

(No Model.)

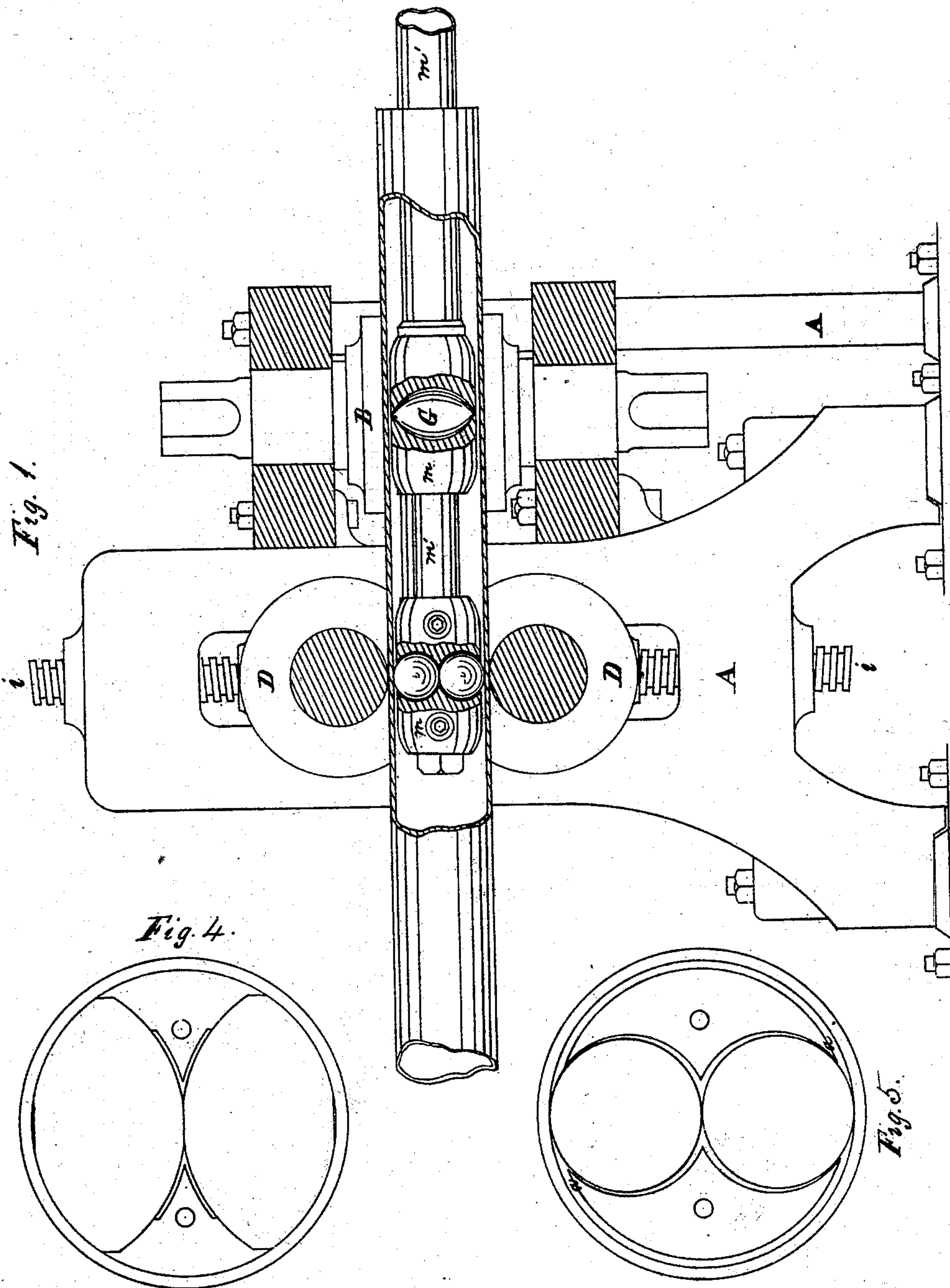
2 Sheets—Sheet 1.

C. KELLOGG.

MACHINE FOR ROLLING TUBES, COLUMNS, &c.

No. 278,340.

Patented May 29, 1883.



Witnesses

*Samuel C. Choy*  
*A. B. Dodge*

*Cha' Kellogg*

*Inventor.*

(No Model.)

2 Sheets—Sheet 2.

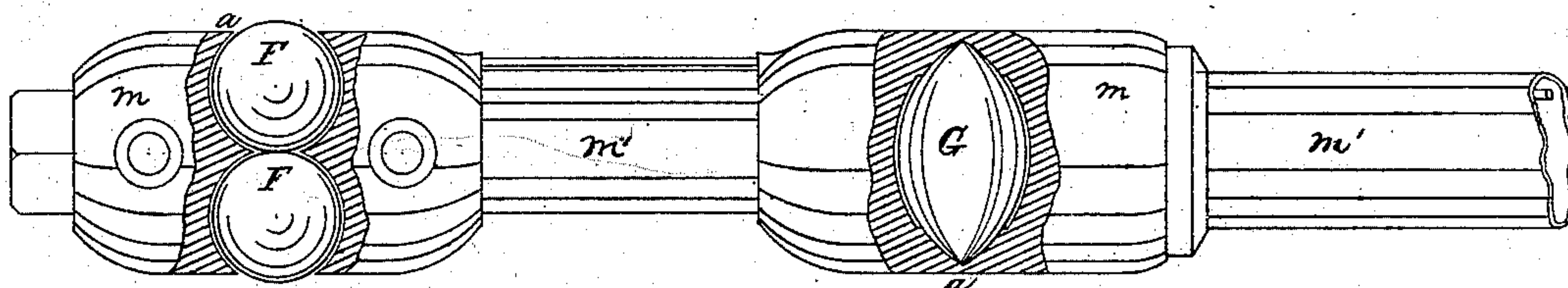
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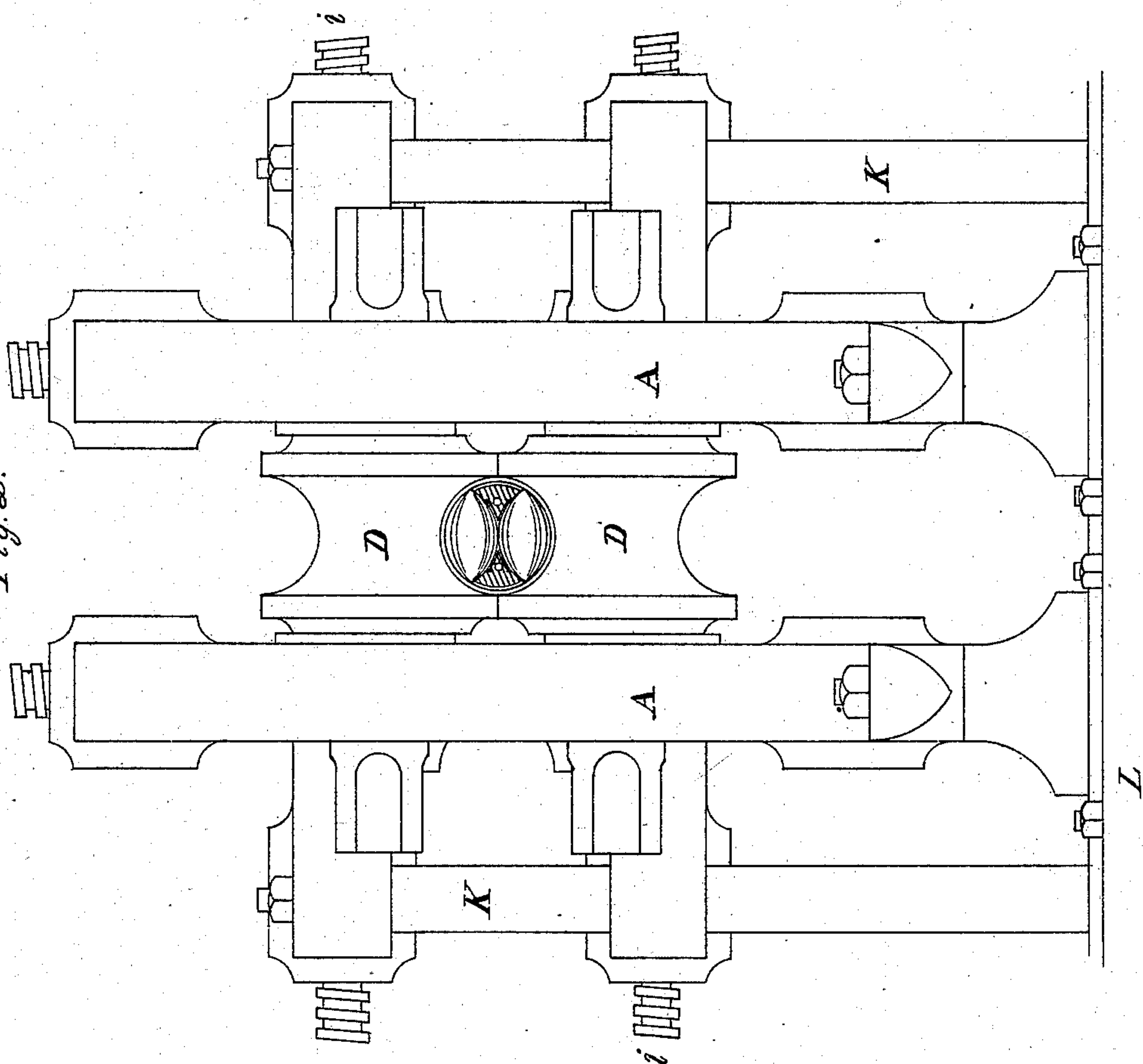
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*Fig. 3.*



*Fig. 2.*



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A. B. Dodge

Chas. Kellogg  
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# UNITED STATES PATENT OFFICE.

CHARLES KELLOGG, OF BUFFALO, NEW YORK.

## MACHINE FOR ROLLING TUBES, COLUMNS, &c.

SPECIFICATION forming part of Letters Patent No. 278,340, dated May 29, 1883.

Application filed June 20, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES KELLOGG, of Buffalo, in the county of Erie and State of New York, have invented certain new and useful improvements in machinery for manufacturing metal tubes and for rolling tubes, columns, shafts, and other hollow cylindrical forms from hollow billets and ingots of metal; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the drawings which accompany and constitute a part of this specification.

In the drawings, Figure 1 is a sectional view of a two-high universal rolling-mill such as is in common use, showing a tube or a billet or ingot in the position it occupies in being rolled by my method, and also showing one of a pair of exterior horizontal rolls and a pair of exterior vertical rolls, together with the interior rolls, which are carried in the mandrel, herein-after to be described. Fig. 2 is an end view, showing the tube and the vertical rolls in the position in which they are when the operation is finished. Fig. 3 is an enlarged view of my improved mandrel, which carries two pairs of interior rolls corresponding to the respective horizontal and vertical exterior rolls already referred to. Figs. 4 and 5 are enlarged detail views of the interior or mandrel rolls.

This invention consists, first, in a mandrel which is provided with two pairs of rolls arranged in chambers on the mandrel-rod and adapted to roll the inner surface of tubes, columns, shafts, and other hollow cylindrical forms; and, second, in the combination, in a universal mill or other apparatus for rolling metal, of two pairs of exterior rolls adapted to form the exterior surface of a metallic tube, column, shaft, or other hollow work of cylindrical or other desired shape from a hollow billet or ingot, or from metal in any other suitable condition, with a mandrel adapted to enter the tube or other work, and carrying two pairs of rolls arranged so as to act upon the interior surface of the work at points exactly opposite those at which the action of the exterior rolls takes place, and thereby to roll and form and consolidate the inside surface at the same time that the exterior rolls produce a similar effect upon the outside.

In the drawings, A A K K, Figs. 1 and 2, represent the standards of a set of ordinary two-high rolls, consisting of a pair of horizontal rolls, B, (of which only one can be seen in the figures,) and a pair of vertical rolls, D D. These pairs of rolls are arranged at right angles with and at a short distance from each other, and are in all respects alike, and are constructed and operated in the usual way. Both sets of them are provided with screws *i i* for advancing and withdrawing them to and from the work in the customary manner. L is the bed-plate to which the standards are bolted. No further description of this portion of the machinery is necessary, as it is in every respect the same as the usual universal mill well known to iron-rollers.

*m m*, Figs. 1 and 3, represent the controlling novelty in my invention. It is what may be termed a "double hollow mandrel," and it is designed to be held stationary while within the tube, hollow cylinder, or other work to be rolled, and to roll and form the inner surface of the work, and to consolidate and refine the material while the tube is passing over it at the same time that similar effects are being produced by the exterior rolls upon the outer surface of it. I construct the slotted chambers *m m* of said mandrel at suitable points on the mandrel-rod *m'*, and in each of these chambers I arrange a pair of small rolls, F F G G, which are adapted to project slightly through openings *a a* in the walls of the chambers against the interior surface of the tube or other article to be rolled. The shafts of these rolls have short journals at their ends, which are supported and turn in recesses in the shell of the chambers; but the rolls have their principal bearing upon each other, and are always in contact, as the interior diameter of the tube or other work does not change, but remains the same as that of the billet or ingot or other form of metal from which it is made. It results from this that the function of these mandrel-rolls is to serve as anvils for the exterior rolls. Like the latter, the respective pairs of them are arranged at right angles with and at a short distance from each other, and, as is represented in Figs. 1 and 3 of the drawings, each respective chamber must be so arranged and located upon the mandrel-rod that



the action of the pair of rolls carried in it upon the interior surface of the tube or other work to be rolled will necessarily be precisely opposite the points at which a pair of either the horizontal or vertical exterior rolls will at the same instant be acting. By this means not only is the work suitably sustained from the inside against the pressure of the exterior rolls, but the inner surface of it is thoroughly consolidated as well as made more uniform and far more perfect in outline than it could otherwise be.

The operation of my invention is as follows: A hollow billet or ingot of homogeneous material—such as steel, homogeneous iron, or other suitable metal, or any other work to be rolled—is first prepared in any of the usual ways. When at a proper heat for rolling it is placed in the mill, and the mandrel is introduced into it and adjusted in the requisite position to effect the results above referred to. The mill being started, the work is rolled with the ordinary manipulation, the exterior rolls being rotated by gearing, as usual, and the mandrel-rolls being operated by the reciprocatory movement of the work upon them, and the process is continued until complete, when the work will have become a finished tube, as seen in Fig. 2, of uniform diameter and walls throughout, or of whatever other hollow form the rolls may be adapted to.

It is believed that by means of this improved mandrel tubes and analogous work of large diameter can be successfully rolled, and in longer lengths than by any other mode of operation, and the interior surface of the work will in all cases be far more close and uniform in texture and its outline far more accurate than can be attained by any other system. At the same time the combined operation of the interior and exterior rolls will thoroughly condense the material employed throughout its mass, and when billets or piles are used will weld their respective constituents solidly together and refine and make homogeneous the metal of which they are composed.

I do not claim, broadly, a hollow mandrel

carrying a pair of rolls, as that has before been patented; but my improved mandrel here described is designed to roll, form, and condense the inner surface of the work, and is to be used with two pairs of exterior rolls. It is therefore essential to it that the rolls carried by it should be in different pairs, and hence in more than one chamber, and that the respective pairs of them should be arranged on the mandrel-rod at right angles with each other and at a distance apart corresponding with the distance apart of the exterior pairs of rolls, so that they shall at all times be in such relation to and be so combined with the respective pairs of exterior rolls that their action will necessarily be precisely opposite the points of action of the latter.

The manner in which I form and combine the mandrel-rolls so that they shall roll upon each other on a long central bearing, thus insuring their durability, is fully shown in Figs. 4 and 5, but is not here claimed, as it will be made the subject of another application for Letters Patent.

Having thus made known my improvements, what I claim therein as new, and desire to secure by Letters Patent, is—

1. A mandrel for rolling and forming the inner surface of metal tubes, columns, shafts, and other hollow cylindrical or otherwise shaped work, consisting of a mandrel-rod having two chambers, in each of which is a pair of rolls, which pairs are arranged at right angles with each other and at a distance apart corresponding to the distance apart of the pairs of exterior rolls of the mill, substantially as described.

2. The combination, in a mill for rolling iron or other metal, of two pairs of exterior rolls with a mandrel having two chambers on a mandrel-rod provided with pairs of rolls, arranged as described, the whole operating in the manner set forth.

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Witnesses:

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A. B. DODGE.