

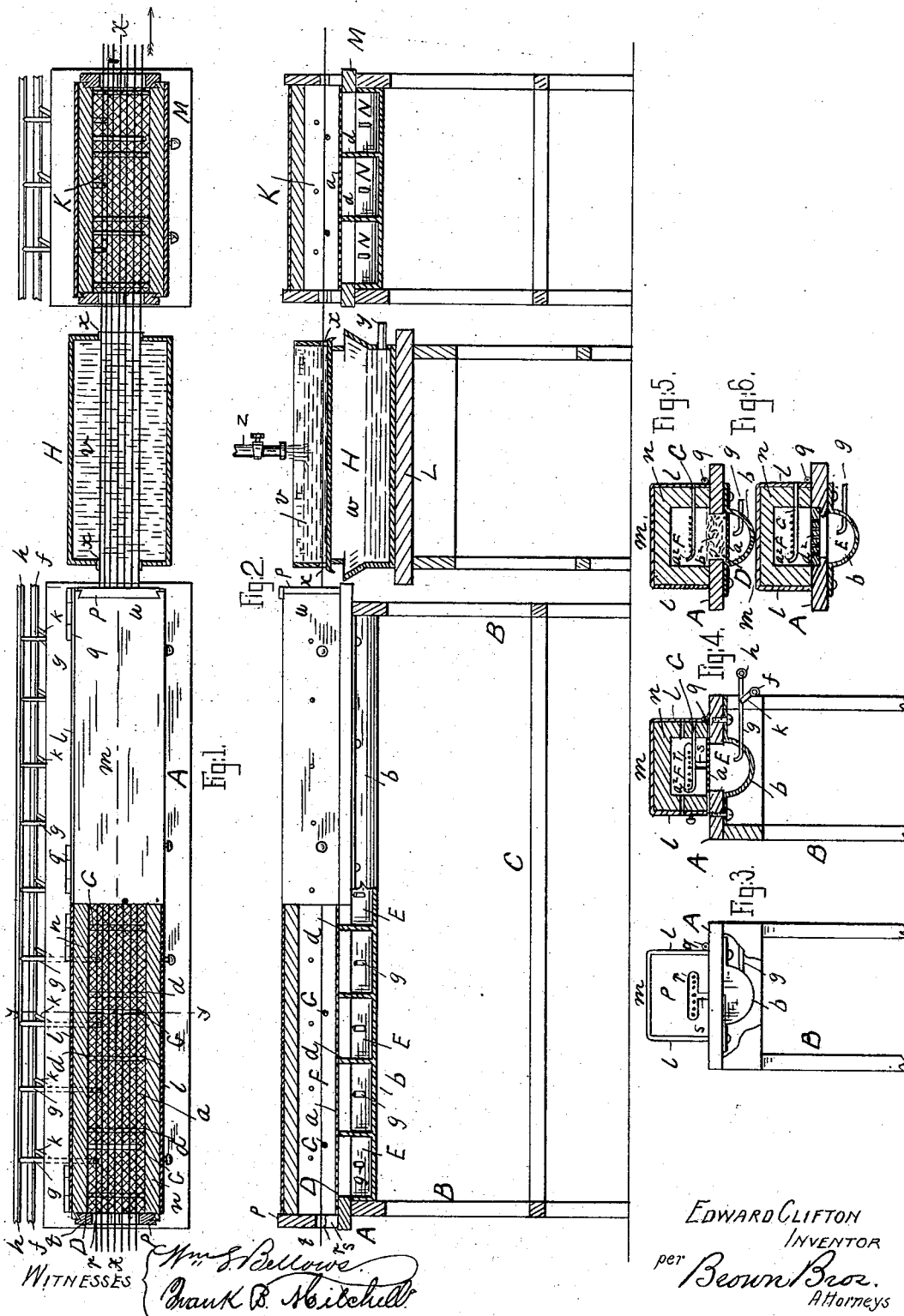
(No Model.)

E. CLIFTON.

APPARATUS FOR TEMPERING AND HARDENING WIRE.

No. 263,859.

Patented Sept. 5, 1882.



UNITED STATES PATENT OFFICE.

EDWARD CLIFTON, OF LOWELL, MASSACHUSETTS.

APPARATUS FOR TEMPERING AND HARDENING WIRE.

SPECIFICATION forming part of Letters Patent No. 263,859, dated September 5, 1882.

Application filed June 8, 1882. (No model.)

To all whom it may concern:

Be it known that I, EDWARD CLIFTON, of Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Tempering and Hardening Wire, of which the following is a full, clear, and exact description.

Figure 1 is a plan view, partly in section. Fig. 2 is an elevation, partly in section. Figs. 3, 4, 5, and 6 are detail views.

This invention relates to improvements in apparatus for hardening and tempering steel wire; and it consists more particularly of improvements in the arrangement and construction of the heating and tempering chambers for the wires, all substantially as hereinafter fully described.

In the drawings, A represents a horizontal table or platen, supported at each end upon legs B, braced by transverse and longitudinal rails C. The table A is made of cast-iron, and has an opening or slot, D, through it, which extends its whole length between its end legs, B, and is covered and inclosed upon the upper side with a sheet, *a*, of wire-gauze and upon the under side and at each end with a semicircular casing, *b*, of sheet metal, the whole forming an inclosed chamber, which, by a series of equidistant vertical transverse metal partitions, *d*, is divided into a series of separate and distinct compartments or chambers, E. The wire-gauze *a* and semicircular casing *b* are each secured to the table in any suitable manner, and they may be both applied to the under side of the table, Fig. 5, and for the wire-gauze perforated metal or fire-clay may be substituted. The compartments E have severally each a separate branch pipe, *g*, all of which lead out of the compartment to a common air-supply, *h*, which runs horizontally along the length and at one side of the table, and is connected to any suitable air-pump or other air-supply.

h are short gas-pipes, which enter each branch air-pipe *g* outside of the compartments E, and are branches of a common horizontal gas-pipe, *f*, arranged alongside of the air-supply *h*, which is connected to any suitable gas-supply. The branch air and gas pipes *g* *h* are each to be provided with a suitable stop-cock for regulating the supply of air and gas, and the several

separate cocks of each set of stop-cocks can be connected to a common rod for operating them simultaneously and either to open or close them.

F is a chamber or compartment above the table A. This chamber F runs the length of the slot or opening D in the table, and its parallel side walls, *l*, and top *m* are made of sheet-iron, lined with fire-clay or other suitable refractory material *n*, and its end walls, *p*, of sheet-iron or other suitable metal. One of the side walls, *l*, forming the chamber F, is hinged to the upper side of the table, as at *q*, and thus it and the other side wall and top wall making said chamber can be swung back to uncover the table along the length of the slot or opening D. Each end wall, *p*, is arranged to be raised and lowered in a direct vertical line upon the ends of the sides and top walls, *l* *m*, of the chamber F, and each has a similar horizontal slot, *r*, and vertical slot *s*. The horizontal slots of the end walls are in the same horizontal plane, and the vertical slots in the same vertical plane, and each vertical slot is open at the lower edge of the end wall.

G is a series of transverse horizontal rods, located at intervals along the length of the chamber F, and secured to one of its side walls, their other ends being free.

The chamber F, with the under series of separate chambers or compartments E separated therefrom by wire-gauze or perforated metal or fire-clay *a*, as has been described, is for heating the wires previous to their being hardened and tempered, and in this operation, as will hereinafter more fully appear, the several wires pass through the heating-chamber F, entering at its end *t* and passing out of its end *u*, and from thence to and through the length of an oil-tank, H, for hardening them, and thence to and through a tempering-chamber, K, and as they pass out of this tempering-chamber they are coiled or wound in any suitable manner.

The oil-tank H, for hardening the wires, is supported upon a table, L, and it is in two horizontal compartments, *v* *w*, one above the other, relatively constructed for the oil in passing out of the openings *x*, at which the wires enter into and pass out of the upper compartment, *v*, to fall into the lower compartment, *w*,

and from thence by a pipe, *y*, conducted to any suitable pumping apparatus to be pumped up and again discharged through a pipe, *z*, into the upper compartment, *v*, and so to therein
 5 act to harden the wires and to pass out again into the lower compartment, and so on.

The tempering-chamber *K* is supported upon a table, *M*, and it is constructed and arranged in all its parts in a similar manner to the chamber *F*, hereinbefore referred to, for heating the
 10 wires previous to their being hardened and tempered; and it is provided with a series of chambers, *N*, for gas and air in all respects similar to the compartments *E* for said wire-
 15 heating chamber *F*, hereinbefore described. The tempering-chamber, however, is shorter in length than the wire-heating chamber, and the compartments are less in number than those for said wire-heating chamber.

20 In the use of this apparatus the wires to be treated are first arranged lengthwise through the wire-heating chamber *F*, upon the cross-rods *G* thereof, and through the oil-tank *H* and the tempering-chamber *K* upon the cross-
 25 rods thereof. For so arranging the wires it is necessary first to open the heating and the tempering chambers *F* *K* and lift the end walls of each, and then to put the wires one after the other through the vertical slots *s* into
 30 the horizontal slots *r* of the end walls and over the free ends *a*² of the cross-rods *G*, in which position, when the heating and tempering chambers *F* *K* and the end walls thereto are closed, the wires will be disposed and rest upon the
 35 cross-rods *G* of said chambers and in the horizontal slots of the end walls of said chambers. The wires thus having been placed are made to travel in any suitable manner through the
 40 apparatus described, and as they so travel they are heated in the heating-chamber *F* by the combustion of gas and air on the upper surface of the wire-gauze bottom of such chamber to the desired degree, preferably to a bright-red
 45 heat, whence, passing to and through the oil-tank, they are suddenly cooled and hardened, and after that, in their continued passage, are tempered in passing through the tempering-chamber *K*, wherein they are subjected to heat
 50 from the combustion of gas and air at the upper surface of the wire-gauze bottom of said chamber *K*. The heat in the wire-heating chamber *F* and tempering-chamber *K* is to be regulated as may be necessary to suit the
 5 speed at which the wires pass through the apparatus.

The wire-gauze or perforated plate making the bottom of the wire heating and tempering chambers may be covered with asbestos, as illustrated at *b*² in Fig. 5, for the more thorough and equal distribution of the flames from the burning air and gas. Again, the table or platen
 5 *A* may be made of fire-clay in lieu of metal constructed in itself to make the perforated bottom of the wire heating and tempering

The use of a series of separate chambers *E* below the perforated bottom of the chamber *F* is advantageous in that the gas and air are more uniformly combined, whereby a better and more even diffusion and distribution of the
 70 combined gas and air to chamber *F* is secured.

Steam may be substituted for the air and a hydrocarbon oil for the gas, and if they are used it is preferable to use a fire-clay perforated plate, *b*²—as, for instance, as shown in
 75 Fig. 6.

As the several wires to be heated and tempered are disposed in their respective chambers for such purposes in a common horizontal plane as to each chamber, necessarily they
 80 must be more uniformly heated in each chamber than if they were arranged one above the other. After the wires are placed in their chamber *F*, as described, then by their ends they are passed through the oil-tank *H* at the
 85 openings *x*, after which they are placed in the tempering-chamber *K*, as described.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an apparatus for hardening and tempering wires, a heating-chamber, *F*, for the wires, having a wire-gauze or perforated bottom, *a*, and a series of chambers, *E*, below said bottom, for the mixing of the air and gas to be
 95 burned at the perforated bottom, substantially as described.

2. In an apparatus for hardening and tempering wires, a heating-chamber, *F*, for the wires, having a wire-gauze or perforated bottom and
 100 hinged to the table, to be opened and closed therefrom, and a series of chambers, *E*, below said bottom, for mixing the air and gas to be burned at the perforated bottom, substantially
 105 as described.

3. In an apparatus for hardening and tempering wire, the chamber *F*, for heating the wires, arranged to be raised and lowered, and constructed with end walls having horizontal
 110 slots *r* and vertical slots *s* opening into said horizontal slots and to the lower or outside edge of said end walls, substantially as described, for the purpose specified.

4. In an apparatus for hardening and tempering wires, a chamber, *F*, for heating the wires, and a chamber, *K*, for tempering the wires, and each constructed with a wire-gauze or perforated bottom, and having a series of chambers, *E* *N*, below said perforated bottom, for
 115 mixing the air and gas to be burned at the perforated bottom, in combination with a tank, *H*, for hardening the wires, all arranged together for operation, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing
 125 witnesses.

EDWARD CLIFTON.

Witnesses:

EDWIN W. BROWN,
 WM. S. BELLOWS.