(No Model.) 2 Sheets—Sheet 1.

W. J. MUNCASTER.

MACHINE FOR STRAIGHTENING SHAFTING.

No. 388,574. Patented Aug. 28, 1888.

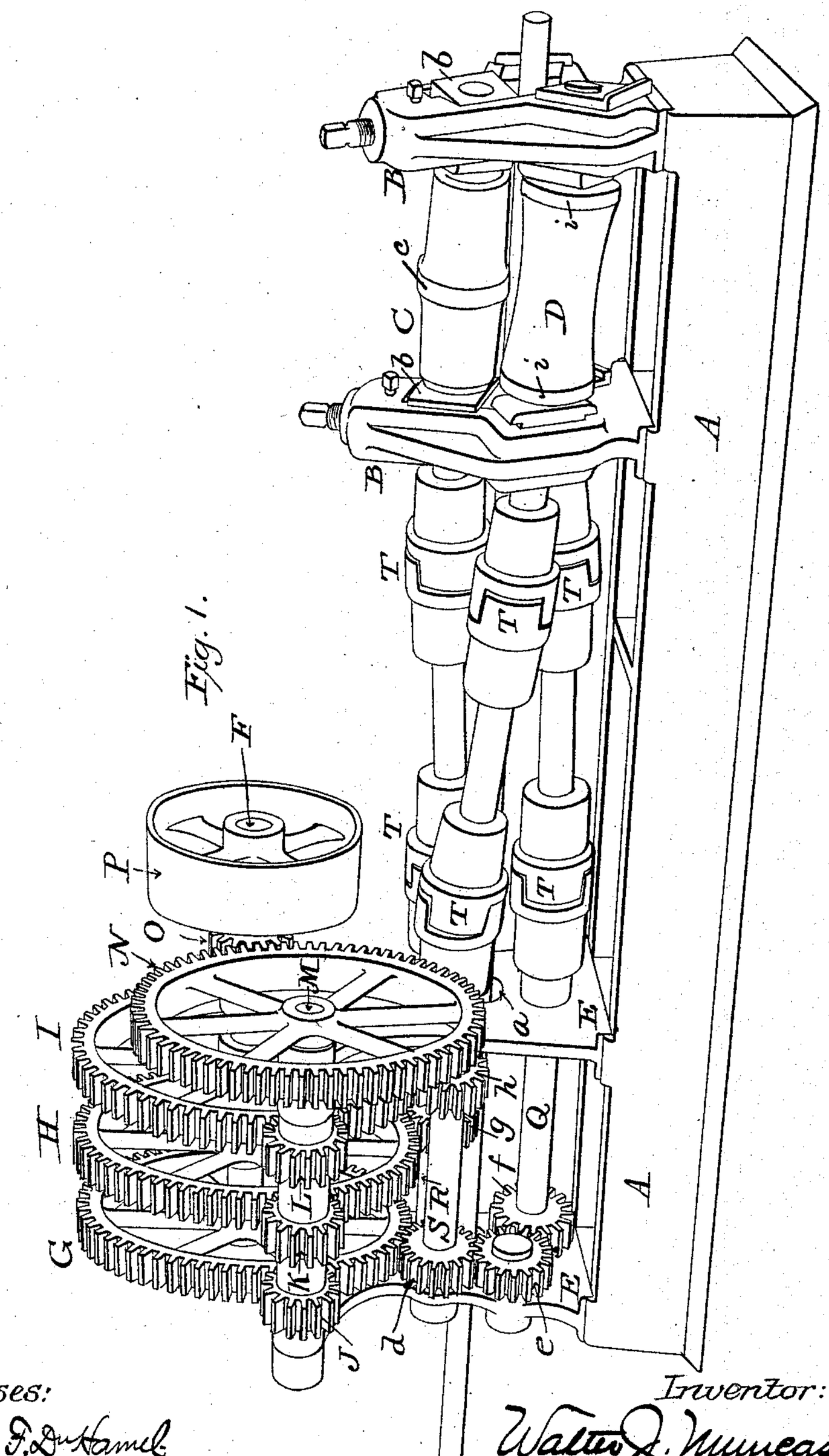

Fig. 1.

Witnesses:
James F. DuHamel
Horace A. Dodge

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Walter J. Muncaster,
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his Attys.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

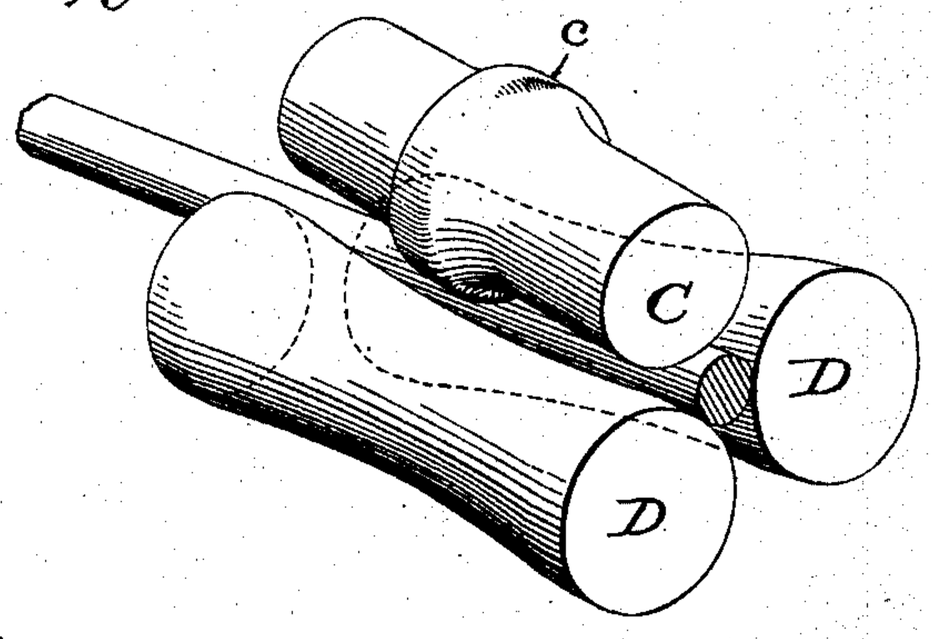
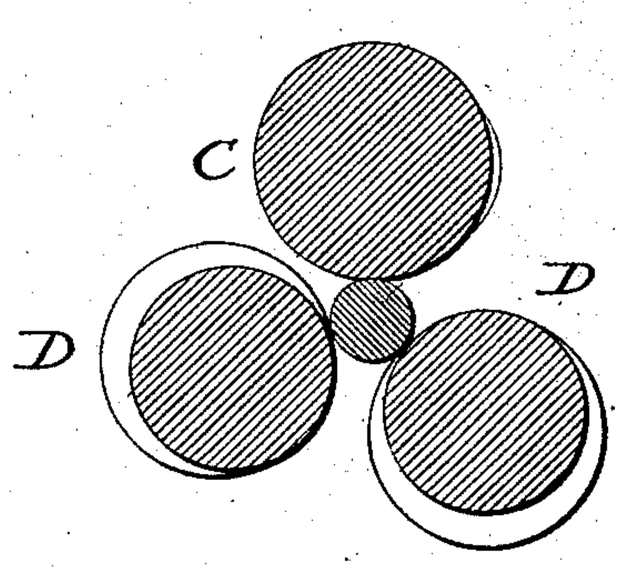


Fig. 3.



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Inventor:
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by Dodger Sons,
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UNITED STATES PATENT OFFICE.

WALTER J. MUNCASTER, OF CUMBERLAND, MARYLAND, ASSIGNOR OF ONE-HALF TO MERWIN McKAIG, OF SAME PLACE.

MACHINE FOR STRAIGHTENING SHAFTING.

SPECIFICATION forming part of Letters Patent No. 388,574, dated August 28, 1888.

Application filed April 4, 1888. Serial No. 269,574. (No model.)

To all whom it may concern:

Be it known that I, WALTER J. MUNCASTER, of Cumberland, in the county of Allegany and State of Maryland, have invented certain new and useful Improvements in Machines for Straightening Shafting, of which the following is a specification.

My invention relates to machines for straightening shafting and other cylindrical bodies; and it consists in a convex roller and concave rollers placed opposite each other and having their axes inclined at different angles to the axis of the shaft which passes between them, the rollers being directly and positively driven, and serving both to rotate and to advance the shaft.

Referring to the accompanying drawings, Figure 1 is a perspective view of my improved machine; Fig. 2, a perspective view of the rollers without their supports or driving-gear. Fig. 3 is a cross-section through the rolls and the shafting acted upon.

In straightening shafting without the aid of heat it is essential that the shaft be sprung or bent in a direction opposite to that in which the original irregularity or bend exists, and to a point beyond that which it is to retain, or, in other words, beyond a straight line with the circumference of the shaft. The reason for this is that when cold all shafting possesses a greater or less degree of elasticity, and unless the bend given it is sufficient not only to overcome the elasticity but to give a permanent set to the metal it will spring back to its original irregular form.

In constructing a machine of this character it is desirable to render it capable of automaticaly handling the shaft and performing its work from the moment the end is entered between the rolls; and this end I attain by the use of rolls of the form mentioned and hereinafter more fully described.

In the drawings, A indicates a strong frame of metal having standards B at one end to support and carry the rolls C and D D, and standards E at the opposite end to sustain the gearing by which the rolls are driven. The shaft to be straightened enters through suitable openings, *a*, in the standards E, and passes between the rolls C D D, as indicated in Fig. 1, the rolls being arranged about the axis of the shaft, or about a line corresponding therewith, as will be seen by referring to Fig. 1. The boxes or bearings *b*, in which the journals of each roll are mounted and turn, are placed at different elevations, so that the axes of the several rolls are oblique to the line about which the rolls are grouped or arranged, as will be understood upon referring to Figs. 1 and 2.

One or more of the rolls have their boxes made adjustable toward and from the line about which the rolls are grouped, in order to adjust or adapt the machine for operating upon shafting of different diameters. In the drawings I have represented only the convex roll C as being thus adjustable; but it is obvious that one or both the rolls D may be similarly arranged.

The form of the rolls is clearly shown in Fig. 2, the bending-roll C being made with a swell or enlargement, *c*, at its middle, preferably somewhat flattened on the circumference, but without well-defined edges or angles at any point.

If desired, the face may present a regular curve from end to end, though I prefer to employ the flattened face shown.

The supporting-rolls D, which are alike, are each concave on their circumference, or of parabolic form, with preferably a short zone at each end having a flattened face, but joining the concave face by an easy curve, it being important to avoid angles or edges which might indent or mar the face of the shafting. The flattened faces *c* and *i* are elsewhere designated as "flattened zones" for brevity.

It is further important that no one of the rolls be formed with a ridge or shoulder having a face perpendicular or approximately perpendicular to the axis of the roll, for the reason that when the roll is so formed the end of the shaft will engage against such face or shoulder and prevent the operation of the machine.

The curved faces of the rollers permit the end of the shaft to slide freely forward, the rolls turning in one and the same direction and serving to impart a rotary motion to the shaft.

The oblique position of the rolls causes the shaft to be drawn forward simultaneously with its rotation, and, being thus rapidly rotated, every portion of its surface passes in turn beneath the swell or raised central portion of the roll C. The adjustment of this

roll is nicely regulated to suit the size and character of the shafting to be operated upon, but in all cases it projects beyond the line to which the circumference of the shaft is to be finally brought, this adjustment causing the shafting to bend or spring down into the concave portions of rolls D far enough to insure a permanent set to the metal.

The gearing for rotating the rollers may be varied as desired, any ordinary arrangement by which each roll may be positively driven in the proper direction answering the purpose; but a convenient arrangement is that illustrated in Fig. 1.

F indicates a shaft mounted in the standards E and having mounted upon it three gear-wheels, G, H, and I, the first of which is preferably keyed thereon and the other two of which may be fast or loose, as preferred. These gear-wheels receive motion from three pinions, J, K, and L, keyed fast to a shaft, M, also mounted in the standards E, which shaft also has keyed upon it a gear-wheel, N.

Motion is given to wheel N by a pinion, O, which is cast with or bolted to a band-wheel, P, the two being loosely mounted and free to rotate upon shaft F, the band-wheel receiving motion by belt from any convenient prime motor.

Journaled in the standards E are three shafts, Q, R, and S, each of which connects by suitable flexible joints or couplings, T, with the spindle or arbor of one of the rolls C D D. Shaft Q receives motion from gear G through loose pinions *d* and *e* and pinion *f*, keyed upon said shaft. Shaft R receives motion from gear H through pinion *g*, secured upon said shaft. Shaft S receives motion from gear I through pinion *h*, secured upon shaft S. In this way each shaft, and consequently each roll, receives motion, and all turn at like speed and in the same direction at those points which constitute bearings for the shaft under operation. As stated, this is merely a preferred plan of gearing designed to avoid undue strain or labor upon any one pinion or gear.

I am aware that three rolls have heretofore been combined and arranged with their axes oblique to each other, such rolls being all of like form, however, and designed merely to compress and reduce the size of a shaft, rod, or tube passing between them. For this purpose the rolls have frequently been made of parabolic form, in order that when placed obliquely they might have a considerable surface in contact with the body acted upon, while in other cases the rolls have been made convex to reduce the bearing surface and concentrate the pressure.

I am aware, also, that it has been proposed to straighten metal bars and pipes by means of a series of pairs of rolls arranged obliquely to the path of the bar or pipe, the pairs alternating with one another or placed at different points along the path of the bar or pipe. Such construction is essentially different from mine, and is not claimed by me. It involves far greater complication of the machinery, multiplies rollers, necessitates the employment of guides for the bar or pipe, involves the liability of the end thereof coming into contact with and being stopped by the side face of a roll or rolls, and requires mechanism independent of the rolls for rotating the bar or tube.

Finally, I am aware that a machine has been devised in which the straightening of rods, tubes, &c., is accomplished by a convex roll acting in connection with a single concave roll, the ends of which latter sustain the rod or tube while being acted upon at an intermediate point. A machine thus constructed is capable of doing good work under favorable conditions, but necessitates the employment of special supports for the rod or tube, and is open to the more serious objection that in the event of any irregularity in the body acted upon—as, for instance, a slight eccentricity thereof—the bending will be too great.

It is well known by those engaged in manufacturing and using shafting that it is seldom perfectly cylindrical as it comes from the rolling-mills, and whenever a shaft that is at all eccentric passes between two rolls of the form in question placed on diametrically-opposite sides of its axis and properly adjusted to act upon a cylindrical shaft or upon the cylindrical portion of a shaft the eccentric portions will be bent unduly and the shaft rendered crooked; but when two concave rollers are employed in connection with a single convex roller, as above set forth, no roll stands diametrically-opposite another, treating the axis of the shaft as the center about which the rolls are grouped, and consequently when one side of the enlarged or eccentric portion is in contact with the convex or bearing roll the opposite side is between the other two rolls, and there will be no undue bending.

I disclaim the combination of a convex bending-roll and a single concave supporting-roll.

Having thus described my invention, what I claim is—

1. The combination of a convex roll and two concave rolls arranged about a given line, the convex portion of one roll being opposite the concave portions of the other two rolls and adapted to bend or spring a shaft or like body into the concave faces thereof.

2. The herein-described machine for straightening shafting, consisting of convex roll C, concave rolls D D, and gearing, substantially such as shown and described, for imparting rotary motion to said rolls in the same direction, the three rolls being grouped about a common line and each having its axis arranged at an angle to said line.

In witness whereof I hereunto set my hand in the presence of two witnesses.

WALTER J. MUNCASTER.

Witnesses:
C. SMITH, Jr.,
F. M. OFFUTT.