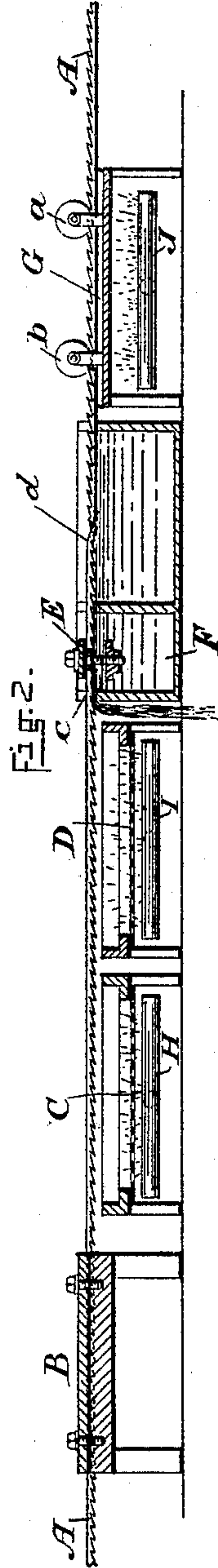
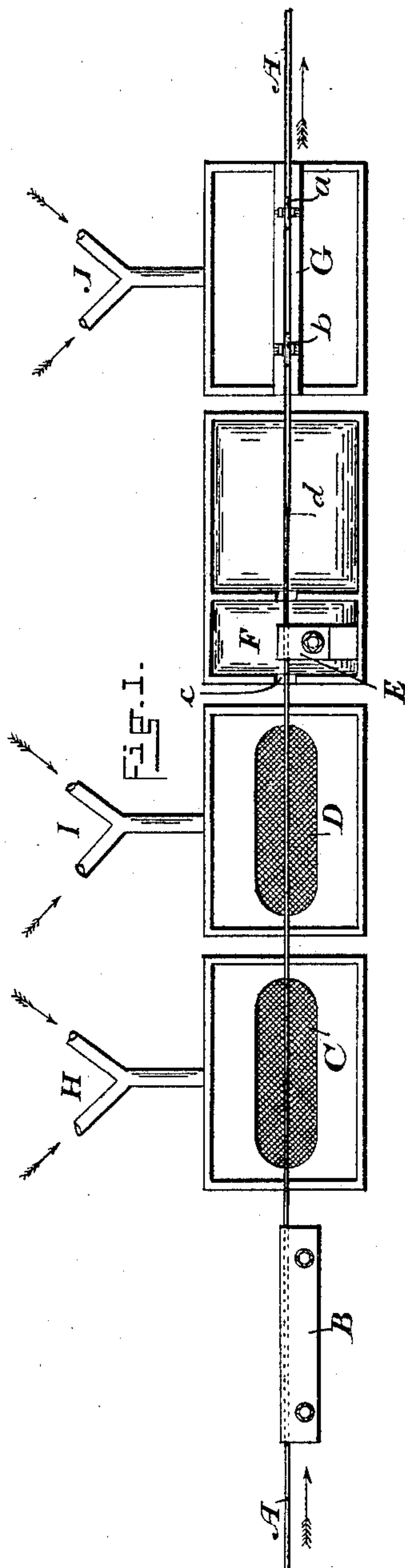


(No Model.)

E. & D. SYKES.  
METHOD OF HARDENING SERRATED BANDS.

No. 452,858.

Patented May 26, 1891.



WITNESSES:  
*Walter Allen*  
*Harry S. Rohrer.*

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# UNITED STATES PATENT OFFICE.

EZRA SYKES AND DAVID SYKES, OF HUDDERSFIELD, ENGLAND.

## METHOD OF HARDENING SERRATED BANDS.

SPECIFICATION forming part of Letters Patent No. 452,858, dated May 26, 1891.

Application filed December 9, 1890. Serial No. 374,120. (No model.) Patented in England July 12, 1888, No. 10,124.

*To all whom it may concern:*

Be it known that we, EZRA SYKES and DAVID SYKES, citizens of Great Britain, residing at Huddersfield, in the county of York, England, have invented certain new and useful improvements in the method of hardening and tempering serrated or "Garnett" saw teeth employed in waste opening, scribbling, carding, and similar machinery, (for which we have obtained a patent in England, No. 10,124, dated July 12, 1888;) and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to serrated or Garnett saw-teeth, which are punched or otherwise cut out of a narrow length or strip of thin metallic flat wire, which is afterward wound onto a cylindrical surface and secured thereon for the purpose of opening fibrous materials. These teeth have hitherto been formed from soft-iron wire or flattened strips of soft iron or other metal, but they have not possessed sufficient strength to resist the strains to which the teeth are subjected when employed in the machinery above named, nor will the teeth composed of such material endure any great amount of wear and tear; but they have soon to be renewed in consequence of the points of the said teeth wearing away. Many experiments have been made to use flat steel wire and attempts made to harden and temper the teeth thereon, but so far these attempts have failed in consequence of the inability to harden and temper the teeth without also hardening and tempering the backbone or continuous portion of the strip of steel, which strip, when being bent to the curvature of a cylinder or drum, frequently broke. We have, however, discovered a method whereby we are enabled to harden and temper the points or the whole of each tooth in the strip, (whether such strip is made with a single or double row of teeth,) while at the same time we can leave the backbone or continuous portion of the strip soft and ductile or flexible, whereby such strips of steel teeth can be easily bent and wound onto a cylinder or roller, and as the teeth are hardened and tempered they will stand a much

greater amount of wear and tear and will be strong enough to resist the strains to which they are subjected when employed in waste opening, scribbling, or carding machines.

In order to carry out our invention we first pass the serrated steel strips with the teeth downward over or through a flame or flames of gas or fire, after which the rib or back of the strip passes under a deflecting-plate placed over a trough or cistern, which brings the teeth into contact with cold water or other suitable liquid, and after being cooled, and consequently hardened and tempered thereby, the steel strip passes over a heated plate, so as to dry off the moisture on the teeth and complete the tempering process.

In order that our invention may be put into practice, we will now make reference to the accompanying sheet of drawings, which illustrate one method of carrying out our invention.

Figure 1 is a plan view of the device, and Fig. 2 is a longitudinal section through the same.

The serrated wire is shown at A and traveling in the direction indicated by the arrows. The wire, which to start with is traveling teeth downward, may be coming off a drum and taken up by another drum at the opposite end of the apparatus; but be that as it may the said wire passes under a projecting edge of the bar B, which keeps the wire down or in a proper position as it passes over a flame of gas issuing through the wire-gauze C and D. By the time the serrated wire has passed the flame at D it is heated to a red heat, from whence it then passes under an adjustable deflecting-plate E, which holds the traveling strip so that the teeth on the under side thereof are immersed in water or other liquid in the trough F. The wire is now twisted or turned over, as shown at *d*, so that the teeth thereon are made to project upward, so that the backbone or rib of the serrated teeth is made to travel over a hot plate G, which is heated to a suitable temperature for that purpose, and this is done so as to soften the backbone or rib of the strip, while the teeth remain hardened and tempered. If the said traveling serrated teeth are compound or made trough-shaped, we employ thin disks *a*



and *b*, which are inserted into the trough-shaped strip for the purpose of keeping the strip down upon the hot plate *G* and also to open the trough and keep the serrated teeth equidistant from each other, by which means the teeth are hardened and tempered, while the backbone or rib remains soft, allowing any suitable length of the said serrated strip to be wound upon rollers or drums; but the teeth are hard and sharp and operate uninjured upon any matted, knotty, or hard substances contained in the fiber, which is not the case when the points of the said teeth are soft.

We prefer to employ a length of flame for heating the serrated wire, so that it is gradually done, and the heat becomes more intense as the strip travels over or through the flames of gas or fire, the amount of heat given depending on the strength of the wire and the speed at which such wire is made to travel. The cooling-trough *F* is preferably so arranged that a constant supply of fresh water or other liquid is admitted thereto, the overflow passing out through an aperture at *c* near where the steel strip emerges from the flames of gas, so that the teeth first come into

contact with water that is running from the cistern.

A proper admixture of gas and air for the purpose of getting "Bunsened" gas is admitted through the pipes *H*, *I*, and *J*.

We would have it understood that we do not limit ourselves to the exact details in the apparatus herein shown and described, as it is obvious that other forms of apparatus may be employed for effecting the same purpose.

We claim as our invention—

The continuous method of hardening and tempering a steel band having teeth upon one edge, which consists in first passing the band with the teeth downward through a heating flame, then deflecting the band and passing the teeth through a cooling-liquid, then twisting the band, and finally passing the band with the teeth upward over a heated plate, substantially as and for the purpose set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

EZRA SYKES.

DAVID SYKES.

Witnesses:

WILLIAM P. SMYTH,

THOMAS H. BARRON.