Aug. 17, 1943. D. C. HOLAND ET AL 2,326,944

TESTER TRAINER

Filed Feb. 10, 1942 2 Sheets-Sheet 1

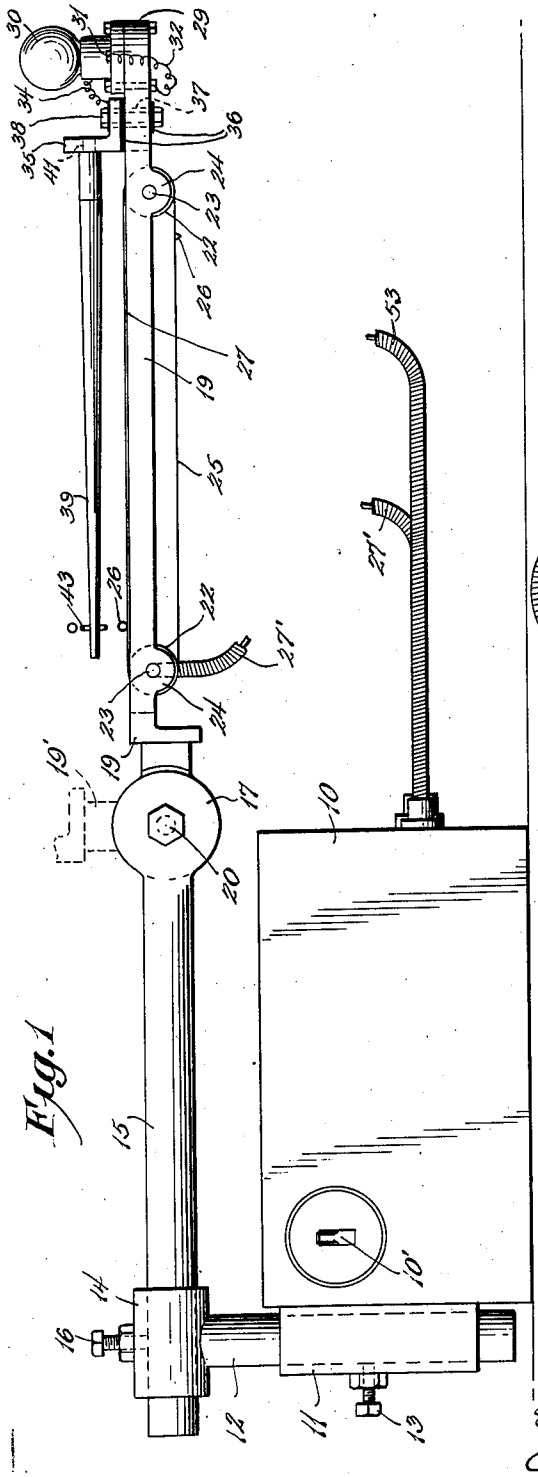


Fig. 1

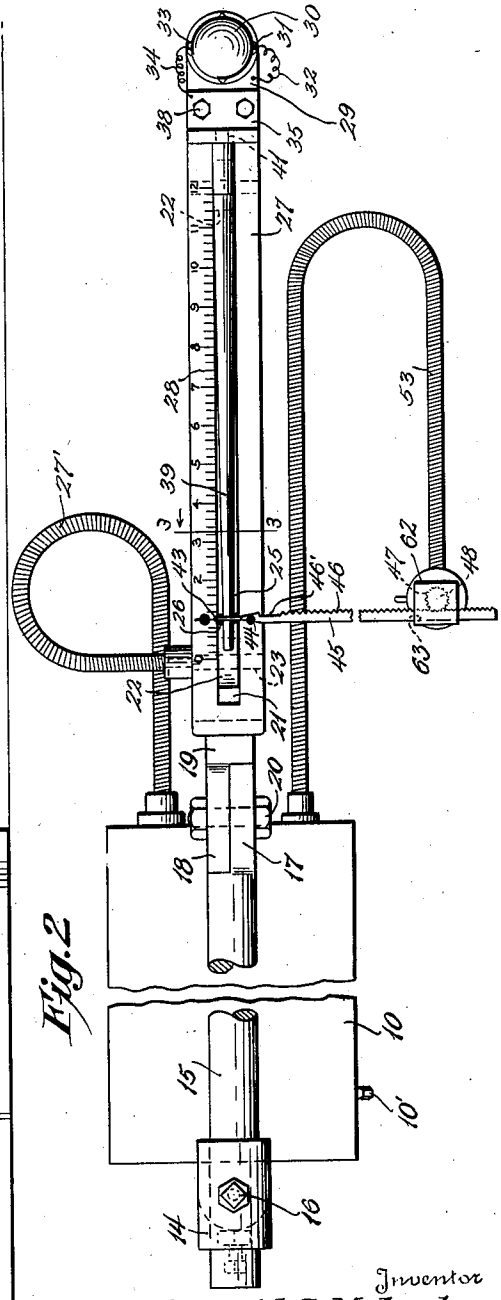


Fig. 2

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Filed Feb. 10, 1942 2 Sheets-Sheet 2

Fig. 3

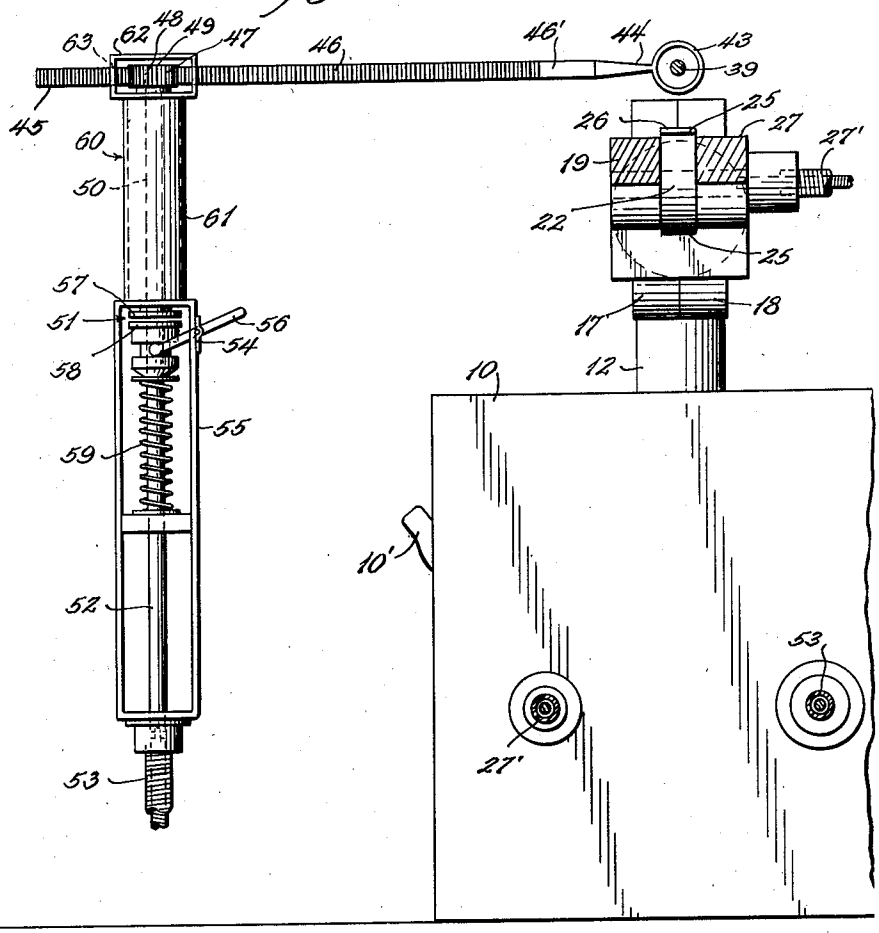


Fig. 4

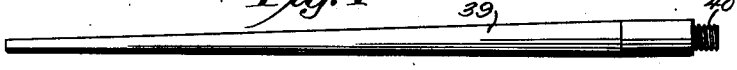
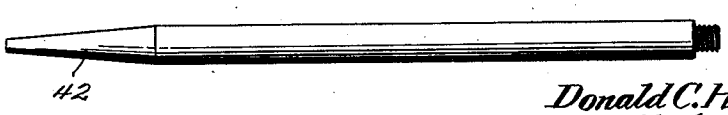


Fig. 5



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TESTER TRAINER

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Application February 10, 1942, Serial No. 430,308

11 Claims. (Cl. 35—1)

This invention relates generally to welding and more particularly to the provision of apparatus, both simple in construction and efficient in operation, intended for testing and training in welding, especially arc welding, where, in view of use being made of an electrode continually burning away, it is necessary to maintain not only an even movement in the horizontal or longitudinal direction of the weld but also an even "down" movement of the electrode with respect to the weld.

Our invention, adapted for testing and training in such "lengthwise" and "down" movements, furnishes means for measuring the ability to coordinate the mind and the movement of the arm in such a way as to maintain the end of the electrode at a constantly even distance from the metal being welded.

Various other objects and advantages of this invention will be obvious from the following particular description of an embodiment of our invention.

The various features of novelty which characterize our invention are pointed out with particularity in the claims, annexed to and forming a part of this specification, but for a better understanding of the invention, however, its advantages and specific objects attained with its use, reference should be had to the accompanying drawings and descriptive matter in which we have illustrated and described the best form of our invention.

Of the drawings:

Fig. 1 is a side elevation of part of our apparatus.

Fig. 2 is a plan view thereof.

Fig. 3 is a partially sectional view on the line 3—3 in Fig. 2 looking in the direction of the arrow.

Fig. 4 is a side elevation of one form of rod for use in our apparatus.

Fig. 5 is a side elevation of a modified form of rod for use in our apparatus.

Referring to the drawings, a case 10 serves not only as a support for part of our apparatus, hereinafter described, but also as a housing for electric motor, transformer, reducing gears, etc. (not shown) for operating such apparatus, the motor being controlled by switch 10'.

Rigidly secured to the case 10 is a sleeve 11 in which fits rod 12 slidable longitudinally and rotatably therein, and releasably clamped in adjusted position by set screw 13.

Rigidly secured, in turn, on the upper end of rod 12 is a sleeve 14 in which fits rod 15 slidable longitudinally and rotatably therein and releasably clamped in adjusted position by set screw 16.

The rod 15 has its outer or free end 17 reduced in thickness to cooperate with an end 18, similarly reduced in thickness, of arm 19 to provide an elbow or hinge joint to permit arm 19 to be swung about hinge pin 20 into a dotted-line position 19'.

Extending vertically completely through, and preferably located centrally in, the arm 19 is a slot 21, of a length terminating short of the ends of such arm and of a width to permit rotation freely therein of pulleys 22, journalled in bearings 23, preferably ball bearings, mounted in lugs 24 on such arm, so as to permit the endless steel tape 25, with red indicator pyramid 26 mounted thereon, carried by such pulleys to lie at or slightly above the upper face level 27 of arm 19.

For moving the endless tape at the desired speed, one of the pulleys carrying the tape is driven by a flexible shaft 27' connected to the motor in case 10.

Along one edge of the slot 21, the face of the arm has marked thereon a scale 28 extending between points opposite bearings 23 of the pulleys 22 which are mounted adjacent opposite ends of the slot.

Mounted on the free end 29 of the arm 19 is an electric lamp 30, having one terminal grounded, 31, through wrie 32 to arm 19 to the case 10 and the other terminal 33 connected through wire 34 to bracket 35, insulated by plates 36 and bushings 37 from arm 19 and clamping bolts 38, respectively, and thence to tapered rod 39 having a threaded end 40 detachably fitting a hole 41 in such bracket.

Instead of being gradually tapered throughout its length as shown in Figs. 1 and 4, the rod may be of uniform diameter throughout its length except for a tapered end portion 42, as shown in Fig. 5, or the rod may be of uniform diameter throughout its entire length.

For movement over the rod 39, a ring 43 is mounted on the tapered free end 44 of a simulated electrode bar 45, preferably case-hardened, provided with teeth 46, throughout the length thereof, except for a short space 46' where the teeth are removed, to mesh with the teeth 47 of a gear 48 secured rotatably to the end 49 of a spindle 50 driven through a clutch 51 by a spindle 52 rotatable by a flexible shaft 53 operatively connected to the motor in case 10.

Obviously, the length, diameter and taper, if any, may be varied in the rods provided for interchangeable use as desired, and also the elec-

trode rings may be made of circular or oblong or any other shape or size than that shown in the drawings.

Projecting through the wall **54** of a case **55** housing the clutch **51**, is a lever **56** for holding disengaged, when desired, the clutch plates **57** and **58** which, mounted respectively on adjacent ends of spindles **50** and **52**, are urged into engagement by coil spring **59** surrounding shaft **52**.

Extending from, and secured to, an end of case **55** is a case **60** comprising a main section **61** surrounding spindle **50** and a terminal section **62** which, enclosing the gear **48**, has its walls formed with squared openings **63** to non-rotatably receive the electrode bar **45** slidable therethrough under the "rack and pinion" relation of such electrode bar and gear.

In use, the case **10** is set at any convenient location, the supporting rods **12** and **15** clamped in adjusted position, and the arm **19** swung about pivot **20** so as to extend at the height and angle desired, corresponding to various welding positions.

In operation, the speed of the flexible shaft **53** is preferably adjusted, through use of gears and motor control, so as to cause the electrode rod **45** to recede at the same rate of movement as does an electrode in actual welding, and such speed may be varied to account for varying sizes and kinds of electrodes used in actual welding oprations.

In operation, likewise, the speed of the flexible shaft **27'** is preferably adjusted, through use of gears and motor control, so as to cause the red pyramid **26** on endless tape **25** to move at a rate corresponding to the desired travel in the direction of a weld in an actual welding operation, and such movement of the type may, of course, be varied so as to properly represent various welding situations.

With the "receding electrode" and endless tape set in operation by power transmitted through flexible shafts from the electric motor synchronized by gears for proper speed, the electrode ring is passed over the rod at the pace set by the moving pyramid until, on the scale **28**, a point is noted where the ring contacts the rod, thereby completing the circuit and lighting the lamp, such point on the scale thus indicating how far the ring passed before contacting the rod, thereby serving as a measure or "score" of steadiness of movement in all directions.

The teeth are removed near tapered end **44** to provide a toothless space **46'** so that when the electrode is wasted that far, the gear will not continue to draw it farther.

We claim:

1. Means for testing and training in welding comprising a simulated electrode member, a rod, and a ring mounted on said electrode member for passing over said rod to produce a signal when said ring contacts said rod.

2. Means for testing and training in welding comprising a simulated electrode member, a rod, a ring mounted on said electrode member for movement over said rod to produce a signal when said ring contacts said rod, and an endless tape indicator movable adjacent said rod for indicating the desired speed of movement of said ring over said rod.

3. Means for testing and training in welding comprising a simulated electrode member, a rod, a handle for supporting said electrode member, a ring mounted on said electrode member for movement over said rod to produce a signal when said ring contacts said rod, and means for varying the distance between said ring and said handle.

4. In apparatus of the character described, the combination of a simulated electrode member supported by a handle, a rod, a ring mounted on said electrode member for movement over said rod, means for varying the distance between said ring and said handle while moving said ring over said rod, and an indicator movable adjacent said rod for indicating the desired speed of movement of said ring over said rod.

5. In apparatus of the character described, the combination of a simulated electrode member, a rod, a ring mounted on said electrode member for passing over said rod, and means for indicating when said ring contacts said rod.

6. In apparatus of the character described, the combination of a simulated electrode member, a rod, a ring mounted on said electrode member for movement over said rod, a handle for said electrode member and means for varying the distance between said ring and said handle, said means comprising teeth on said electrode for meshing with a gear driven through a flexible shaft by an electric motor.

7. Means for testing and training in welding comprising a rod and a simulated electrode member formed with spaced portions adapted to receive the rod therebetween to produce a signal when any of said portions contacts said rod.

8. In apparatus for testing steadiness of hand, the combination of two relatively movable elements, one of said elements comprising a rod-like member and the other element having portions spaced apart greater than the diameter of the other element, signal means operated by any contact between such two elements, whereby said other element can be received within said first-mentioned element and any contact between said first and second elements will produce a signal.

9. Means for testing and training in welding comprising a simulated electrode member, a rod, a ring mounted on said electrode member for movement over said rod to produce a signal when said ring contacts said rod, and a movable indicator adjacent said rod for indicating the desired speed of movement of said ring over said rod.

10. In apparatus of the character described, the combination of a simulated electrode member, a support for said electrode member, a rod, said electrode member being formed with spaced portions adapted to receive said rod therebetween to produce a signal when any of said portions contacts said rod, means for varying the distance between said spaced portions and said support, and a movable indicator for indicating the desired speed of movement of said ring over said rod.

11. In apparatus of the character described, the combination of a rod, a simulated electrode member formed with spaced portions adapted to receive the rod therebetween, and means for indicating when any of said spaced portions contacts said rod.

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