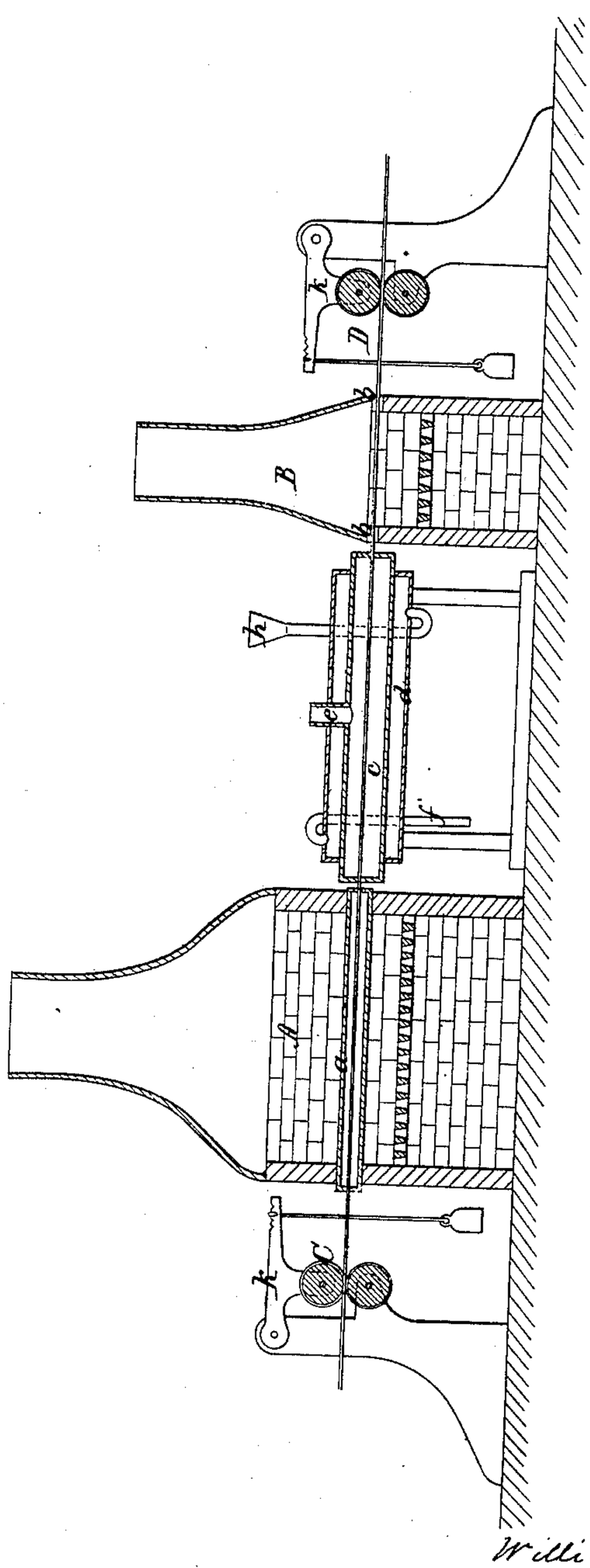
W. A. SHAW.

TEMPERING STEEL WIRE.

No. 90,314. Patented May 18, 1869.



Witnesses

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Inventor

William Anthony Shaw

by his attorney

A. Pollok

United States Patent Office.

WILLIAM ANTHONY SHAW, OF NEW YORK, N. Y.

Letters Patent No. 90,314, *dated May* 18, 1869.

IMPROVEMENT IN TEMPERING STEEL WIRE.

The Schedule referred to in these Letters Patent and making part of the same.

To whom it may concern.

Be it known that I, WILLIAM ANTHONY SHAW, of the city, county, and State of New York, have made a new and useful Improvement in Apparatus for Annealing and Tempering Steel Wire and Steel Ribbon; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, which represent a longitudinal vertical section through an apparatus made in accordance with my invention.

To enable others to make and use my invention, I will proceed to give a description of the manner in which the same is or may be carried into effect by reference to the drawing.

I first construct a furnace, A, having a fire-box about four feet long, one foot in width, and one and one-half foot in depth, though these proportions are not absolutely essential.

Above the grate is a door for feeding this furnace with fuel. Within the furnace is a muffle, *a*, made of any suitable material, which will sustain the required heat, a full red heat. A very good muffle is made by coating externally and internally an iron-pipe, with the composition of plumbago and clay employed for making plumbago crucibles. The ends of this muffle project beyond the outside of the walls of the furnace at each end about one inch.

About six feet distant from the above furnace, and on a line with it, is a smaller furnace of cast-iron, B, mounted on rollers. This furnace has a small aperture, *b*, on each side. Between the furnaces is an oil-bath, or other suitable liquid bath, constructed by enclosing a metallic tube, *c*, of about six inches diameter, and four feet long, within another, *d*, of ten inches diameter, and three and two-thirds feet long, soldering a flange to the two pipes at each end, so as to suspend the inner, pipe in the centre of the outer one, and to leave a space of two inches around the inner and between the two pipes. These flanges render the chamber water-tight. Passing through the outer pipe, and the space between the two pipes, and leading in to the inner pipe, is a small tube, *e*, which projects above the outer pipe. A pipe, *f*, is also attached to the outer pipe, so as to allow of an overflow to the chamber to which water is admitted through the funnel *h*. This apparatus is mounted on a table, at a height which will bring the centre of the inner pipe on a line with the ends of the muffle of furnace A, and the apertures of the furnace B.

Situated at a few feet from each furnace, are two pairs of griping-rollers, C D, depending upon weights which are suspended from levers K, to govern the force of their gripe. In practice, a reel of the wire to be treated is brought near the griping-rollers at the left of the muffle-furnace. One end of the wire is passed through the rollers, and thence through the muffle, the oil-tube *c* of the apparatus between the two furnaces, the apertures of the smaller furnace, and thence between the griping-rollers at that end, from which it passes to a reel, commonly employed and long in use for drawing wire, and which is described in technical works, in treatises on wire-manufacture.

The wire being thus arranged, and ready to be drawn through the whole apparatus, the muffle of furnace A is filled with plumbago, or powdered and bolted kaoline, prepared by subjecting kaoline to a kiln-heat, as is employed in manufacturing porcelain-ware, and afterwards grinding and bolting; or I can employ other powder, the particles of which will not cohere together at the temperature required, and which will not injure the wire, while it will protect it from the oxygen of the atmosphere.

To keep this powder from escaping the end of the muffle, plumbago-plug or stoppers, with an aperture through them just sufficient for the wire to pass through, are inserted in its ends; asbestos fibres, made into a plug, answer very well.

The inner tube *c*, of the tempering-apparatus, between the two furnaces, is filled with oil or other desirable tempering-liquid. Water, at the required temperature to govern the coolness of the oil, is allowed to flow into the funnel *h*, and overflow at the escape-pipe *f*, for that purpose.

A fire is now built in furnace A, of quantity and intensity sufficient, with regulation by the door and dampers, to uniformly heat the muffle to a red heat; a wood fire is also built in the smaller furnace.

The whole now being arranged, and the weights on the levers properly adjusted, the reel is put in motion at the proper speed to obtain, first, the required heating of the wire in its passage through the muffle, second, the required temper in its passage through oil-bath, and third, the required degree of annealing in its passage through the wood fire of the smaller furnace. These conditions are also regulated, as is obvious, by the intensity of the heat in the muffle, the temperature of the oil, and the intensity of the wood fire.

By means of an apparatus, such as above described, there is much saving of time in performing the work, and a uniformity of quality is attained. There is also a saving of waste in materials usually employed in other processes to attain the same result. The apparatus is comparatively inexpensive, and adapted to the controlling of the quality of the wire, which is very essential, in order to meet the various requirements of the arts.

Having now described my invention, and the manner in which the same is or may be carried into effect, I would observe that I am aware it is not new to maintain the wire in a state of tension during its passage through the tempering-apparatus, for such method is described in English patent, No. 824, of 1857, and is mentioned in American patents of a late date. as. for

instance, that to Henry Waterman, dated August 24, 1858.

What I claim, and desire to secure by Letters Patent, is—

1. The employment, with the heating-furnace of the tempering-apparatus, of a muffle, containing powders or powder, substantially such as herein specified, as and for the purposes set forth.

2. The muffle, when formed of an iron tube, coated externally and internally with a composition of plumbago and clay, and closed at its ends by plugs of plumbago or asbestos fibres, as and for the purposes specified.

3. The construction of the apparatus for containing the bath of oil or other tempering-liquid, and the jacket for containing the water to regulate the temperature of such liquid, substantially as herein shown and described.

4. The employment, with the tempering-apparatus, of griping-rollers, in combination with levers and weights, or their mechanical equivalent, for regulating the tension of the wire as it passes through the apparatus.

5. The combination and arrangement of the heating-furnace and its muffle, the annealing-furnace, the oil-bath and surrounding water-jacket, constructed as described, and the griping-rollers for regulating the tension of the wire, substantially as shown and set forth.

In testimony whereof, I have signed my name to this specification, before two subscribing witnesses.

WILLIAM ANTHONY SHAW.

Witnesses:

I. D. PARMELEE,

C. W. R. DISOSWAY.