(No Model.) 3 Sheets—Sheet 1.

S. H. WILSON.

MACHINE FOR ROLLING AXLES.

No. 297,546. Patented Apr. 22, 1884.

Fig. 1.

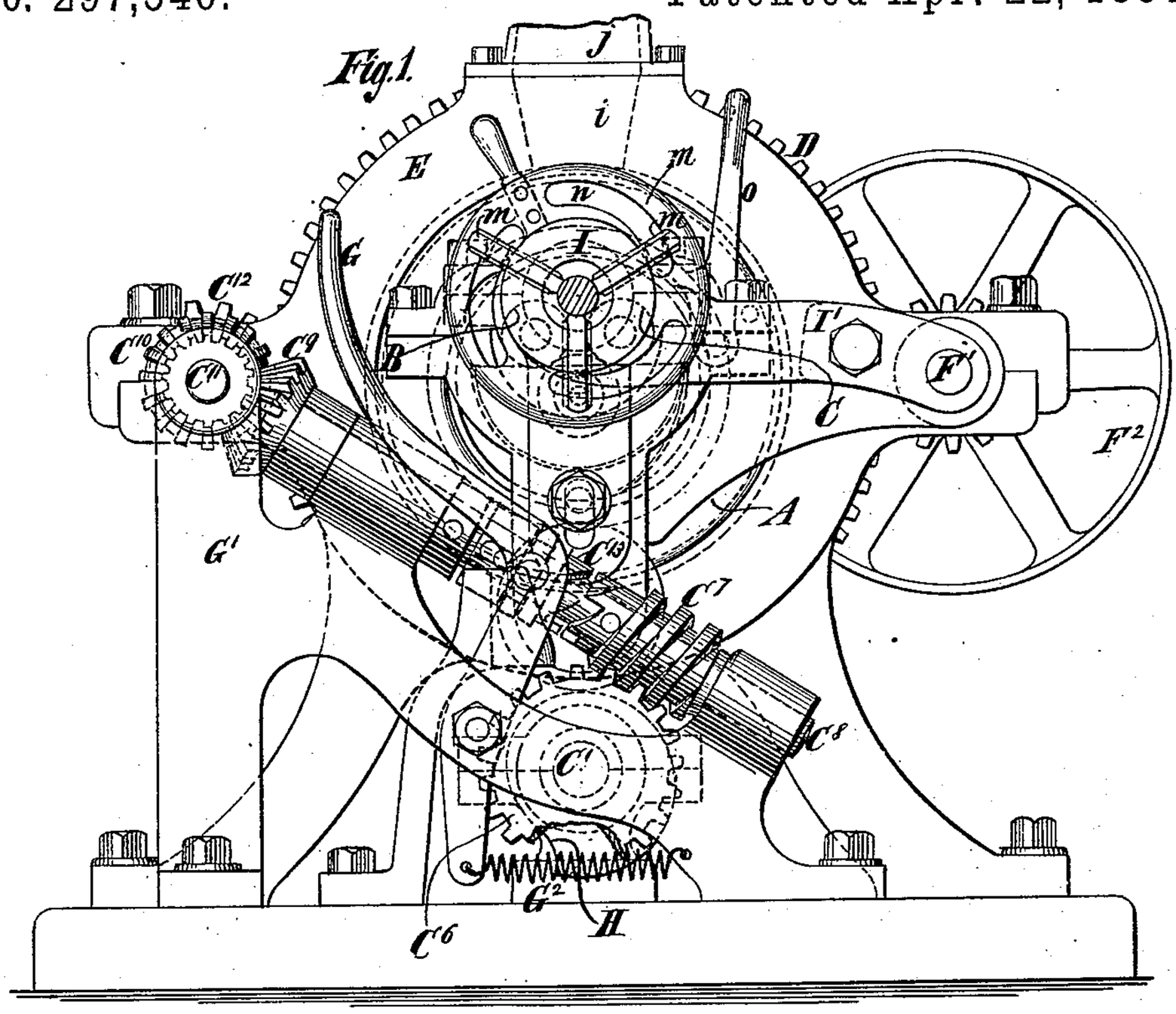


Fig. 4.

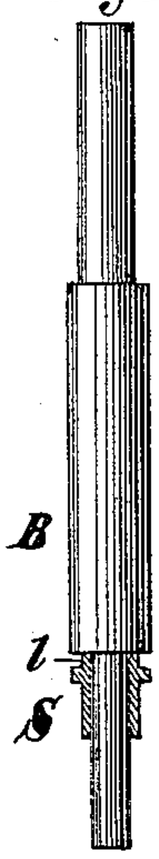
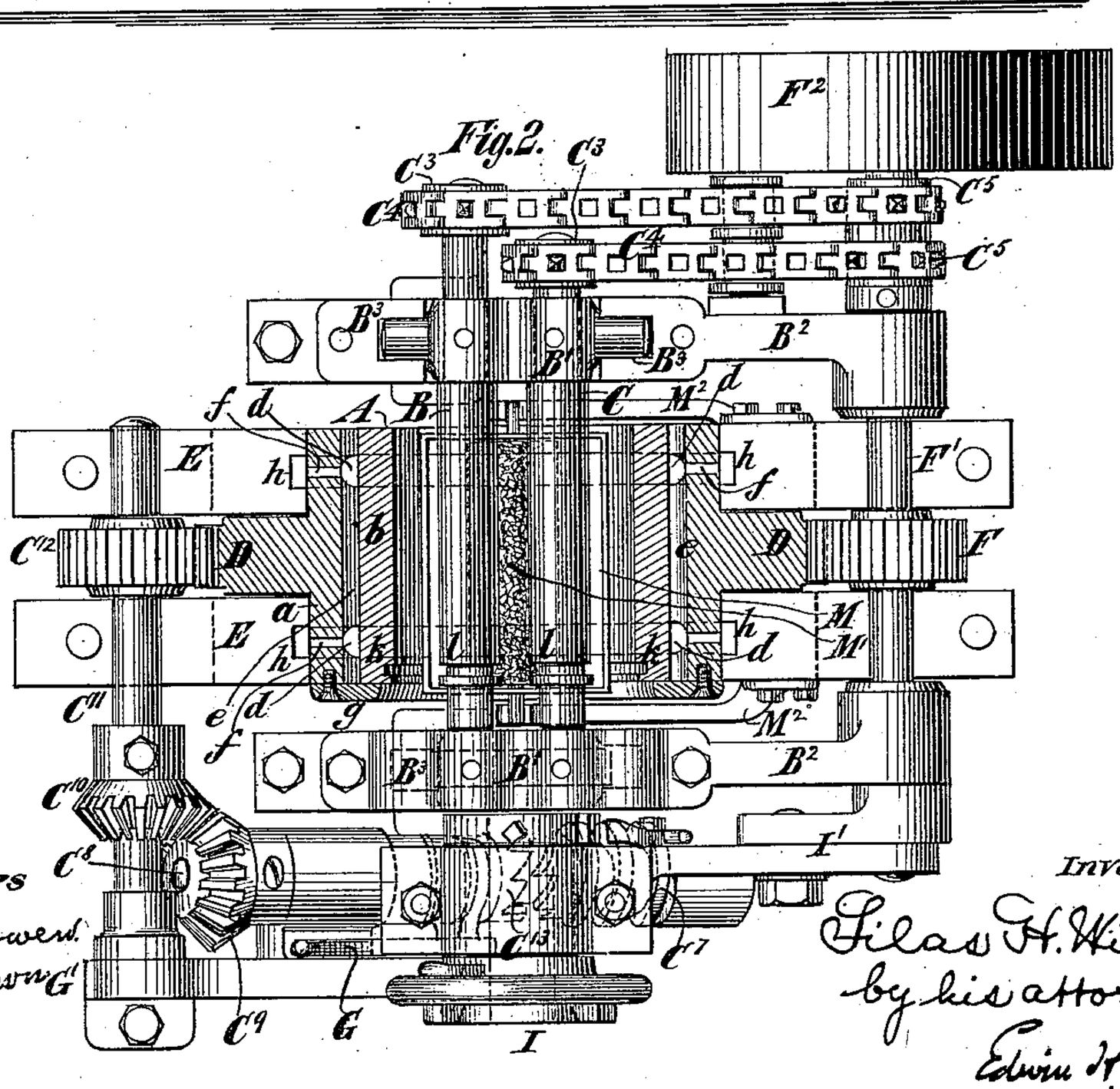


Fig. 2.



Witnesses

James R. Bowers.

A. L. Brown.

Inventor

Silas H. Wilson,

by his attorney,

Edwin H. Brown.

(No Model.) 3 Sheets—Sheet 2

S. H. WILSON.

MACHINE FOR ROLLING AXLES.

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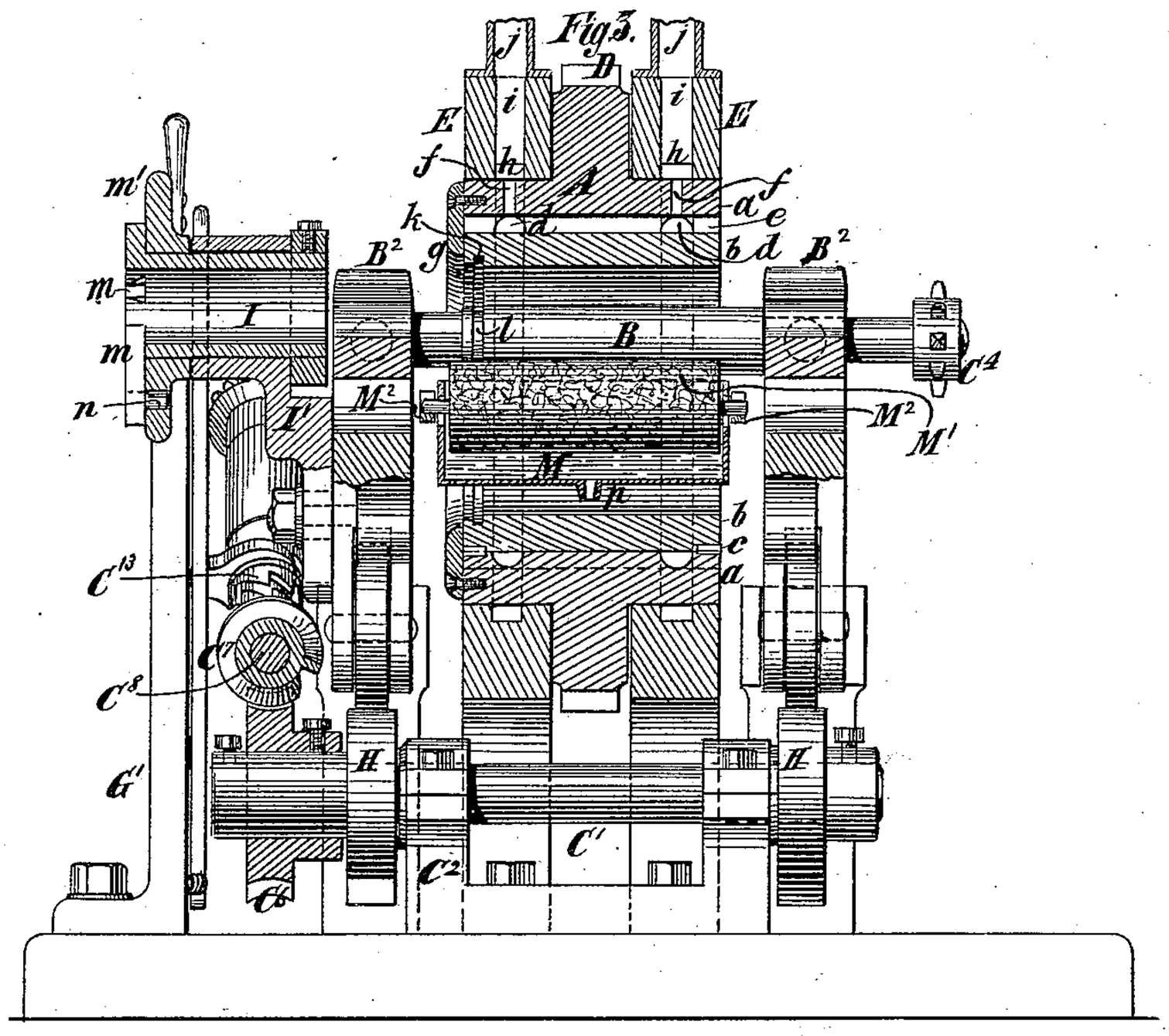
Fig 3.



Witnesses
James R. Bowen.
A. S. Brown.

Inventor
Silas H. Wilson,
by his atty,
Edwin H. Brown.

N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.) 3 Sheets—Sheet 3.

S. H. WILSON.

MACHINE FOR ROLLING AXLES.

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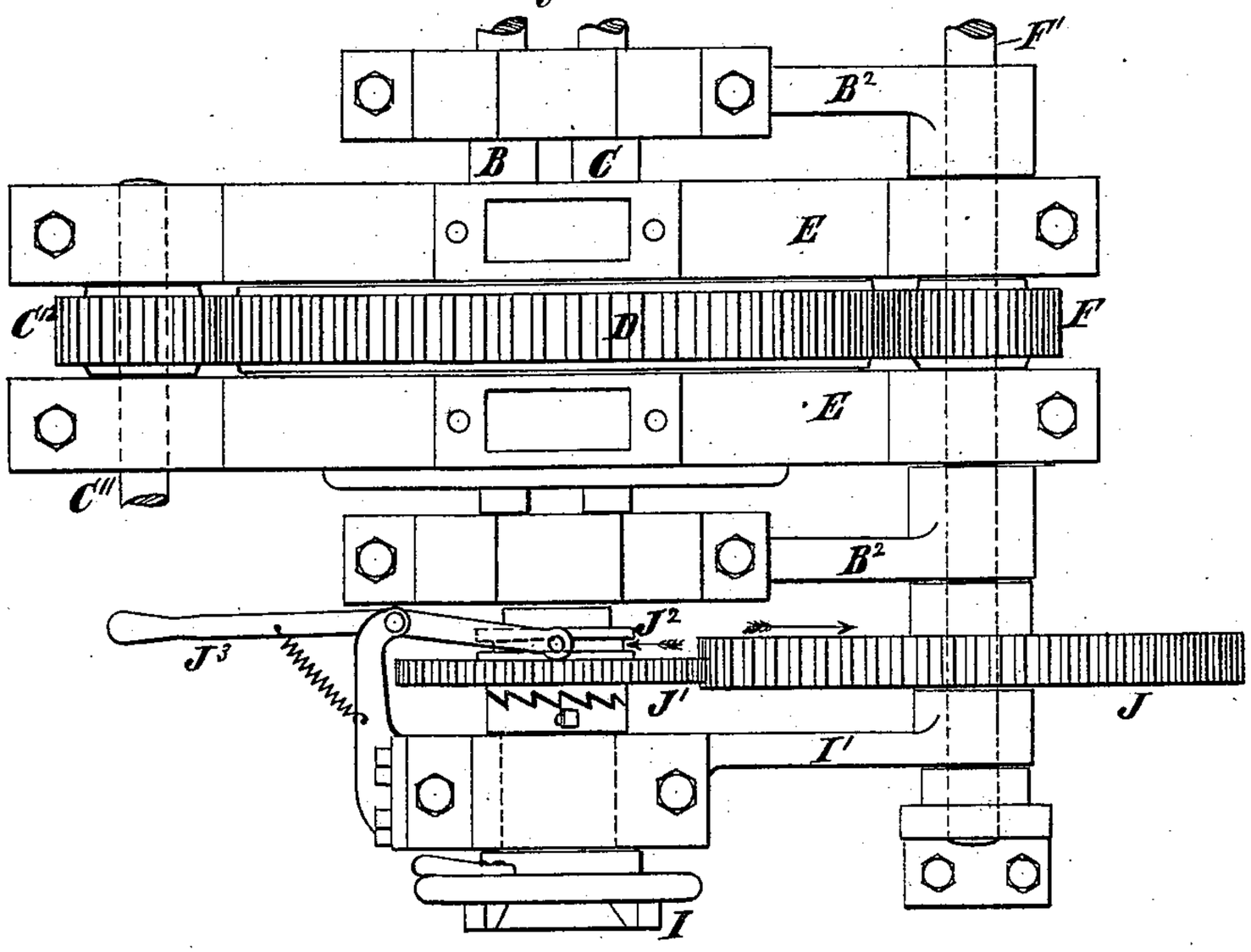
Fig. 5.



Witnesses
James R. Bowen.
Alfred L. Brown.

Inventor
Silas H. Wilson,
by his attorney,
Edwin H. Brown

UNITED STATES PATENT OFFICE.

SILAS H. WILSON, OF BROOKLYN, NEW YORK, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO ROBERT H. THOMPSON AND ELIZABETH WILSON, OF SAME PLACE, AND HENRY D. NORRIS, OF NEW YORK, N. Y.

MACHINE FOR ROLLING AXLES.

SPECIFICATION forming part of Letters Patent No. 297,546, dated April 22, 1884.

Application filed April 27, 1883. (No model.)

To all whom it may concern:

Be it known that I, SILAS H. WILSON, of Brooklyn, in Kings county, and State of New York, have invented a certain new and useful Improvement in Rolling Axles and other Round Articles, of which the following is a specification.

My improvement relates to machines for rolling axles and other round articles, wherein the rolling is performed by rollers operating with their axes parallel with the axes of the articles subjected to them.

In my machine the articles to be rolled are operated upon by the interior surface of an annular or female roller, and the exterior surfaces of male rollers extending within the female rollers.

The improvement will be described in detail, and then pointed out in the claims.

In the accompanying drawings, Figure 1 is a front view of a machine embodying my improvement. Fig. 2 is a plan of the same, with certain parts removed, and certain other parts shown in section. Fig. 3 is a central transverse vertical section of the same. Fig. 4 is a view of a roller detached from the machine, and Fig. 5 is a plan of a portion of a machine illustrating a modification of the improvement.

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

I will first describe the machine as illustrated in Figs. 1, 2, and 3.

A B C designate three rollers, between which the axles are rolled. The roller A encircles the rollers B C; hence the rolling of the axles is performed between the interior of the roller A and the exterior of the rollers B C. The roller A is shown as consisting of two cylindric shells, *a b*, fitting one within the other, and maintained in their relative positions by keys *c*, so that they will rotate together as one structure. In the inner surface of the outer shell, *a*, are two grooves or channels, *d*, which extend entirely around its circumference, and a number of intersecting grooves or channels, *e*, extending parallel with the axis from the front to the back. Channels *f* extend from the channels *e* radially to the outer surface of the shell. An annular plate, *g*, arranged on the front of the shells *a b* and extending from one to the other of the shells, covers the front ends of the channels *e*. The shell *a* of the roller A has on it a toothed flange or circumferential rib forming a gear-wheel, D. The portions of the shell on each side of this gear-wheel form the journals of the roller, and are supported in bearings in standards E. The bearings of these standards are provided internally with grooves or channels *h*, which are in the same planes as the radial channels *f* of the roller A, and communicate therewith. The channels *h* are in communication with ducts *i* in the standards. Pipes *j* are fastened to the standards, and communicate with the ducts *i*. Water supplied through the pipes *j* circulates into channels of the roller A, and escapes at the rear ends of the channels *e*, thus keeping the roller cool. The roller A is driven by means of a pinion, F, mounted upon a shaft, F′, and engaging with the gear-wheel D of the said roller. The shaft F′ is shown as constituting the driving-shaft of the machine, and is provided with a pulley, F^2, adapted to receive a belt, whereby motion may be transmitted to it. The rollers B C are supported in journal-boxes B′, arranged upon arms B^2, that at one end are loosely mounted on the shaft F′, and at or near the other end are free to rise and fall, to vary the positions of the said rollers with relation to the roller A. The journal-boxes B′ are provided with trunnions B^3, supported in bearings in the arms, so that the rollers may be adjusted to occupy positions at different angles to the said arms. It will therefore be evident that the arms can be adjusted independently of each other at different angles to the horizontal, owing to the manner in which they are mounted on the shaft F′, and that the said rollers can assume different angles relatively to the arms. In consequence of this these rollers may be adjusted at different angles relatively to the roller A. The arms are adjusted by cams H, which act against downward projections on the arms. These cams are arranged upon a shaft, C′, supported in standards C^2.

M designates a water-reservoir, and M′ designates a roller faced with absorbent material—such, for instance, as felt—rotating in said reservoir and in contact with the rollers B C. The journals of this roller extend through slots in the reservoir and rest on springs M^2, which impel the roller upward against the rollers B C, causing it to follow them when they rise, and allowing it to fall when they fall. The reservoir is provided with a nozzle, *p*, from which water drips onto the roller A. The rollers B C are shown as provided at the rear ends with sprocket-wheels C^3, with which engage chains C^4, that also engage with sprocket-wheels C^5 on the shaft F′. The surface speed of the interior of the roller A and that of the rollers B C are to be the same.

The shaft C′, which carries the cams H, is provided with a worm-wheel, C^6, that gears with a worm, C^7, on a shaft, C^8. This shaft C^8 extends obliquely to the shaft C′, and at the upper end it is provided with a bevel-gear wheel, C^9, which engages with a bevel-gear wheel, C^{10}, on a shaft, C^{11}. This shaft C^{11} derives motion through a pinion, C^{12}, with which it is provided, engaging with the gear-wheel D of the roller A. The worm C^7 is loose on the shaft C^8, and is made to derive motion therefrom by means of a clutch-piece, C^{13}, which engages with a spline or feather on the shaft, so as to rotate therewith, but which can be moved lengthwise of the shaft. The clutch-piece and worm may be made to engage by any suitable devices. In this example of my invention ratchet-shaped teeth are formed on their adjacent ends for this purpose. A lever, G, which is fulcrumed to a standard, G′, contributing to the support of the shaft C^{11}, serves as a means for shifting the clutch-piece into engagement with the worm. A spring, G^2, acting on the lower end of this lever, shifts the clutch-piece out of engagement with the worm when the lever is released by the operator. The cams H on the shaft C′ are of the snail form, or, in other words, have faces which increase in eccentricity throughout their extent. The shaft C′ makes but one rotation to a number of rotations of the rollers B C; hence a bar of metal placed between the rollers A B C is rolled around a number of times, and the cams gradually force the rollers B C toward the opposite surface of the roller A.

It will be remembered that the arms B^2, which support the rollers B C, can be adjusted independently of each other and into different positions from each other, so as to cause the rollers B C to assume positions parallel with the opposite surface of the roller A or at angles relatively thereto.

The cams H may be differently formed or differently set, so that the one at the front of the machine will force up the adjacent ends of the rollers B C slightly in advance of the other end, to allow of the metal, as the rolling progresses, to be forced toward the rear end of the rollers. When a taper is to be given the rolled article, one of the cams H may have a greater throw than the other, so as to bring one end of the rollers B C nearer to the roller A than their other ends.

In the roller A is a groove, *k*, and in the rollers B C are corresponding grooves, *l*, whereby the collar of the axle is formed. Preferably the grooves *l* of the rollers B C are formed partly in sleeves S, which fit the rollers loosely and are free to turn thereon. It is advantageous to employ these sleeves to compensate for the different speeds at which the different parts of the metal being rolled will have, owing to their different diameters. The rollers will always be provided with grooves *k l* when designed to roll axles or other articles which have collars; but if it is desired to roll straight or taper articles without collars, then rollers without the grooves *k l* will be substituted.

I designates a chuck, in which the metal to be rolled is secured. It consists of a cylinder supported in a bearing in an arm, I′, which is hung loosely on the shaft F′ and connected to the adjacent arm B^2, so as to rise and fall therewith. At the front of the cylinder of the chuck are a number of dogs, *m*, adapted to slide toward and from the axis of the cylinder, and having on the backs lugs which fit in arc-shaped slots *n*, arranged in a wheel, *m′*, mounted loosely on the cylinder near the front. The slots of the wheel extend eccentrically to the cylinder. The wheel *m′* has a handle, whereby it may be turned; and a lever, *o*, provided with a tooth adapted to engage with a notch in a flange at the rear end of the cylinder, serves as a means for holding the cylinder stationary while the wheel is being turned. By holding the cylinder in this manner and turning the wheel, the dogs may be adjusted toward and from the axis of the cylinder, to secure or release a bar of metal placed in the cylinder. Owing to the manner in which the chuck is supported, it rises and falls with the rollers B C.

The chuck I may derive rotary motion from the metal bar which it holds, but preferably it will be positively driven. In Fig. 5 I have shown a means for driving it.

J designates a gear-wheel upon the shaft F′, and J′ designates a gear-wheel on a sliding clutch-piece, J^2, by which rotary motion is transmitted to the clutch-cylinder. The clutch-piece can be shifted by means of a lever, J^3, so as to engage it with or disengage it from the clutch-cylinder. When the clutch is thus rotated, it rotates the bar of metal in the same direction in which it would be rotated by contact with the rolls. This clutch-piece and the clutch-cylinder are provided with ratchet-shaped teeth, by which they are locked together. A spring may be employed for normally controlling the engagement of the clutch-piece with the clutch-cylinder.

If a counter-shaft is used and geared to the shaft F′, so as to rotate reversely, a sprocket-

wheel may be arranged on the counter-shaft. Another sprocket-wheel may be arranged on the clutch-piece, and a chain may pass around the sprocket-wheels to transmit motion from one to the other. The gear-wheels J J′ can then be omitted.

In making axles, round iron or steel is generally employed, as it is cheaper than square bars, and the axles are formed in two parts, each of about half the length of the finished axle.

The bar of metal to be rolled is slipped through the clutch-cylinder and between the rolls A B C. It is then fastened in place within the clutch-cylinder, and afterward the clutch-piece is allowed to engage with the clutch-cylinder, so as to transmit motion to it. The clutch will rotate at about the same speed as the speed which the metal bar would derive from the action of the rollers A B C. If the rollers will carry the bar faster than the clutch-piece rotates, they can do so, because, owing to the shape of the teeth whereby the clutch and clutch-piece are locked, the clutch can rotate ahead of the clutch-piece. After the metal bar has started its rotation, the clutch C^{13} is shifted so as to start the worm C^{7}. As soon as the worm rotates, the cams H are caused to gradually force the rollers B C toward the opposite surface of the roller A. After these cams have made a complete rotation, the rollers B C are allowed to drop, and the clutch-pieces C^{13} and J^{2} being disengaged from the parts to which they transmit motion the clutch may be released from the metal bar and the latter withdrawn. If the axles are to be square, the entire length of each bar back of the collar formed by the grooves *k l*, and including the part of the bar which was held in the chuck, is then forged square, and two halves or pieces, each having a journal, are to be welded together to produce a finished axle.

The rollers of the machines described may be made of steel, and the other parts may be made of iron.

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

1. In a machine for rolling round articles, the combination of an annular or female roller, male rollers extending within the same, and means for rotating them so that their adjacent surfaces will move in the same direction, the operation of rolling being performed by the interior surface of the female roller acting in conjunction with the exterior surfaces of the male rollers, substantially as specified.

2. In a machine for rolling round articles, the combination of an annular or female roller, male rollers extending within the same, means for rotating the rollers, and mechanism for producing a movement of the male rollers toward the opposite portion of the female roller, substantially as specified.

3. In a machine for rolling round articles, the combination of an annular or female roller, male rollers extending within the same, a chuck for holding the metal to be rolled, means for rotating the rollers, and mechanism for moving the male rollers toward the opposite portion of the female roller and raising and lowering the chuck correspondingly, substantially as specified.

4. In a machine for rolling round articles, the combination of an annular or female roller, male rollers, a chuck for holding a bar of metal to be rolled, and means for rotating the said rollers and the said chuck, substantially as specified.

5. In a machine for rolling round articles, the combination of an annular or female roller, male rollers, supports for the journals of the latter admitting of the adjustment thereof at different angles, and means for forcing the male rollers toward the opposite surface of the female roller with the front end in advance of the rear end, substantially as specified.

6. The combination, with the annular or female roller A, provided with channels, of bearings therefor provided with channels, and means for supplying water to these channels, substantially as specified.

7. The combination, with the annular or female roller A and the male rollers B C, of a water-reservoir, and a roller rotating therein and in contact with the rollers B C, substantially as specified.

SILAS H. WILSON.

Witnesses:
T. J. KEANE,
ED. L. MORAN.