(No Model.)

L. D. YORK.

MACHINE FOR STRAIGHTENING METAL BARS, &c.

No. 316,102. Patented Apr. 21, 1885.

Fig. 1.

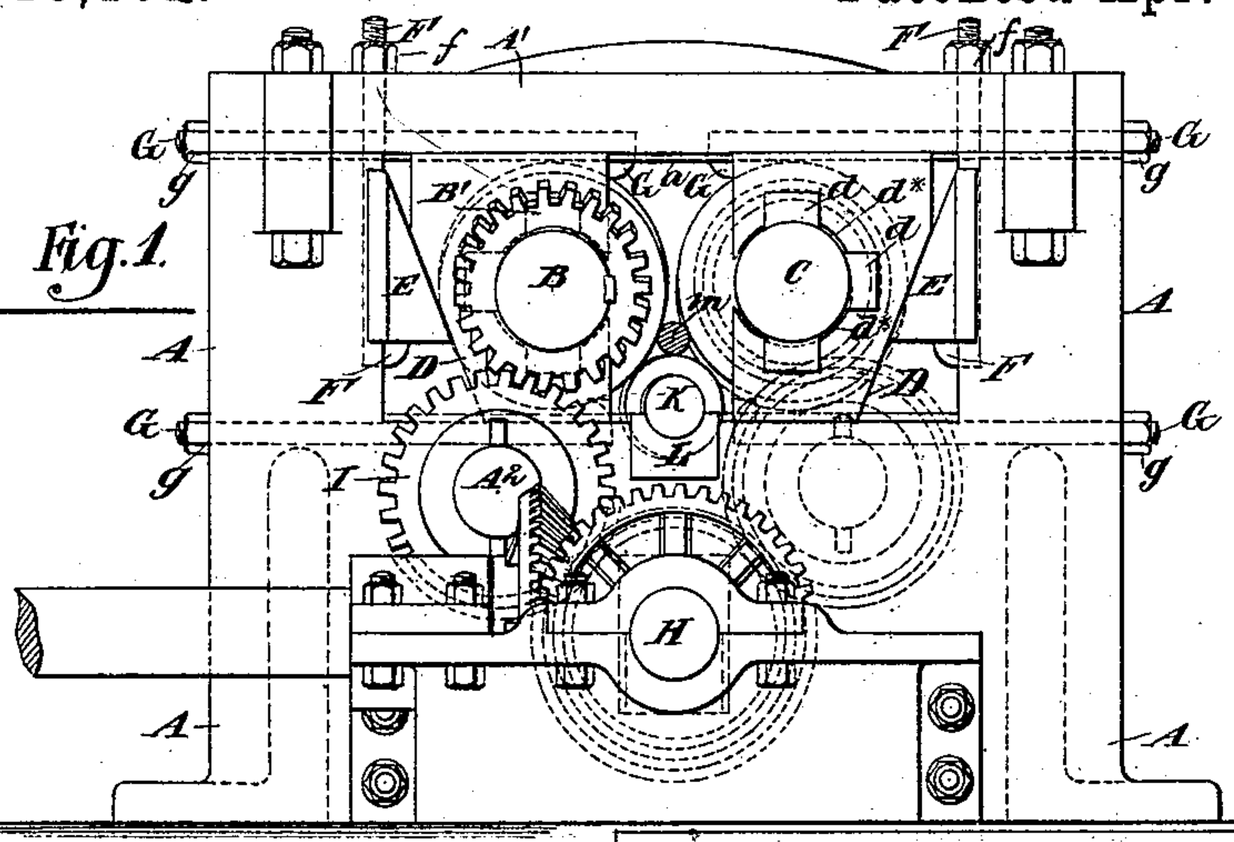


Fig. 2.

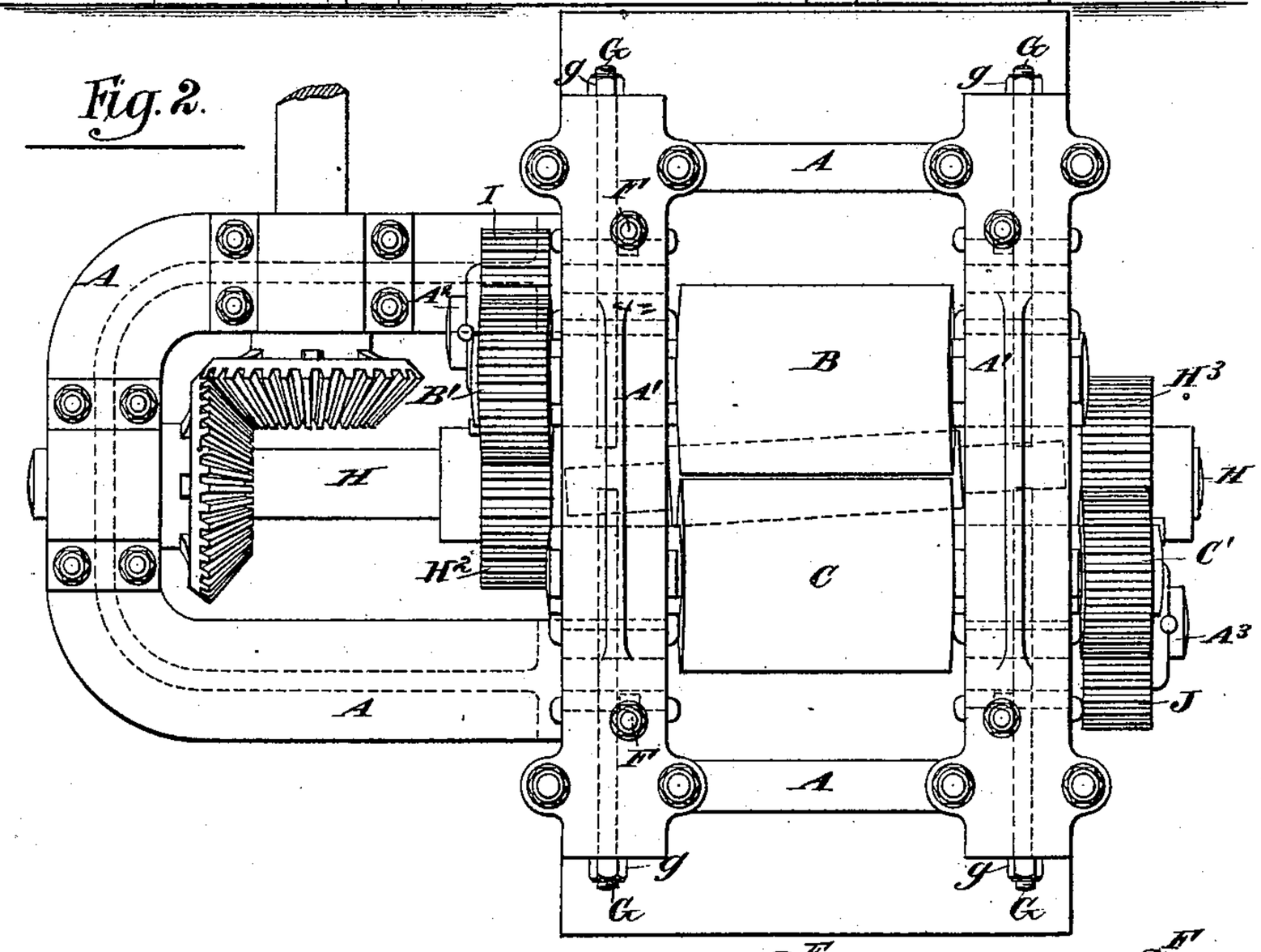
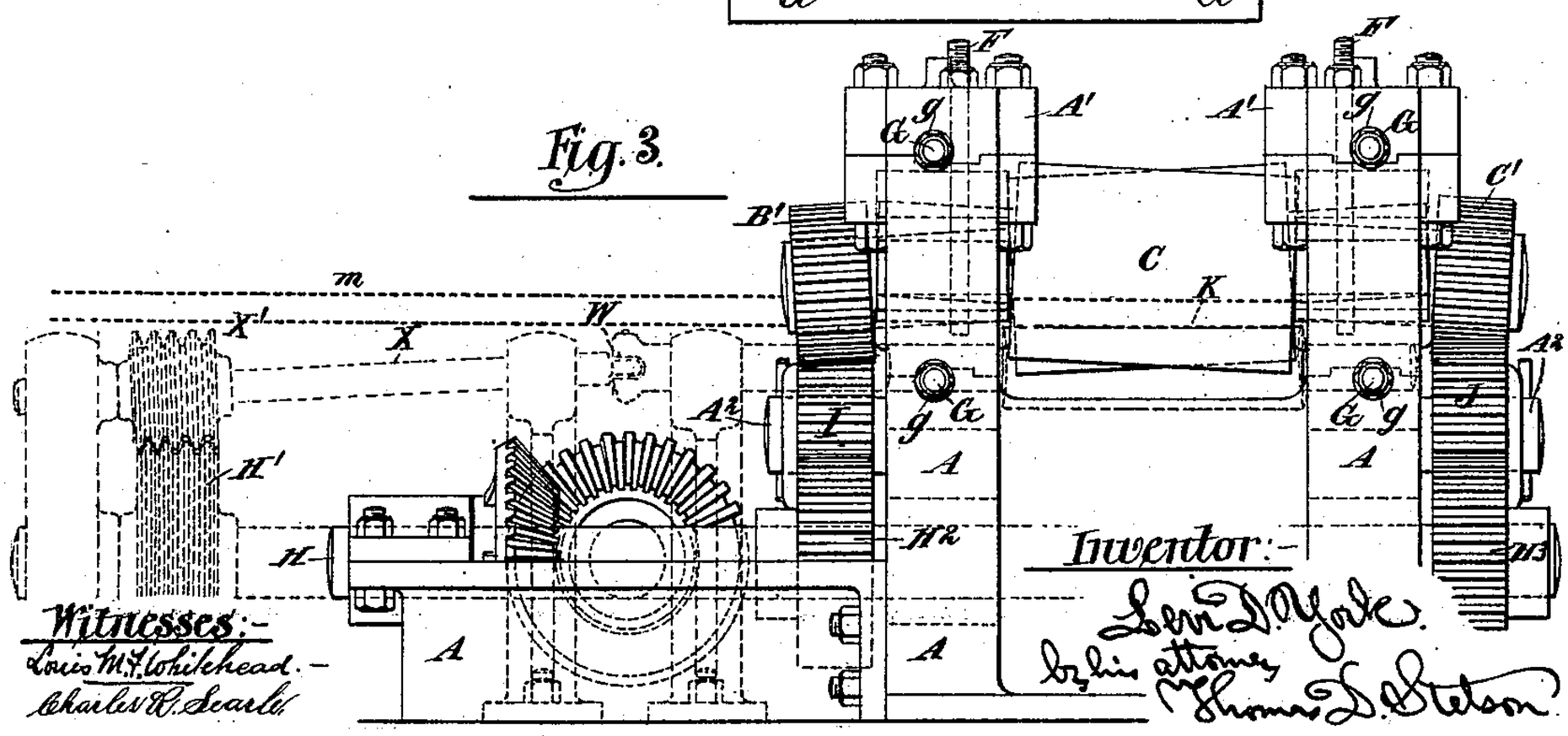


Fig. 3.



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UNITED STATES PATENT OFFICE.

LEVI D. YORK, OF PORTSMOUTH, OHIO.

MACHINE FOR STRAIGHTENING METAL BARS, &c.

SPECIFICATION forming part of Letters Patent No. 316,102, dated April 21, 1885.

Application filed April 4, 1884. (No model.)

To all whom it may concern:

Be it known that I, LEVI D. YORK, of Portsmouth, Scioto county, in the State of Ohio, have invented certain new and useful Improvements in Machines for Straightening Metals, of which the following is a specification.

The improved machine is intended more particularly for straightening shafting; but it may be used in straightening cylindrical bars of iron or analogous material for any purpose. I will describe it as applied for straightening shafting of medium size. I employ three short rolls mounted with their axes askew. By revolving all in the same direction the shafting introduced into the approximately-triangular space between them is revolved on its own axis and also moved endwise. Two of the rolls are driven by gearing so arranged that a liberal space is left clear at each end for the reception and discharge of the shafting. The third roll is not turned with the same force as the others; but I provide means for maintaining its motion, so that when a length of shafting is introduced at the receiving end it finds all the rolls in motion in the same direction. This is particularly important when the shafting to be treated is introduced in a highly-heated condition. It has been common heretofore to leave one or more of the rolls to be turned by the friction of the shaft alone. On the first introduction of a shaft in such machine one of the rolls is stationary, and requires time to set it in motion by the friction.

I provide peculiarly efficient and reliable means for holding the axes of the several shafts in their true positions. Two of the rolls lie nearly level at the top of the system. These are held strongly, but may be adjusted apart and together at either end or both ends with great delicacy.

I provide specially efficient means for holding the rolls apart. They may be adjusted to run with the surfaces of two rolls very nearly in contact with each other; but as both turn in the same direction the adjacent surfaces move rapidly past each other. By virtue of their being held reliably apart they thus turn without the resistance and abrasion due to contact. The bearings are grooved longitudinally, and allow for liberal access for lubrication and cooling.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a front elevation of my improved shaft-straightening machine, showing the position of the rolls, &c., for a medium-sized shaft. Fig. 2 is a plan view of the same. Fig. 3 is a side elevation of the same, showing means of driving the small roll in dotted outline.

Similar letters of reference indicate corresponding parts in all the figures.

A is a fixed frame-work, of cast-iron or other suitable material, certain parts being designated, when necessary, by additional marks, as A′ A².

B and C are stout rolls with true cylindrical surfaces, preferably of chilled iron, finished by grinding in any ordinary or suitable manner. They are or may be exactly alike. Each has an accurately-formed gear-wheel on one end, as indicated by B′ C′. These rolls are mounted in reversed positions, the gear-wheel on one not engaged with the other; but each gear-wheel is mounted next to the blank end of the other. These rolls B and C are supported in massive boxes or brasses D D, which I will term "bearing-blocks." These are each formed with longitudinal bearing-surfaces *d d*, with open spaces *d** between. These boxes or stout bearing-blocks D *d* are each free to be adjusted so as to carry their respective ends of the rolls to and from each other, or so as to carry either end of both rolls bodily to the right and left. The uppermost of the stout parallel ways *a*, in which they are thus guided, is formed by a removable binder, A′, which is held down by stout bolts. The binder may be removed to insert and renew the blocks D and their adjusting means. The ways *a* guide the blocks as they are adjusted to the right or left; but the fit is made sufficiently loose to allow the blocks D to skew a little one way and the other when the rolls B and C are changed in position. The tendency of the rolls B C to move apart is resisted by stout wedges E, which may be concave on one face and apply against inclined surfaces on the blocks, which

surfaces are correspondingly swelled, thus allowing the rolls and the blocks to be skewed a little one way and the other, and maintain a fair bearing against the wedges. Each wedge is held up by an adjustable hook-bolt, F, controlled by a nut, *f*. The wedge bears against a corresponding broad inclined surface on the bearing-block D. Each block D is also subject to the control of two horizontal hook-bolts, G, which lie one below and the other above, and engage with the top and bottom of their respective blocks. Each is controlled by a nut, *g*.

I will term the side of the machine which is presented in Fig. 1 the "front," and the opposite side the "back," side of the machine. The rolls B and C are set inclined.

Referring to Fig. 1, the roll B is set with its front end the lowest. The roll C is set, on the contrary, with its back end the lowest. The gear-wheels B′ C′ are on the lowest end of each. They stand at the same level each as the other. Although working in a slightly oblique position, they can engage and be effectively driven by vertical spur-wheels.

H is the main driving-shaft, turned steadily and strongly by a water-wheel, steam-engine, or other suitable motor. A^2 A^3 are stout studs, of steel or iron, firmly set in the fixed framing A. The stud A^2 is on the front side. The stud A^3 is on the farther or back side of the machine. The wheel B′ is driven by a gear-wheel, I, turning loosely on the stud A^2. This wheel gets its motion from a gear-wheel, H^2, on the driving-shaft H. The gear-wheel C′ at the back side of the machine gets its motion from a gear-wheel, J, revolving loosely on the stud A^3. This wheel J gets its motion from a gear-wheel, H^3, on the main driving-shaft.

The studs A^2 A^3, on which the gear-wheels I J revolve, are each so nearly under the centers of their respective rolls B or C that these rolls may be adjusted apart and together to the extent required in rolling different-sized shafting without causing the gears to materially change their degrees of engagement. I provide four horizontal hook-bolts, G—one for the top and one for the bottom of each brass or block D. Each carries a nut, *g*, by tightening which the block may be held apart with great firmness.

K is the bottom roll. It extends horizontally in a skewed position, as shown in dotted lines in Fig. 2. Its surface moves at a uniform distance from the surfaces of the rolls B and C. This roll runs in brasses L, supported in suitable recesses formed in the framing A.

For the smallest shafting the rolls B and C should be adjusted together, so that their rapidly-moving surfaces run nearly but not quite in contact with each other. For treating larger shafting, rolls B and C are adjusted apart by slacking the nuts *f* and lowering the wedges E and setting up on the nuts *g*. I take care to move the two blocks D each to an equal distance.

The construction of the framing and the arrangement of the gearing allow not only a clear space for the reception and discharge of the shafting, *m*, which is being treated, but also allow the bottom roll, K, or the shaft thereof, to be extended longitudinally in one or both directions as far as may be required. I thus extend in one direction, as shown in dotted outline in Fig. 3, and provide a universal joint, W, of simple construction, composed of two cross wings or blades on the end of one shaft, engaging in corresponding cross-grooves on the end of the other shaft. By this compact universal joint the extended shaft of K is connected to a shaft, X, mounted in the vertical plane of the main shaft, H, and approaching the same obliquely. I engage these converging shafts X and H by the friction gear-wheels X′ and H′. The effect is to maintain the revolving motion of the bottom roll, K, with about the same surface velocity as the positively-driven rolls B and C, so that the machine may run idle any period, and still when a fresh length of shafting *m* is introduced it finds the three rolls between which it is to be treated all in motion with equal speed. Thus conditioned, the shaft promptly commences to revolve under the influence of the three moving rolls, while the means by which the bottom roll, K, is driven allows that roll to turn a little faster or a little slower, as may be required to accommodate the conditions when, by reason of wear or other cause, the ratios of the diameters and the velocities of the rolls are slightly maladjusted. These provisions for driving the bottom roll, K, may be varied within wide limits. The shaft of K need not be prolonged so much as represented. The universal joint W and additional shaft X may be omitted. Belting instead of friction-gear may be used as the means of maintaining the motion without making a positive and unyielding engagement. In such case means should be provided by sheet-metal casing or otherwise to defend the belting against injury from the shafting.

I propose to treat the shafting either cold or at any degree of heat which may best serve with the size and condition of the material.

The friction-gearing will slip to allow changes of position under great strains without fracturing anything, which would not be the case with ordinary toothed gearing.

Modifications may be made in the forms and proportions of the details. Parts of the invention may be used without the whole. I can operate successfully with ordinary bearings instead of the longitudinally ridged and grooved bearings *d d**, the upper rolls, B and C, being adjusted apart and together to allow for the variations in size.

I claim as my invention—

1. In a metal-straightening machine, substantially as described, the combination of two rolls, as B C, and toothed gearing for rotating them in the same direction with a third roll

independent of the first two, a supplemental shaft, and friction-gearing for impelling said third roll, as and for the purposes set forth.

2. In combination with the rollers B C and wedge-blocks E, the bearing-blocks D, having inclined surfaces, the guides *a*, removable binder A′, the horizontal hook-bolts G, and the vertical hook-bolts F, all arranged and adapted to serve with the frame A and nuts *f g*, as set forth.

3. The idle gear-wheels I J, mounted one on the front and the other on the back of the machine, and arranged intermediately between a single driving-shaft, H, and two skewed rolls, B C, in combination with such shafts and rolls, and with the gear-wheels H^2 B′ H^3 C′, and with a third roll, K, as herein specified.

4. In a straightening-machine, the positively-driven skewed rolls B C and relatively free roll K, in combination with each other and with means, as H′ X′, for driving the latter with yielding force at about the same surface velocity, as and for the purposes herein specified.

In testimony whereof I have hereunto set my hand, at Portsmouth, Ohio, this 29th day of March, 1884, in the presence of two subscribing witnesses.

LEVI D. YORK.

Witnesses:
WM. B. GRICE,
P. S. INNIS.