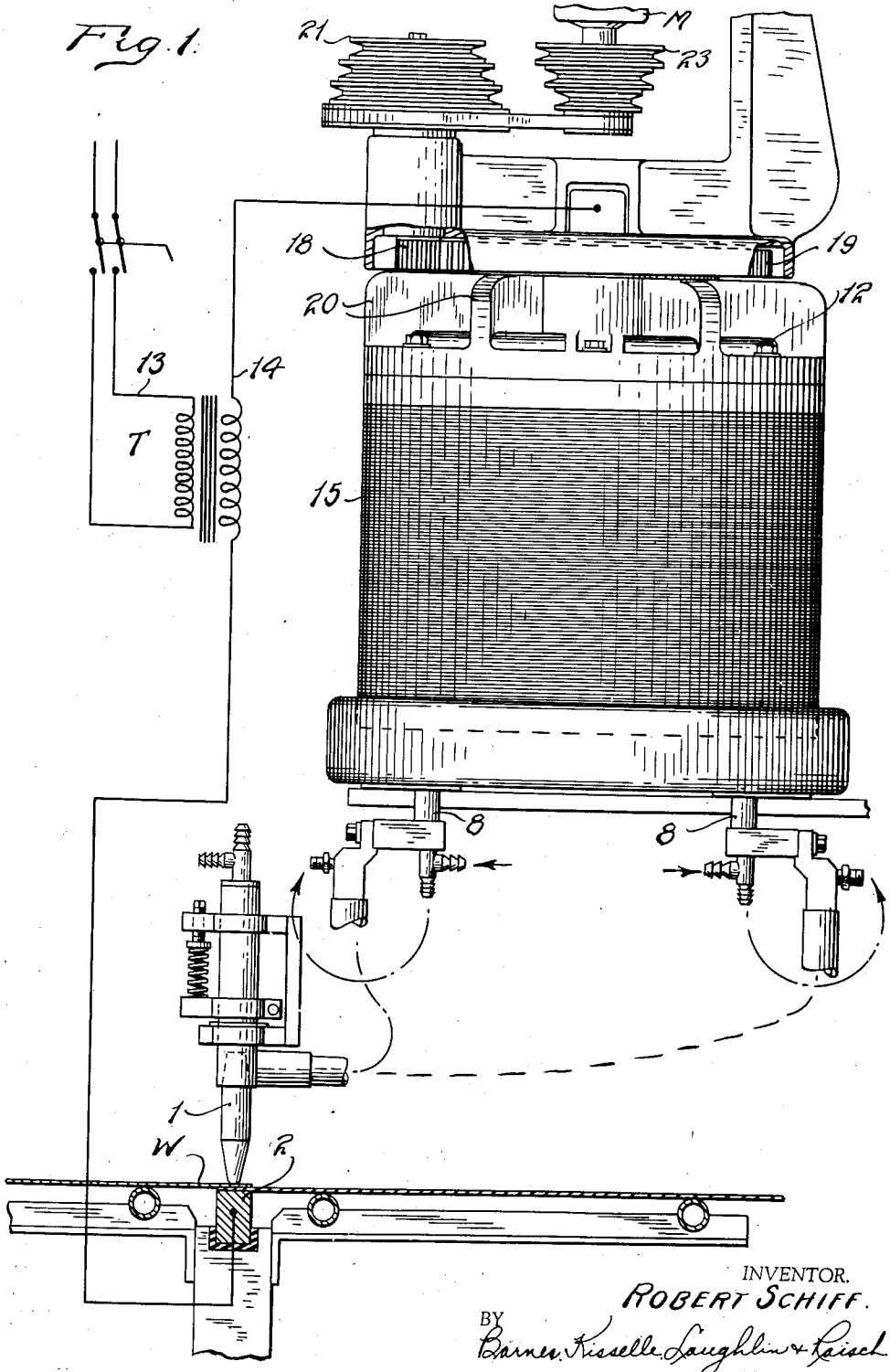
Oct. 13, 1942. R. SCHIFF 2,298,843

GANG SPOT WELDER

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Fig. 1.



INVENTOR.
ROBERT SCHIFF.

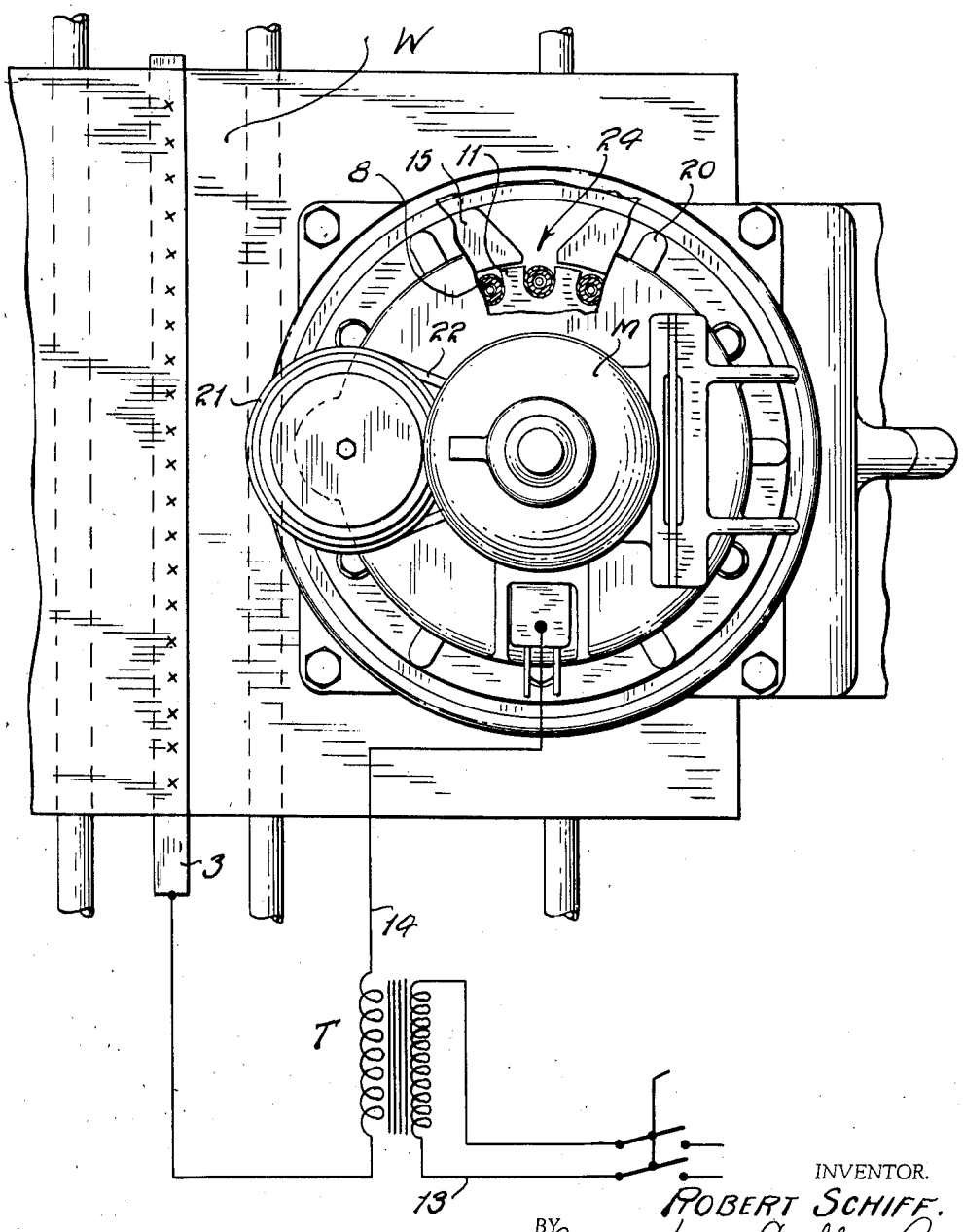
BY
Barnes, Kisselle, Laughlin & Raisch
ATTORNEYS.

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GANG SPOT WELDER

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Fig. 2.



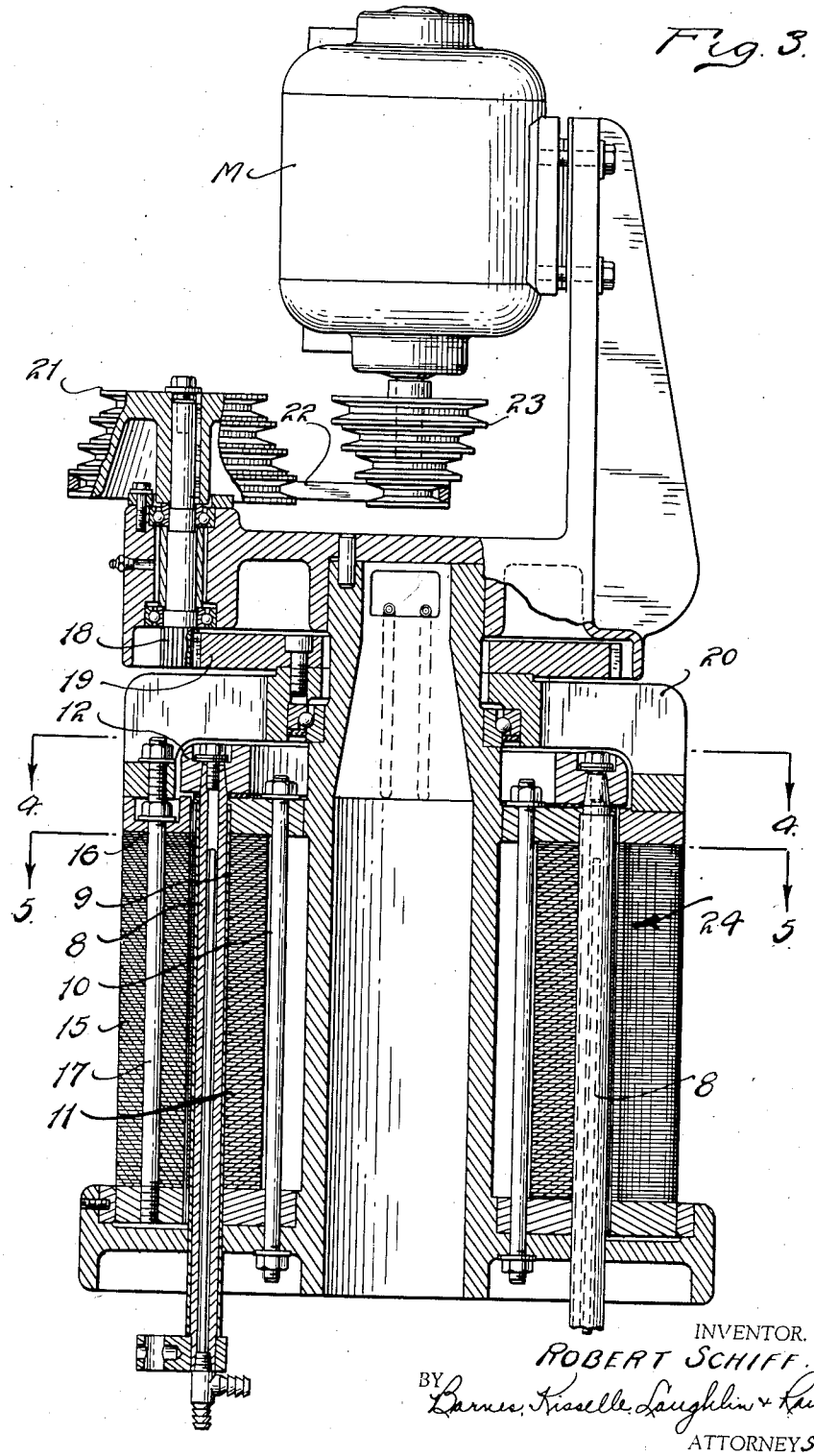
INVENTOR.
ROBERT SCHIFF.
BY Barnes, Kisselle, Laughlin & Raisch.
ATTORNEYS.

Oct. 13, 1942. R. SCHIFF 2,298,843

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Fig. 3.



INVENTOR.
ROBERT SCHIFF.
BY Barnes, Kisselle, Laughlin & Raisch
ATTORNEYS

Oct. 13, 1942. R. SCHIFF 2,298,843

GANG SPOT WELDER

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Fig. 4.

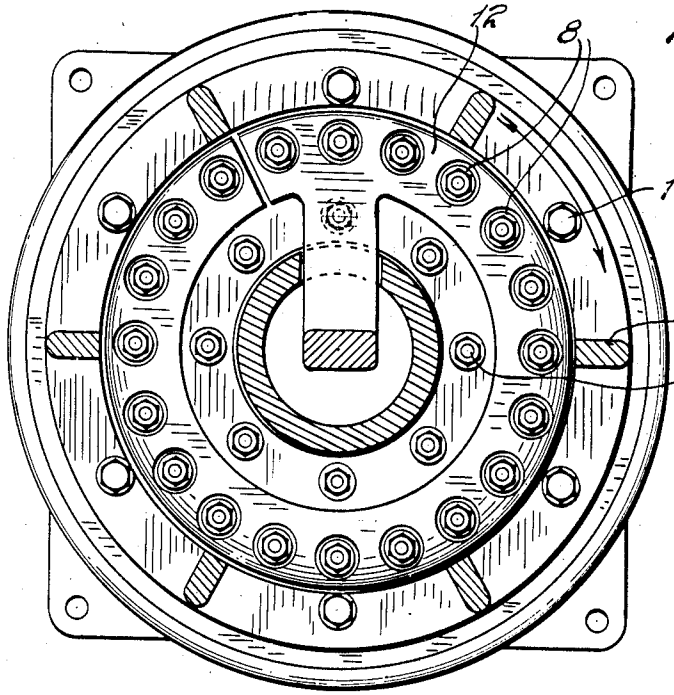
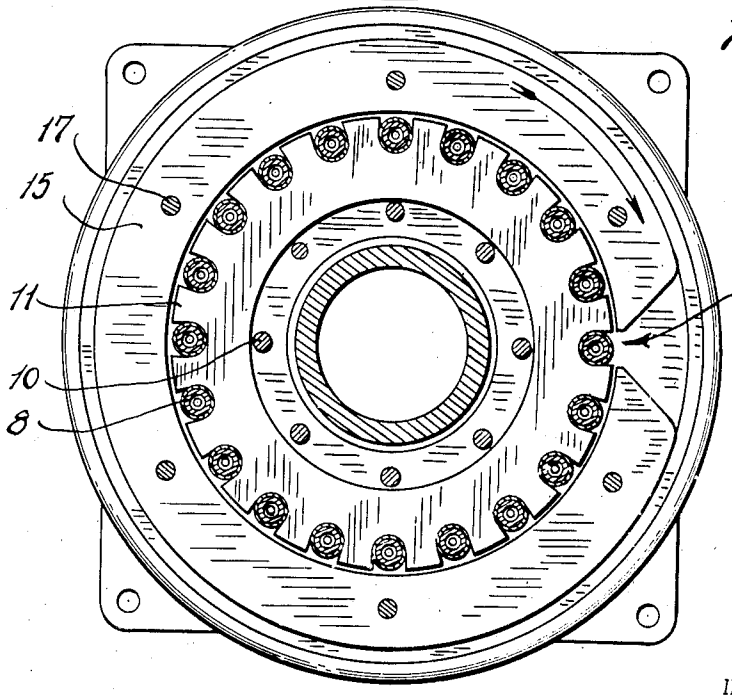


Fig. 5.



INVENTOR.
ROBERT SCHIFF.
BY Barnes, Kisselle, Raisch & Choate
ATTORNEYS.

Oct. 13, 1942. R. SCHIFF 2,298,843

GANG SPOT WELDER

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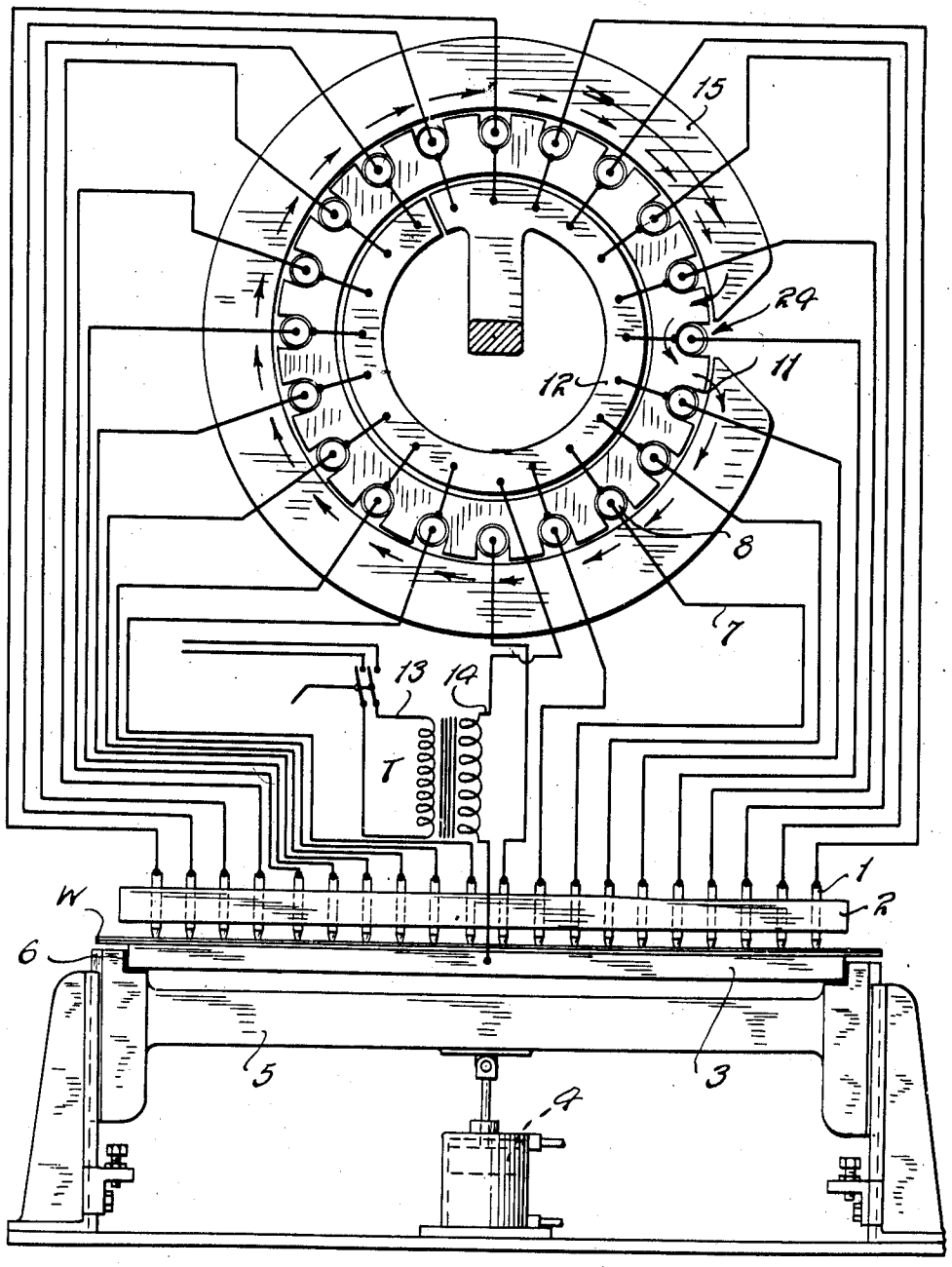


Fig. 6.

INVENTOR.
ROBERT SCHIFF.
BY Barnes, Kisselle, Laughlin & Raisel
ATTORNEYS.

Patented Oct. 13, 1942

2,298,843

UNITED STATES PATENT OFFICE

2,298,843

GANG SPOT WELDER

Robert Schiff, Detroit, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application October 12, 1939, Serial No. 299,166

8 Claims. (Cl. 171—242)

This invention relates to gang spot welding. It has been found desirable to have all the electrodes engage the work at one time so that they can be gently engaged with the work and the pounding of the electrodes eliminated. It has been the general practice in gang welders heretofore to bring each electrode successively into engagement with the work and then give it a shot of current. This has resulted in severe pounding of the electrodes and causes the electrode tips to prematurely wear.

Various methods and apparatus have been proposed for bringing all the electrodes into engagement with the work at one time and then distributing the current to the electrodes successively. This has been found to be quite a problem for the reason that the secondary current has a very large amperage and produces a very destructive arc. It has been proposed to eliminate this arc by interrupting the primary circuit each time the secondary is made and broken. But, some defects have been found even with this arrangement, due to the switches in the secondary circuit sometimes not making good contact because of dirt, or other reasons, and thereby producing arcs.

It is the object of the present invention to provide a gang welder with a distributor which wholly eliminates a mechanical switching system. The switching system involved in this invention is achieved by impeding all the secondary circuits at a given time except one which is left unimpeded and through which the current flows while so unimpeded. The impedance is moved successively over a group of secondary circuits so as to successively relieve the circuits one at a time from the impedance. This more fully appears in the description following.

In the drawings:

Fig. 1 is a view of the distributor and one of the welding electrodes showing the circuits diagrammatically.

Fig. 2 is a plan view of the same.

Fig. 3 is a vertical section of the distributor.

Figs. 4 and 5 are sections on the lines 4—4 and 5—5 of Fig. 3.

Fig. 6 is a diagrammatical showing of the apparatus.

Referring to Fig. 6: It will be seen that there are a plurality of electrodes 1 carried on a support 2. The work W is supported on an electrode table 3 which may be raised and lowered by the fluid piston 4. The electrode table is supported on a frame 5 and is insulated therefrom by the insulation 6. It will be seen that each one of the electrodes is connected by wiring 7 with the secondary cables 8. There may be any number of these. Twenty are shown in Fig. 6. These cables are provided with openings through the center for water cooling, as is customary with welding cables carrying large amperage currents. These secondary cables 8 are carried vertically in the laminated core 9 which has the laminations bolted together by the bolts 10. These laminations are provided with notches 11 into which the sections of the secondary or the cables 8 are located. Inside of the distributor is the main secondary conductor 12. Each of the electrodes is coupled with one of the twenty secondary circuits which are in parallel. 13 is the primary circuit and T the transformer which has the secondary coil 14 in the secondary circuit between the electrode table 3 and the secondary main conductor 12 from which branch out the numerous secondary circuits.

As stated above, the principle is to have a rotating core 15 of laminated metal. The laminations 16 are bolted together by the long bolts 17. The stationary core formed by the laminations 9 remains stationary while the outer rotating core 16 is rotated by means of the pinion 18 driving the large gear 19 which is bolted to the frame 20 that, in turn, is secured to the rotating core. This gear is driven by means of a pulley wheel 21 and a belt 22, pulley wheel 23 and motor M. These pulley wheels are of the step variety so that the belt may be shifted from one set of grooves to another set to change the speed. It will be noted from Fig. 3 that the ends of the cables 8 are bolted to the distributing main 12.

It is appreciated that it is not new to govern the flow of current through an electric circuit by the introduction or withdrawal of a laminated core which acts as an impedance. However, we believe it is new to rotate a laminated core with a gap 24 in proximity to a group of secondary circuits for the purpose of successively allowing shots of current to go through only one or a limited number of circuits and it is believed to be new to couple a distributor of this kind with a gang spot welder. The distributor acts both as a distributor and a timer, the timing being the length of time that it takes the gap to pass across the particular secondary cable section. There is no abrupt turning of the heat on and off which takes place with mechanical switches. There is a gradual increase of the heat to a maximum and a gradual decrease and, consequently, the welds are not calculated to burn the metal and leave scars and discolored portions which are undesir-

able in certain kinds of work connected with automobile bodies.

It is true that there will be a small amount of current wasted by reason of a certain amount going through all the electrodes. But, the great bulk of the current goes only through the electrode whose secondary section is opposite the gap in the rotor and there is not enough of the current going through the other secondary sections to do any welding. This current will simply heat up the metal preliminarily at the electrodes so that the energy is not entirely wasted. The amount of current that passes through the electrodes which are at the time inactive is not such that requires any material increasing of the capacity of the transformer.

This apparatus is cheap to build and has low maintenance costs.

What I claim is:

1. In a distributor, a plurality of electrical circuits, means for sending current through the circuits successively, comprising a moving impedance member having means to prevent or restrain the flow of current through all but selected load circuits at the moment.

2. In a distributor for a plurality of electrical circuits, means for delivering high amperage current to the said circuits successively, comprising a plurality of secondary circuit sections, a moving impedance member arranged to move across sections of the secondary circuits and having means to allow a full current to flow only to one or more circuits at one time but to successively energize the said circuits with current.

3. In a distributor for a plurality of electrical circuits, comprising a plurality of secondary circuit sections and means for distributing the current successively to said secondary circuits comprising a rotating impedance member provided with a gap arranged to successively move across the sections of the secondary circuits and allow the full current to pass only to the circuit having a section opposite the gap.

4. In a distributor for a plurality of electrical circuits, a stator made up of a plurality of laminations having notches in the periphery, secondary circuit sections one located in each notch and an impedance rotor comprising a plurality of laminations arranged to surround the stator and provided with a gap which successively registers with the notches and sections in the stator when the rotor is rotated to allow full current to pass to a selected circuit.

5. In a distributor for electrical circuits, the combination of a stator in the form of a circular member provided with notches in its periphery, a plurality of secondary circuit sections one located in each notch and a rotor surrounding the stator and forming an impedance member with a gap for successively registering with the secondary circuit sections as the rotor rotates with respect to the stator to cause successive energy charges to successive circuits.

6. In a distributor for electrical circuits, the combination of a plurality of circuit sections, a combined distributor and timer for delivering current to the circuits successively, comprising a moving impedance member successively passing over the said sections and having a non-impeding portion to allow successive charges of current to selected circuits as the non-impeding portion passes over the sections of the selected circuits.

7. In a distributor for a plurality of secondary circuits, a stator having a cylindrical core provided with a large number of notches around its periphery, a plurality of secondary circuits joined together in parallel and each circuit arranged for connection with a load device, each circuit having a section in a notch, a rotating ring of metal mounted around the periphery of the stator and provided with a gap, and means for rotating the ring at a uniform speed, the said ring impeding the flow of current through the secondary circuits except when the said gap registers with a section of a secondary circuit, the said rotating ring forming both a timer and a regulator of the flow of the currents through the secondary circuits.

8. In a distributor for a plurality of electric circuits, a stator made up of a stack of laminations bolted together to form a cylinder having notches around the periphery, a ring located on the top of said cylinder and forming a secondary main, a plurality of secondaries joined at their tops to said main and each having a section located in a notch of the stator, a rotor secured around the stator and comprising a stack of ring laminations of metal bolted together to form an impedance member, said laminations provided with registering gaps, and means for driving the ring at a uniform speed, the said rotor serving to impede the flow of the current through all the secondary circuits save the one with which the gaps register and thereby distribute the current to load devices served by the secondaries and also time the flow of the current to such load devices.

ROBERT SCHIFF.