E. THOMSON.

TRANSFORMER SECONDARY.

APPLICATION FILED AUG. 5, 1909.

1,003,547.

Patented Sept. 19, 1911.

2 SHEETS—SHEET 1.

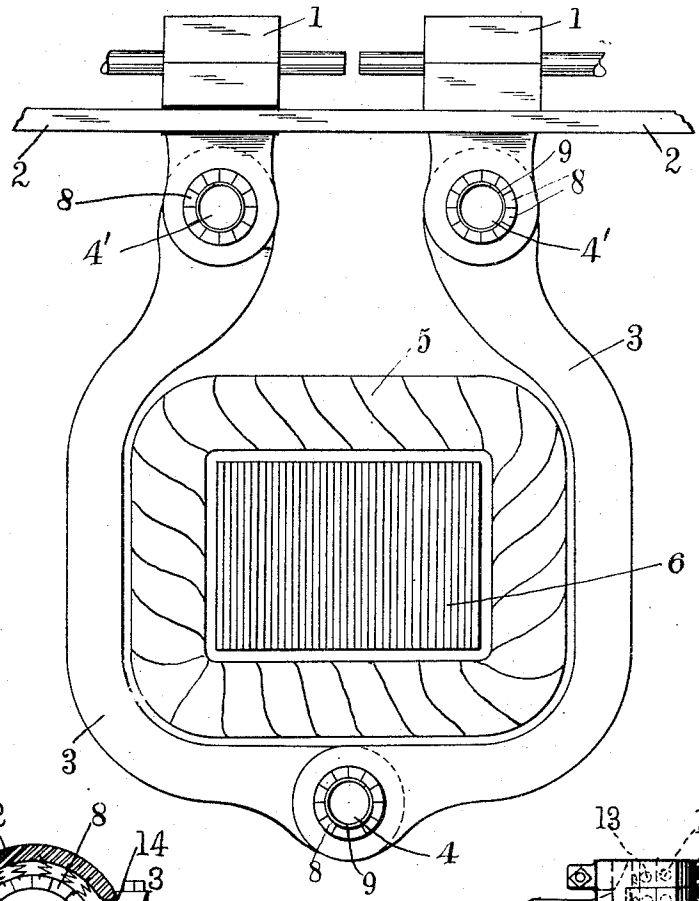

Fig. 1.

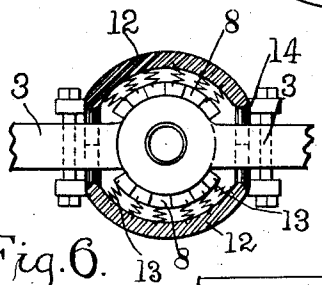

Fig. 6.

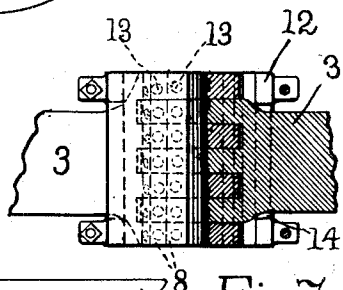

Fig. 7.

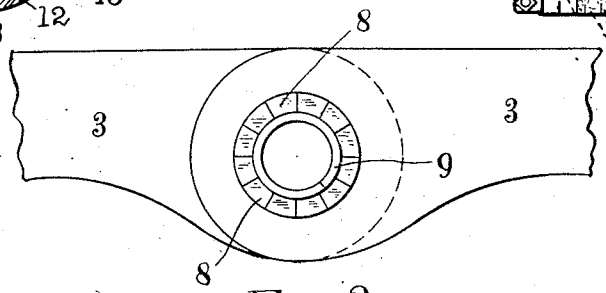

Fig. 2.

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2 SHEETS—SHEET 2.

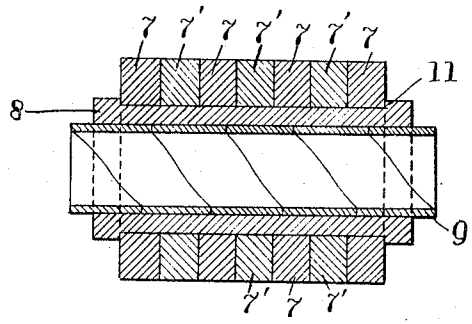

Fig. 3.

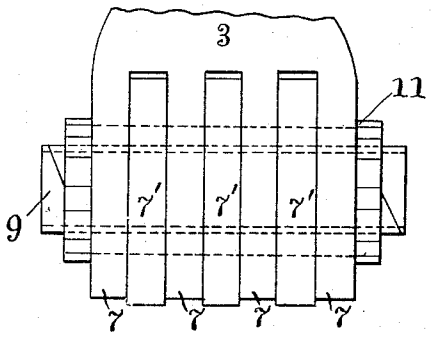

Fig. 4.

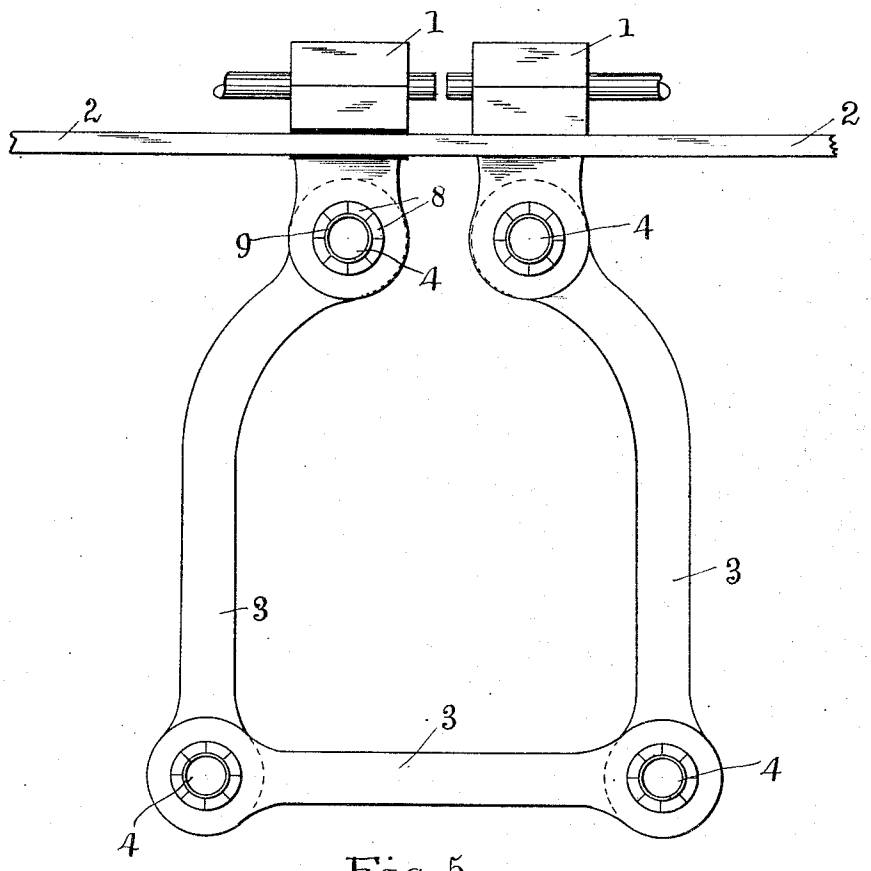

Fig. 5.

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UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THOMSON ELECTRIC WELDING COMPANY, OF LYNN, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

TRANSFORMER-SECONDARY.

1,003,547. Specification of Letters Patent. Patented Sept. 19, 1911.

Application filed August 5, 1909. Serial No. 511,279.

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of Swampscott, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Transformer-Secondaries, of which the following is a specification.

My invention relates primarily to the construction of that class of electric metal working apparatus in which the work-holders or work-engaging electrodes or jaws derive the work-heating current from the secondary of a transformer.

The principal object of the invention is to permit free movement of the work-holders or jaws with relation to one another while maintaining the electrical connection with the secondary or other source of current and without employing sliding connections such as have heretofore been used.

To these ends my invention consists in a novel construction of a hinged joint by which portions of the bar or mass of metal forming the secondary are hinged or jointed to one another, and briefly stated, consists of a joint which in its general construction is the same as a knuckle joint having a number of knuckles on each member combined with conducting bars or rods spanning or bridging the two members, and spring-pressed against the same so as to form good rubbing electrical contact therewith and to thereby electrically connect or couple knuckles of the opposite members respectively of the joint. Said coupling or bridging bars may bear against either interior surfaces of said knuckles or exterior surfaces thereof. In the preferred construction however, the bars are of segmental form and constitute part of the pintle or pin upon which the members turn. In this case said bars comprise a conducting tube sub-divided longitudinally into segmental portions, and the divided tube is provided with means for expanding it to cause its individual members to press outwardly against the tubular members of the joint.

My invention consists also in the details of construction of the joint for securing good conductivity and for properly coupling the two members that are to be jointed together, as hereinafter particularly described and then specified in the claims.

The invention consists also in the combination of work-guides or welding jaw guided in line guides or rigid ways, hinged transformer secondary and intermediate hinge, as hereinafter more particularly described and then specified in the claims.

In the accompanying drawings, Figure 1 is a general side elevation of welding transformer secondary embodying my invention and shows the same as combined with work-holders and line guides in a manner also forming a novel combination invented by me. Fig. 2 is an enlarged end view of my improved joint. Fig. 3 is a longitudinal vertical section through the joint. Fig. 4 is a side view of the joint. Fig. 5 is a modification in the construction of the apparatus. Fig. 6 is an end view of a modified form of joint in which the spring-pressed bars or rods electrically coupling the knuckles of the opposite members are arranged on the exterior of the knuckles. Fig. 7 is a plan view in part section of the form of joint shown in Fig. 6, the parts within the cage or shell employed being shown in dotted lines.

Referring to Fig. 1, the work-holders or electrodes which engage and supply current to the work and which may be of any desired form or description are indicated at 1. Said work-holders or electrodes are attached to or form a part of suitable platens or base pieces working in suitable rigid guides or ways in a table or guide plate 2 as usual in the art. 3 indicates the secondary of a transformer, said secondary being composed of sections or pieces of a copper bar or casting jointed to one another at 4 by the novel construction of conducting joint hereinafter described. 5 is the primary of the transformer and 6 the usual laminated core. The jointing or hinging at 4 permits the parts of the secondary to turn so as to allow movement of the work-holders or electrodes to and from one another in the metal working operation. To assist in the free movement and avoid binding of the platens in their rigid guides I interpose between the secondary bar and the work-holders other joints as indicated at 4′, which couple the end of the secondary bar or portion of bar 3 with an extension from the work-holder or platen thereof extending downwardly as indicated. In the joint itself each member is provided

with a number of tubular projections or knuckles as in the form of joint known as the knuckle joint, the projections of one member being interlaced or interposed in the openings between the knuckles or projections of the other member. The knuckles of one member are marked 7 and those of the other member 7'. They are formed upon the sections of conductor 3 which are to be hinged together and the tubular openings through which the pintle passes form smooth and true conducting surfaces of the same internal diameter. A multiple connection of the two parts 3 of conducting bar with one another through the joint is provided by a bar or bars 8 extending longitudinally through the joint and pressed outwardly so as to engage by a properly fitted surface with the interior of the tubular members of the joint. Any number of such connecting bars may be employed. I preferably, however, use for such bars, the sub-divisions of a tube of copper or other good conducting material extending through the joint like the ordinary pintle, as clearly shown in the drawings, each subdivision then constituting a segmental bar 8. Within the said sub-divided tube are located proper means for expanding the same so as to cause the bars themselves to be pressed outwardly into engagement with the interior surfaces of the knuckles. For this purpose a coiled spring 9 of flat steel may be employed. Each segment 8 being closely fitted to the interior surfaces of the knuckle and being independently movable outward, the result is a high conductivity in the joint with at the same time a comparative freedom of movement. To properly interlock the parts while at the same time permitting the free outward movement of the segments independently of one another, the ends of said segments or of the tube which they compose may each be provided with a slight shoulder as indicated at 11.

It would obviously be within my invention to use other forms of conducting bar spanning the knuckle members of opposite portions of the joint and to use any number of such bars but the best results will obviously be obtained when the curved surfaces of the segmental bar are fitted to the curve of the tubular knuckles. It is also obvious that it is not necessary to use a joint 4' for more than one of the work-holders, since in the usual construction of apparatus provision is made for moving only one of said work-holders. It is also obvious that any number of joints 4 might be provided in the length of the whole secondary bar 3, thus for instance, two such joints might be used at the base of the secondary bar as I have indicated in Fig. 5.

While I show the use of a coiled spring of flat steel for pressing the sub-divided pintle or the members thereof outwardly any other device suitable for expanding said tubular pintle or pressing each member thereof outwardly would be within my invention.

In the modification shown in Figs. 6 and 7 the bars or rods 8 are arranged upon the exterior knuckle and are held in place by a shell or cage 12 of proper construction surrounding the whole. This case or shell is shown in cross-section in Fig. 6. The bars are spring-pressed against the exterior knuckle by means of the coiled springs 13 interposed between the shell and the bars as clearly shown. Openings at 14 in the side of the shell allow the required limited movement of the two members 3 which turn upon one another by means of the joint and form a part of the electrical circuit.

What I claim as my invention is:

1. A conducting joint consisting of a knuckle joint combined with conducting bars or rods spring-pressed against the knuckle portions to form rubbing electrical connection therewith and electrically bridge knuckles of the opposite members.

2. The combination with a knuckle joint of a bridging bar or rod spanning or bridging the knuckles of opposite members and spring-pressed against the curved surface thereof as and for the purpose described.

3. A conducting joint consisting of a knuckle joint combined with spring-pressed bars or rods contained within and pressing outwardly against the knuckles to bridge and electrically couple the same.

4. A knuckle joint having the knuckles of opposite members spanned or bridged by a piece of conducting material spring-pressed against them.

5. A knuckle joint having a multiplicity of knuckles and a pintle portion for said joint embodying a conducting bar and a spring engaging said bar and pressing the same outwardly against the knuckles of the two joint members.

6. A conducting knuckle joint having a pintle portion comprising a conducting tube sub-divided longitudinally into segments adapted to be pressed outwardly independently of one another against the tubular members of the joint.

7. In an electrical conducting hinge of the knuckle joint pattern, a pintle consisting of a metal tube sub-divided longitudinally and a spring acting to expand the tube.

8. An electrical conducting hinge of the knuckle joint pattern having a tubular pintle sub-divided longitudinally into segmental bars and an expansion spring within said pintle.

9. In a conducting hinge of the knuckle joint pattern, a pintle sub-divided longitudinally and combined with an internal expanding coiled spring.

10. In a conducting hinge of the knuckle joint pattern, the combination of bars or

rods extending through the knuckles of the opposite members and a spring expanding tube within said bars.

11. In a conducting hinge of the knuckle joint pattern, the combination of a sectional tubular pintle and an interior spring expanding tube.

12. In a conducting hinge, a sectional tubular pintle and a spring pressing the sections outwardly independently of one another.

13. In a conducting hinge, a sectional tubular pintle and a spring pressing the sections outwardly independently of one another.

14. In a metal working apparatus, the combination of work-holders or electrodes mounted on rigid guides, transformer secondary made in parts hinged to one another by conducting hinges and conducting hinges connecting the work-holders to hinged portions of the secondary.

15. The combination of a work-holder and rigid guides therefor, a transformer having a secondary embodying a hinged bar and a conducting hinge between said bar and the work-holder.

16. In an electric metal working apparatus, a work-holder provided with rigid guides and having an extension hinged to a conducting bar hinged to another bar forming the path of the currents fed to the work.

17. In an electric metal working apparatus, the combination of a work-holder and a secondary consisting of bars hinged to one another, one of said bars being connected by a hinged joint with the work-holder.

Signed at Lynn in the county of Essex and State of Massachusetts this 28th day of July A. D. 1909.

ELIHU THOMSON.

Witnesses:

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ROBERT SHAND.