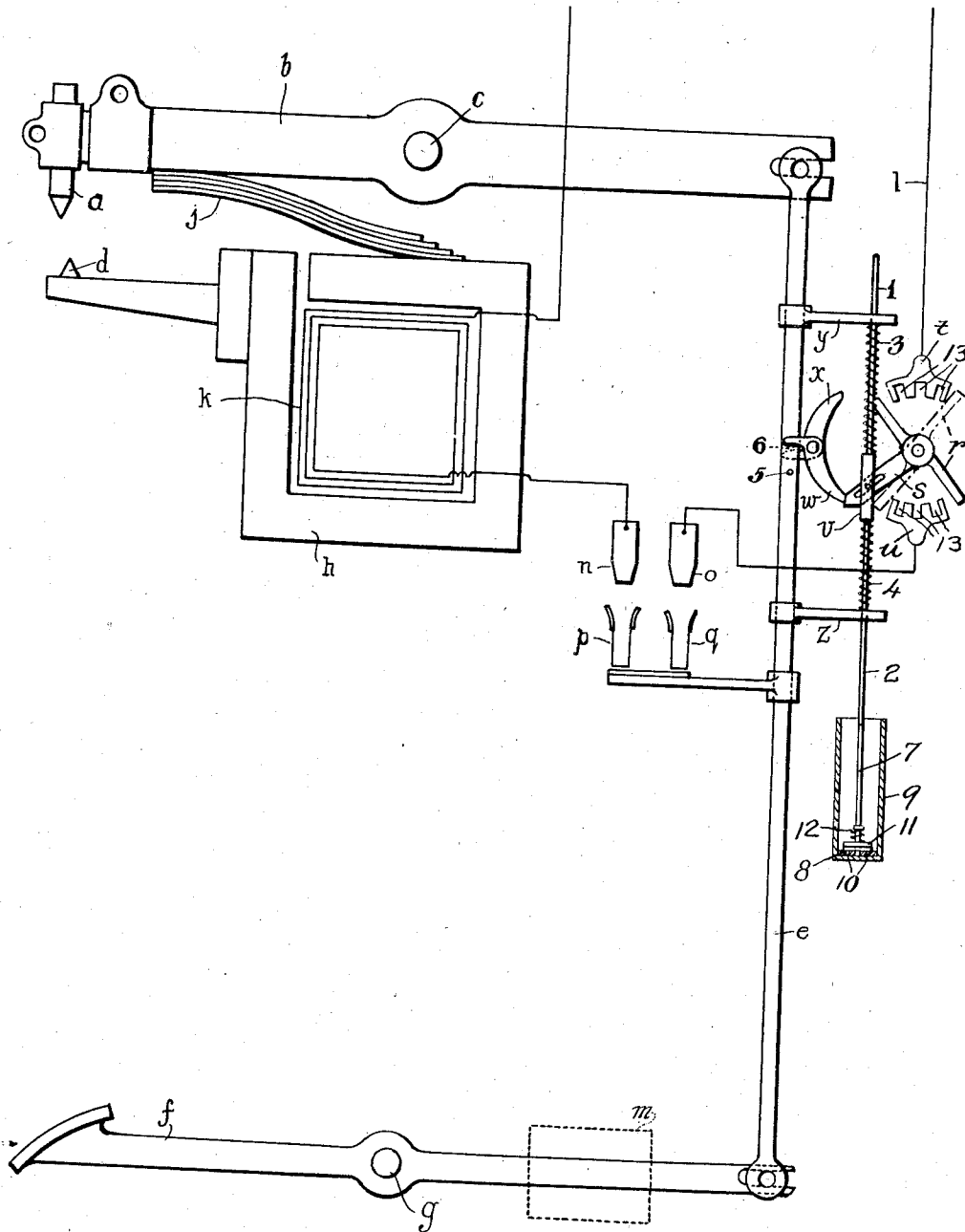


W. H. ISHERWOOD AND W. H. TURNER.
ELECTRIC WELDING APPARATUS.
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Inventors
William Herbert Isherwood
and
William Herbert Turner
per
Herbert Septon Jones
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM HERBERT ISHERWOOD, OF FAR HEADINGLEY, LEEDS, AND WILLIAM
HERBERT TURNER, OF LEEDS, ENGLAND.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, WILLIAM HERBERT ISHERWOOD, a subject of the King of Great Britain, residing at Gaythorpe Road, Far Headingley, Leeds, Yorkshire, England, and WILLIAM HERBERT TURNER, a subject of the King of Great Britain, residing at 575 Meanwood road, Leeds, Yorkshire, England, have invented new and useful Improvements in or Relating to Electric Welding Apparatus, of which the following is a specification.

Our invention relates to improvement in hand or foot operated apparatus for electric contact welding, especially for the operation known as "spot welding." Hitherto in this kind of apparatus the current is supplied to the primary winding of the welding transformer through a hand or foot-operated switch controlled by the operator, and especially in the case of thin plates or strips, considerable skill and judgment is necessary to produce a satisfactory weld while avoiding injurious excess of current.

Our invention comprises mechanism whereby the period during which current is supplied is pre-determined, adjustable for various kinds of work, and independent of the operator.

If the tripping switch makes a suitable number of contacts, direct current may be supplied to the primary winding of the transformer instead of the alternating current hitherto used. The E. M. F. is set up in the secondary winding owing to the interruption of the primary circuit by the tripping switch.

In the accompanying drawings, the invention is illustrated diagrammatically. The upper electrode *a* is carried by the arm *b* rocking about the pivot *c* and brought into contact with the work or the fixed lower electrode *d* by means of the connecting rod *e* operated by the pedal lever *f* pivoted at *g*. The electrode *a* is connected to one end of the secondary winding *h* of the transformer by the flexible connection *j*. The fixed electrode *d* is carried by a bracket making electrical connection with the other end of the secondary winding *h*. The primary winding *k* of the transformer is connected to the supply mains *l, n* through the tripping switch described below, and through a usual form of switch operated by the treadle *f*. This switch is shown as having two fixed

knife contacts *n, o* which are embraced by the spring contacts *p, q* when the latter are raised by the pedal *f*.

The tripping switch provided according to the present invention consists of a double switch blade *r* with an arm *s* projecting therefrom at right angles. The upper and lower ends of the arm *r* are adapted to sweep across fixed contacts *t, u*, respectively. The arm *s* passes through a stirrup *v* and is engaged at its rear end by one of two pawls *w, x*. The connecting rod *e* has fixed to it two laterally projecting brackets *y, z*, and these brackets serve to guide two rods 1, 2, fixed to the stirrup *v*. Each of these rods is encircled by a compression spring 3, 4.

In operation suppose the work is placed between the electrodes *a, d*, and the pedal *f* is depressed. The switch *n o p q* is then closed but not before the electrodes are in contact with the work. This is arranged by a spring device operated by the rod *e* not shown in the drawing. At this stage no current passes because the primary circuit is interrupted between the contacts *t, u*. Spring 4 however, becomes compressed but cannot operate the switch *r* owing to the pawl *w*. However, a pin 5 projecting forwardly from the rod *e* ultimately pushes up the tail of the pawl *w* and allows the switch to be operated. The arm *r* then passes into the dotted position shown in the drawing, during this movement closing the primary circuit for a predetermined time. The switch is locked in the dotted position by the pawl *x*.

When the treadle *f* is released the top electrode *a* is raised and the switch *n o p q* is opened by the downward movement of rod *e*, as the parts resume their normal position (by the action of the counterweight *m*) and at the same time spring 3 is compressed. After switch *n o p q* is opened, a pin 6 projecting from back of rod *e* depresses the tail of pawl *x* and releases the switch blade *r* which under the influence of spring 3 returns into the full line position ready for a further operation.

The duration of contact can be varied by means of a dashpot 9 within which is situated a piston 8 having holes 10 and a valve 11, closed during the upward stroke of the piston 8 by the operation of spring 12 thus retarding the motion of piston 8, extension 7 of rod 2, and the movement of lever *S*

and switch blade R. On the downward stroke of rod 2 and piston 8, the valve 11 lifts and permits movement free from retardation of the attached parts.

5 The blade R however may be varied in width for this purpose or the same effect may be obtained otherwise.

By arranging the arm R to make and break one or more contacts, in succession, 10 which may be effected by providing spaces 13 in the portion of contacts T and U over which the arm R passes, the impulses of direct current which may by this means be admitted to the primary winding K can enable sufficient E. M. F. to be induced in the 15 secondary winding to effect the weld in certain cases.

Electric welding machines have been designed in which the movements of the welder 20 mechanism, the control of the electrical current and in some cases the manipulation of the work to be welded have been effected by power mechanism and the duration of the flow of current has been dependent upon 25 the driving speed, and out of the control of the operator. Moreover, electric welding machines have also been designed, the operation of which is effected by electromagnetic means and the duration of current flow determined by a wattmeter relay, so that equal 30 heating effect is obtained by passing equal amounts of electrical energy through each weld.

Our invention relates exclusively to foot 35 or hand-operated spot welders and we make no claim to mechanically or electrically operated machines.

What we claim is:—

1. In foot or hand-operated electric spot-welding apparatus, means for predetermin- 40 ing the duration of current supply independently of the action of the levers which control the articles to be welded, comprising in combination a primary electric circuit, a secondary circuit, switch contacts adapted 45 to make and break the primary circuit, a tripping switch adapted to make and break the same circuit, and retarding mechanism for rendering the action of the tripping switch adjustable to give the duration of 50 current flow suited to the work to be welded.

2. In foot or hand operated electric spot welding apparatus, means for controlling the supply of welding current independently of the operator, comprising a lever, an up- 55 right bar in operative connection with said lever, contacts supported on said bar adapted to make and break the primary current circuit, a tripping switch adapted to make and break the same circuit, guide rods adapt- 60 ed to control the motion of the tripping switch; and a pair of pawls in operative contact with the upright bar and adapted to control the opening and closing of the switch. 65

In testimony whereof we sign our names to this specification in the presence of two subscribing witnesses.

WILLIAM HERBERT ISHERWOOD.
WILLIAM HERBERT TURNER.

Witnesses:

EDITH M. HOPPER,
R. WHEATLEY.