H. S. COYER.

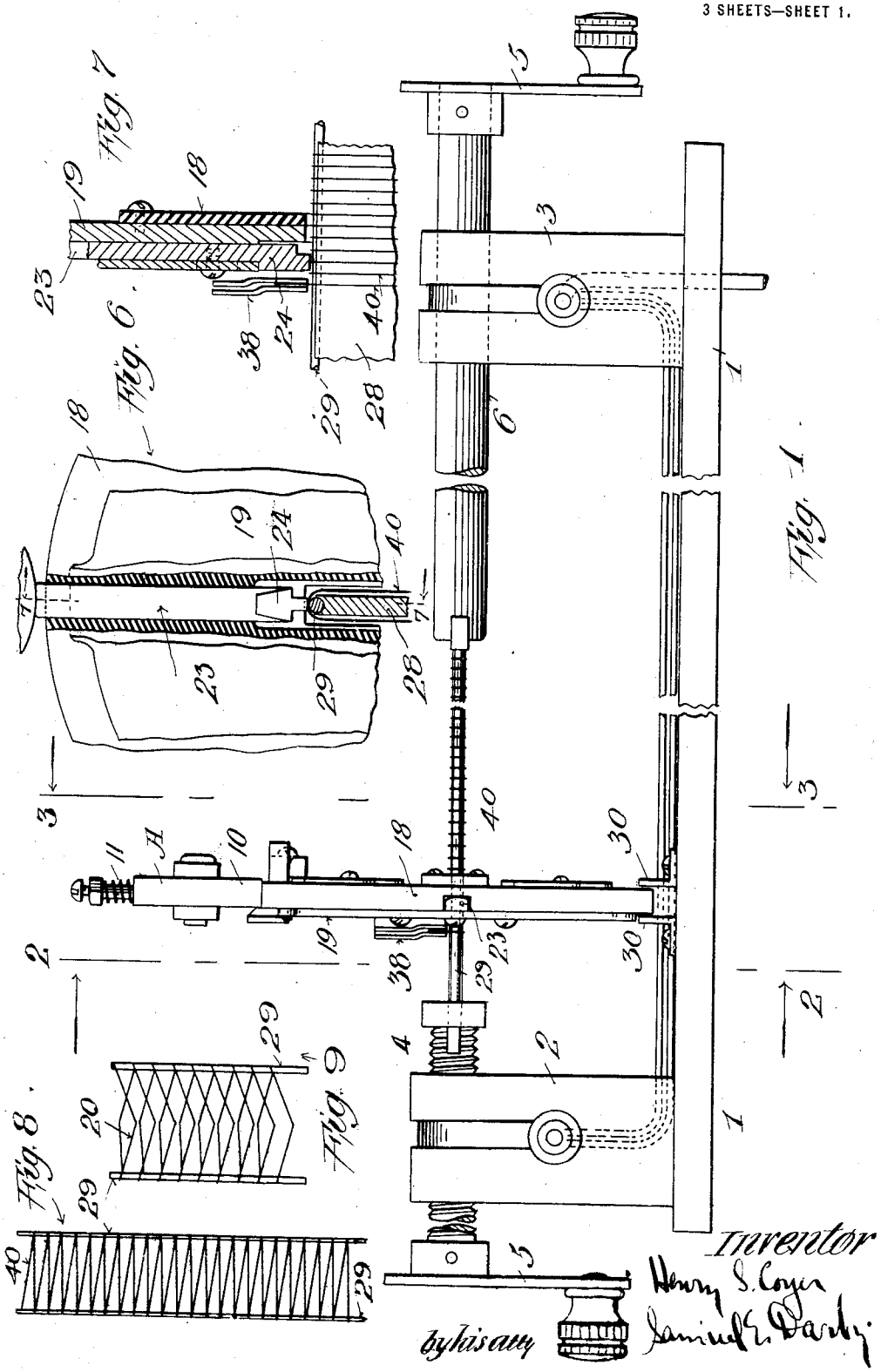
GRID MAKING MACHINE.

APPLICATION FILED MAY 7, 1918.

1,305,690.

Patented June 3, 1919.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

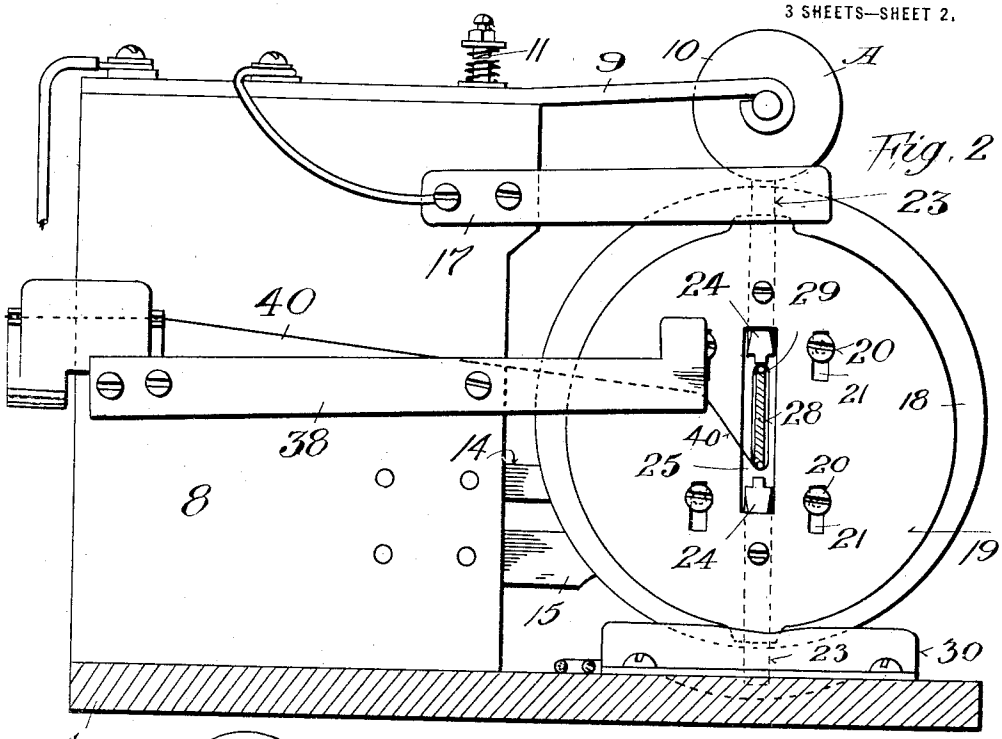


Fig. 2.

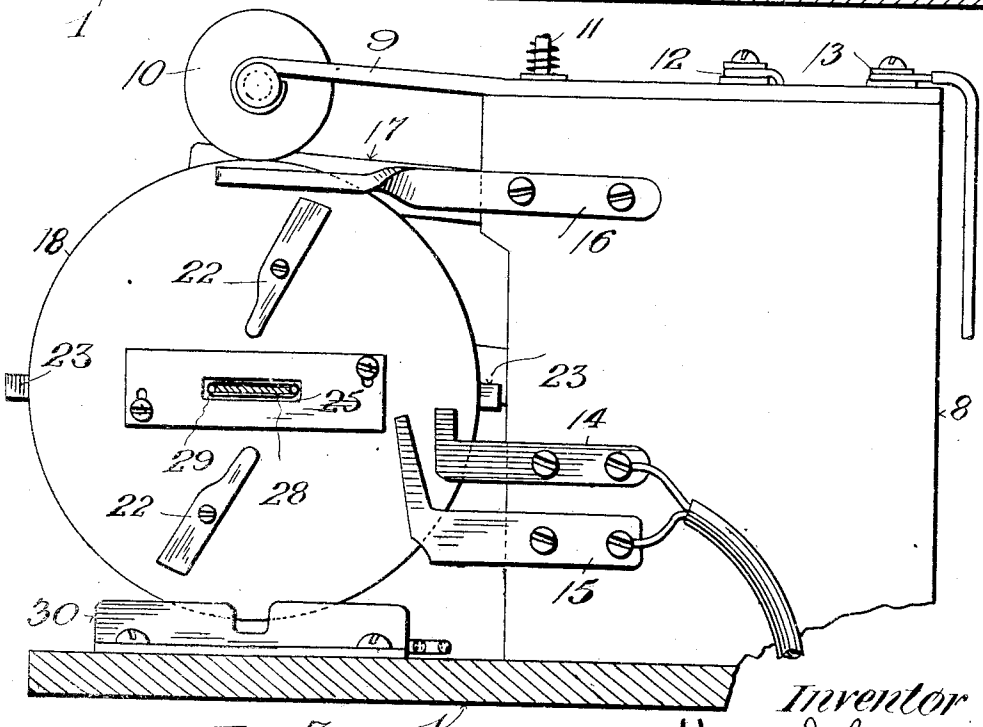


Fig. 3.

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by his atty Samuel E. Darby

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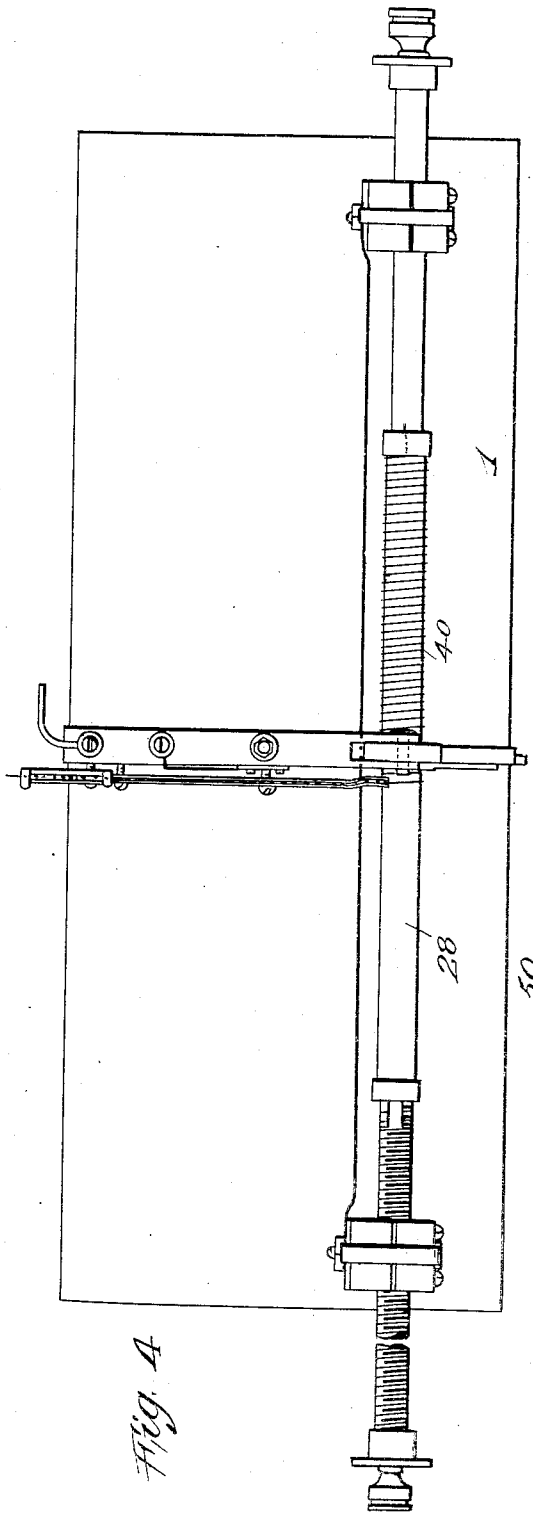


Fig. 4

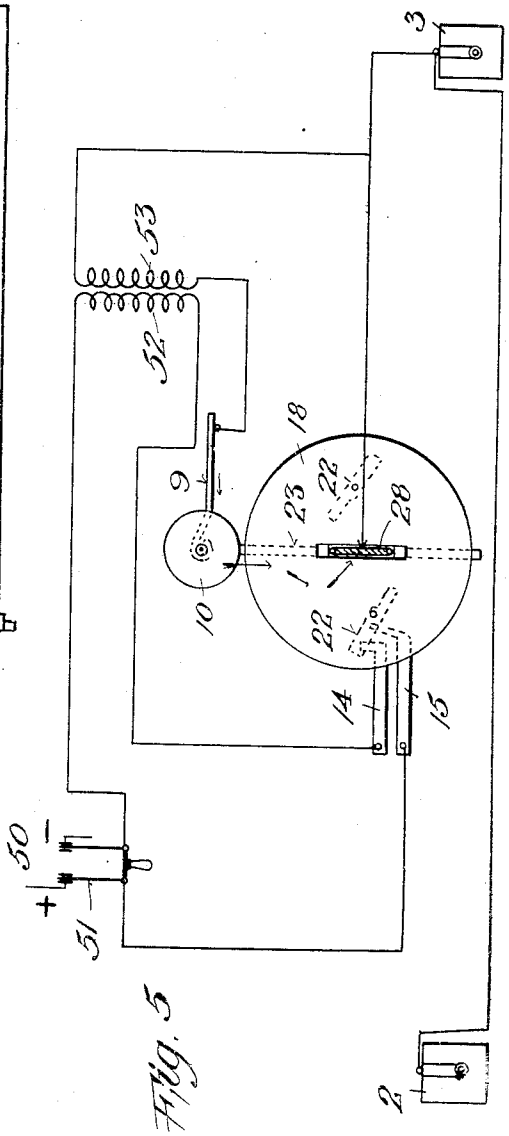


Fig. 5

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UNITED STATES PATENT OFFICE.

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GRID-MAKING MACHINE.

1,305,690. Specification of Letters Patent. Patented June 3, 1919.

Application filed May 7, 1918. Serial No. 233,004.

To all whom it may concern:

Be it known that I, HENRY S. COYER, a citizen of the United States, residing at New York, in the county and State of New York, have made a certain new and useful Invention in Grid-Making Machines, of which the following is a specification.

This invention relates to grid making machines.

The object of the invention is to provide a grid making machine which is simple in structure, efficient in operation, and economical of manufacture.

A further object of the invention is to provide a machine for automatically winding a wire around two separated supporting posts.

A further object of the invention is to provide a machine of the character described which will weld the wire on each of the supporting posts coincidently with winding the same thereon.

Further objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location, and relative arrangement of parts, all as will be more fully hereinafter set forth as shown by the accompanying drawings and finally pointed out in the appended claims.

Referring to the drawings:—

Figure 1 is a view in front elevation of a grid making machine embodying my invention.

Fig. 2 is a sectional view taken on the line 2, 2, Fig. 1, and looking in the direction of the arrows.

Fig. 3 is a similar view taken on the line 3, 3, Fig. 1, and looking in the direction of the arrows.

Fig. 4 is a top plan view of the construction shown in Fig. 1.

Fig. 5 is a diagrammatic view showing wiring connections employed in accordance with my invention.

Fig. 6 is an enlarged detail view partly in section of the welding mechanism employed in accordance with my invention.

Fig. 7 is a vertical sectional view of the same taken on the line 7, 7, Fig. 6, looking in the direction of the arrows.

Fig. 8 is a detail view of the product secured in accordance with my invention.

Fig. 9 is a similar view of one type of product now in commercial use.

The same part is designated by the same reference character wherever it occurs throughout the several views.

It is among the special purposes of my present invention to provide a machine which will form a grid shaped member composed of a continuous wire wound around at a constant pitch to spaced supporting bars of any desired length. In accordance with my invention to render the grid structure a permanent one I also provide means for automatically welding the wire to the respective supports around which the same is wound where the wire comes in contact therewith. Thus it will be seen that I am enabled to produce a rigid strong grid structure which is permanent in the rest of the position of the wire which forms the grid structure, thereby securing a strong efficient grid structure suitable for all classes of work where a grid structure possessing these characteristics is desired. The fact that each turn of the wire is welded to the respective supporting arms at the points of contact therewith makes the grid structure of my invention particularly adaptable for use in electrical work, for example, as the grid electrode of the well known De Forest audion, and while for the purpose of an illustration of a specific use of a grid structure embodying my invention I show in Fig. 9 such a grid electrode of an audion capable of application in an audion bulb structure, I wish it to be understood that I do not desire to be limited or restricted to this specific use which the product of my invention is especially adapted for, nor do I wish it to be understood that my machine is to be used solely and exclusively for the purpose of production of grid electrodes.

Referring to the drawings: I show at 1 a base provided with a journal 2 and 3 at its respective ends, the journal 2 is provided with an interiorly threaded passage through which a threaded member 4 passes actuated in any suitable manner, for example, by means of the handle 5. The journal 3 may be likewise constructed with an interior thread, or, and as shown, it may be provided with merely a smooth bore to support a shaft 6 therein to allow the shaft 6 to operate freely therethrough, and the shaft 6 may likewise be provided with a handle 5, if desired, for a purpose which will be more fully

hereinafter set forth. The base 1 also carries a vertical supporting member 8, the top of which supporting member carries an overhanging arm 9 at one end of which is mounted a roller 10. The arm 9 is in the form of a spring arm, and, if desired, and as shown, it may be maintained adjustably with a constant downward pressure in any suitable manner, for example, by means of the spring arrangement indicated generally at 11. Thus an upward pressure on the roller 10 will cause the roller 10 to move upwardly against the action of the spring device 11, and when the upward pressure on the roller 10 is removed the roller will assume its normal position. The vertical support 8 also carries at its top circuit terminals 12 and 13, and on one side thereof separate circuit terminals 14 and 15, which terminals 14 and 15 are in the form of contacts or brushes, as will be more fully hereinafter described. The opposite sides of the vertical support 8 have secured thereto guide arms 16 and 17 to form a channel through which a roller indicated generally at 18 rotates. The roller 18 is of any suitable material, preferably non-conducting, with a conducting plate 19 adjustably secured thereto by means of set screws 20 resting in slots 21 cut in the conducting plate. The opposite side of the roller 18 is provided with two current conducting strips 22 located diametrically opposite each other and so arranged that the rotation of the roller 18 will cause one of the bridging contacts 22 to establish circuit connection between the terminal brushes 14, 15, for each half revolution of the roller 18. The roller 18 is also provided with radially extending lugs 23 located diametrically opposite to each other as shown. These diametrically oppositely located lugs as shown best in Fig. 6 are in the form of elongated pins extending through a groove or hole provided therefor in the body of the roller 18, and are provided at their innermost ends with what I will term a welding head 24. The plate 19 and the roller 18 are provided with a rectilinear slot 25 passing through the center thereof with the longitudinal axis of the slot forming a continuation of the longitudinal axes of the lugs 23. The respective ends of the shafts 4 and 6 hereinbefore described are provided with notches with which to engage the ends of a rectangularly shaped supporting bar 28, the opposite edges of which bar are provided with grooves within which to receive small bar members 29 of any desired or suitable length. This bar 28 with its bar members 29 positioned thereon as indicated in the drawings, particularly in Figs. 1 and 7, passes through the longitudinal slot 25 in the roller 18 and its plate 19 and forms a bearing for the same so that the roller 18 will rotate with the bar 28 about the axis of the bar, as will readily be apparent. In addition to the guide members 16 and 17 carried by vertical support 8 a guide formed by angle strips indicated at 30 may be also provided for the bottom of the roller 18, which angle strips are supported by the base 1 as clearly shown. The pins or lugs 23 are movable in the bore provided therefor in the roller 18 and are of such length that when the free end of one of the lugs or pins 23 is positioned vertically extending radially upward the welding head 24 of the opposite pin or lug 23 will be out of contact with the lower end of the bar member 28 and its small rod 29 as clearly shown in Fig. 2. One face of the vertical support 8 is also provided with an arm 38 which forms a guide for a wire 40 which is delivered thereto from any suitable source such as an endless spool or the like, not shown.

Referring to Fig. 5 of the drawings wherein is shown the electrical circuit of the machine diagrammatically laid out in connection with certain parts of the machine current is tapped from the source of supply indicated at 50 and controlled as is usual by means of the switch 51, one terminal of which is connected to one end of the primary coil 52 of the transformer, the other end of the coil being connected to the contacting brush 14 carried on the roller 18. The opposite terminal of the source 50, or the switch 51, as the case may be, is connected to the contacting brush or terminal 15. Thus it will be seen that on each half revolution of the roller 18 a bridging conductor 22 will momentarily establish circuit connection between brushes 14 and 15 thereby completing the circuit between primary 52 of the transformer. This, of course, induces current in the secondary 53 of the transformer which is connected in circuit as follows, one terminal is connected to the top circuit 9 and consequently to roller 10, which roller is of any suitable conducting material, for example, brass. The other terminal of the secondary coil 53 is connected to the journals 2 and 3 and through them to the rectangular bar 28 and consequently its supporting rods 29 and the wire 40 wound therearound. From the foregoing the operation of the device will be readily understood and is as follows:—The handle 5 is rotated causing the shaft 4 to move according to the pitch of the threads thereof in its journal 2, the wire 40, of course, having been secured to the bar 28, and it being assumed that the bar 28 with its rods 29 located in the oppositely located groove of the bar has been assembled in the respective ends of the shafts 4 and 6 as hereinbefore described and passing through the center of the roller 18. It will be seen that the bar 28 being rotated and moving toward the right from the position shown in Fig. 1 the distance of the thread of the shaft 4 will

have wound therearound the wire 40 at a constant pitch. When, however, the slot 25 in the roller 18 has reached its vertical position the pin or lug 23 comes in contact with the roller 10 forcing the same upwardly against its spring action normally tending to cause the same to remain in its normal downward position, that is, in normal contact with the periphery of the roller 18 as shown in Fig. 3. This causes the pin 23 to be forced downwardly with the welding head 24 pressed against the wire 40 where the same lies over the rod 29. At the same time a bridging contactor 22 establishes communication between the two brushes 14 and 15 thereby completing the circuit of the primary coil 52 of the transformer, inducing current in the secondary coil 53 of the transformer, which current flows through the roller 10 down the pin 23 to the welding head 24 through the wire 40, rod 29, bar 28, to either or both of the journals 2 or 3 to the opposite side of the secondary coil 53 of the transformer. Thus it will be seen the welding circuit has been completed, and the necessary pressure for a proper welding has been secured by means of the spring 9 and roller 10. It will be apparent that this operation is repeated for each half revolution of the roller 18 throughout the length of the bar 28 and rods 29 employed. It will be apparent that by merely changing the pitch of the teeth of the shaft 4 any desired pitch of grid structure will be obtained. As soon as the entire feed has been completed either one or both of the shafts 4 or 6 may be retracted and the bar 28 with its grid structure thereon removed whereupon the grid structure itself may be readily slipped from over the bar 28 and a complete grid structure of any suitable or desired length is secured, which grid structure may be cut up into any required or desired lengths. It is also apparent that while I have shown either one or both of the shafts 4 and 6 as provided with a handle for hand operation that the same may be actuated from any suitable power source, and inasmuch as the operation of the device depends entirely upon completion of the electric circuit simultaneously secured at a predetermined position of the roller 18, it is obvious that constant speed of rotation of either shaft 4 or 6, or both of them, is not essential. Many other changes and modifications will readily occur to those skilled in the art, and in consequence I do not desire to be limited or restricted to any specific detail or construction herein described, as the same has been employed solely for the purpose of illustration of the principles of my invention, therefore having set forth the objects and nature of my invention, and having shown and described one structure embodying the principles thereof, what I claim as new and useful and of my own invention and desire to secure by Letters Patent, is:—

1. In a machine of the character described, means for winding a wire around spaced supports to form a grid structure, and means for welding said wire to said supports.

2. In a machine of the character described, means for winding a wire around spaced supports to form a grid structure, and means for simultaneously welding said wire to said supports.

3. In a machine of the class described, means for supporting a plurality of spaced supports, and means for winding a wire around said spaced supports, and means for simultaneously welding said wire to said supports.

4. The combination with a support, means for winding a wire around said support, and means for simultaneously welding said wire to said support.

5. The combination with a support, means for feeding a wire to said support, means for rotating said support and simultaneously advancing the same in one direction whereby said wire is wound therearound at a constant pitch, and means for welding said wire to said support.

6. The combination with a support, means for feeding a wire to said support, means for rotating said support and simultaneously advancing the same in one direction whereby said wire is wound therearound at a constant pitch, and means for simultaneously welding said wire to said support.

7. The combination with spaced supports, and means for supporting the same, means for rotating said spaced supports as a unit and simultaneously advancing the same, means for feeding a wire to said spaced supports whereby when said spaced supports are rotated as a unit and advanced, said wire winds therearound, and means controlled by the rotation of said supports for welding said wire thereto.

8. The combination with a wire winding device, of a welding device, and means controlled by said wire winding device for operating said welding device.

9. The combination with a wire winding device, of an electric welding device, an electric circuit for said welding device, and means controlled by said winding device, for controlling said circuit.

10. The combination with a wire winding device, of an electric welding device, a normally open electric circuit for said welding device, and means controlled by said winding device for closing said circuit.

11. The combination with a wire winding device, of an electric welding device, a normally open electric circuit for said welding device, and means controlled by said wind-

ing device for momentarily closing said circuit and again opening the same.

12. The combination with a welding device, of a wire winding device, and means actuated by said wire winding device for actuating said welding device at predetermined intervals.

13. The combination with an electric welding device, and a normally open circuit therefor, of a wire winding device, and means actuated by said wire winding device for momentarily closing said circuit at predetermined intervals.

14. The combination with spaced journals, of means for supporting therebetween spaced supports, means for rotating said spaced supports and simultaneously moving the same longitudinally, a plate mounted around said supports to rotate therewith, means for feeding wire to said supports whereby upon the rotation and longitudinal movement thereof said wire is wound thereabout, and means actuated by the rotation of said plate for subjecting said wire at the point of contact with said supports to pressure and heat.

15. In a device of the character described, and in combination with a wire winding device, of a welding device including a normally open circuited primary coil and a normally open circuited secondary coil, and means controlled by the operation of said wire winding device for momentarily closing the circuit of both of said coils.

In testimony whereof I have hereunto set my hand on this 30th day of April, A. D., 1918.

HENRY SYLVESTER COYER.