

(No Model.)

2 Sheets—Sheet 1.

Z. & C. N. TEETOR.

MACHINE FOR STRAIGHTENING TUBING OR SHAFTING.

No. 585,720.

Patented July 6, 1897.

Fig. 1.

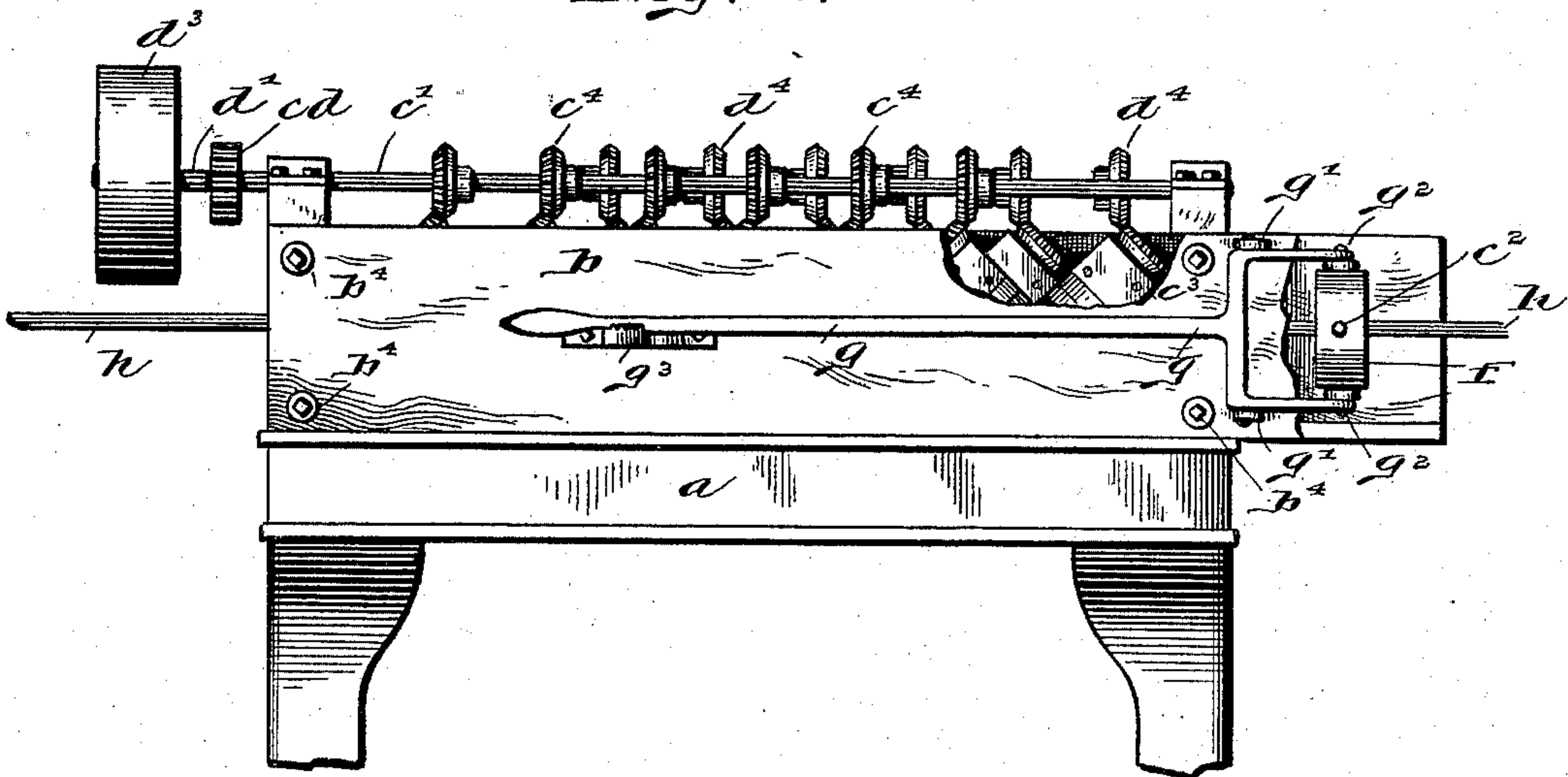


Fig. 2.

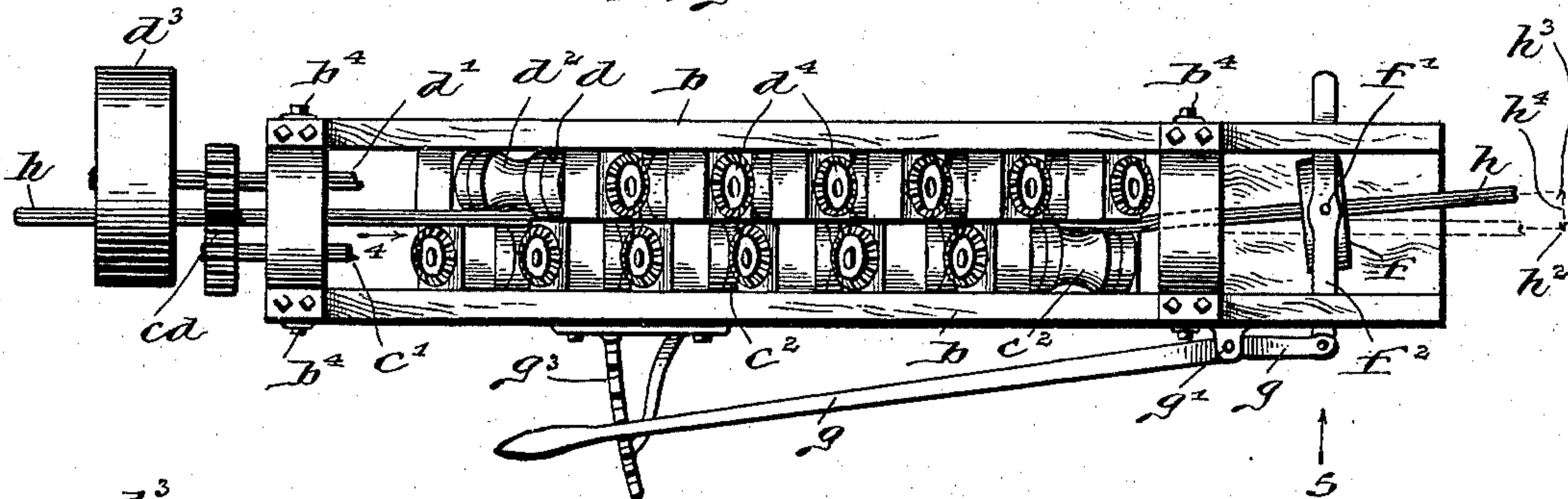
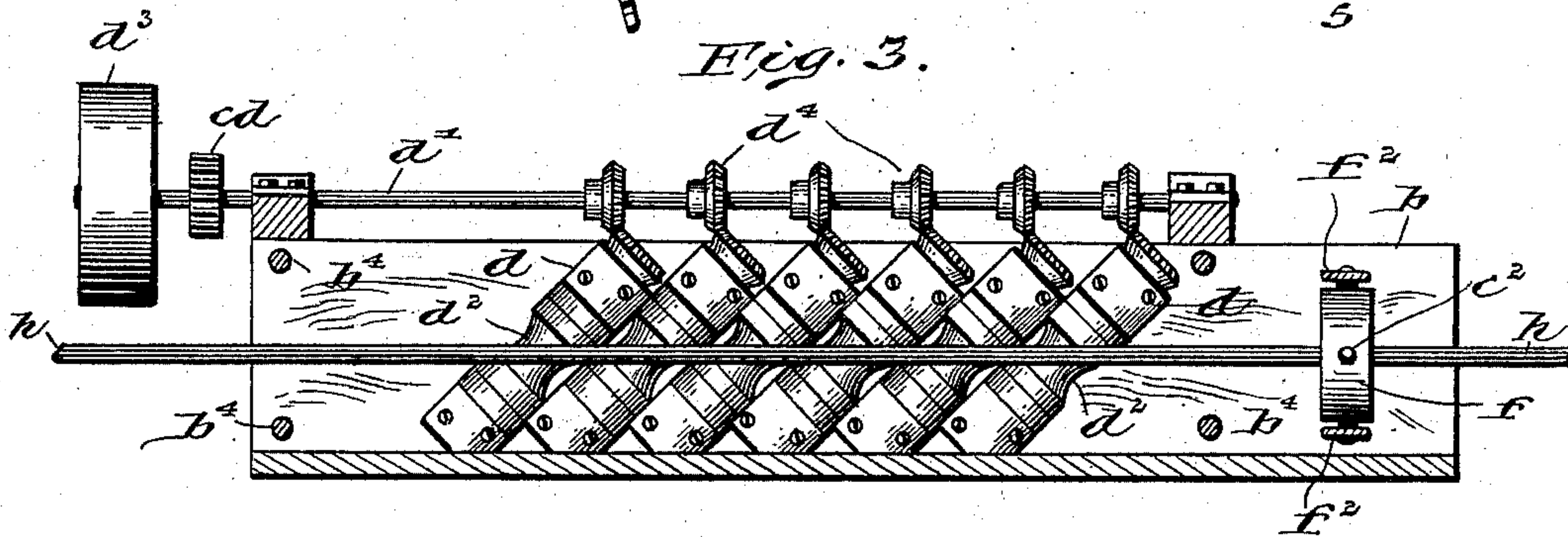


Fig. 3.



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(No Model.)

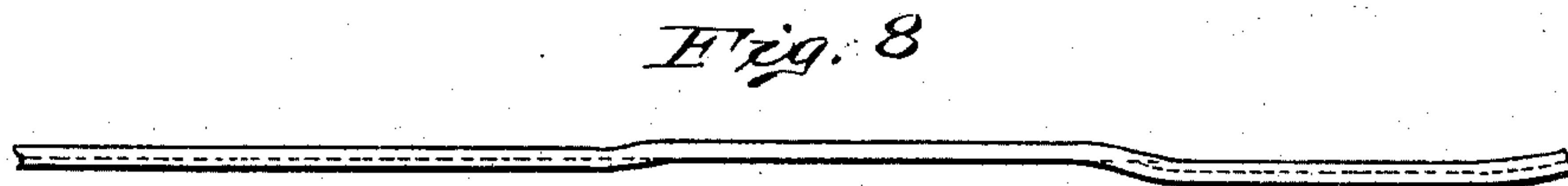
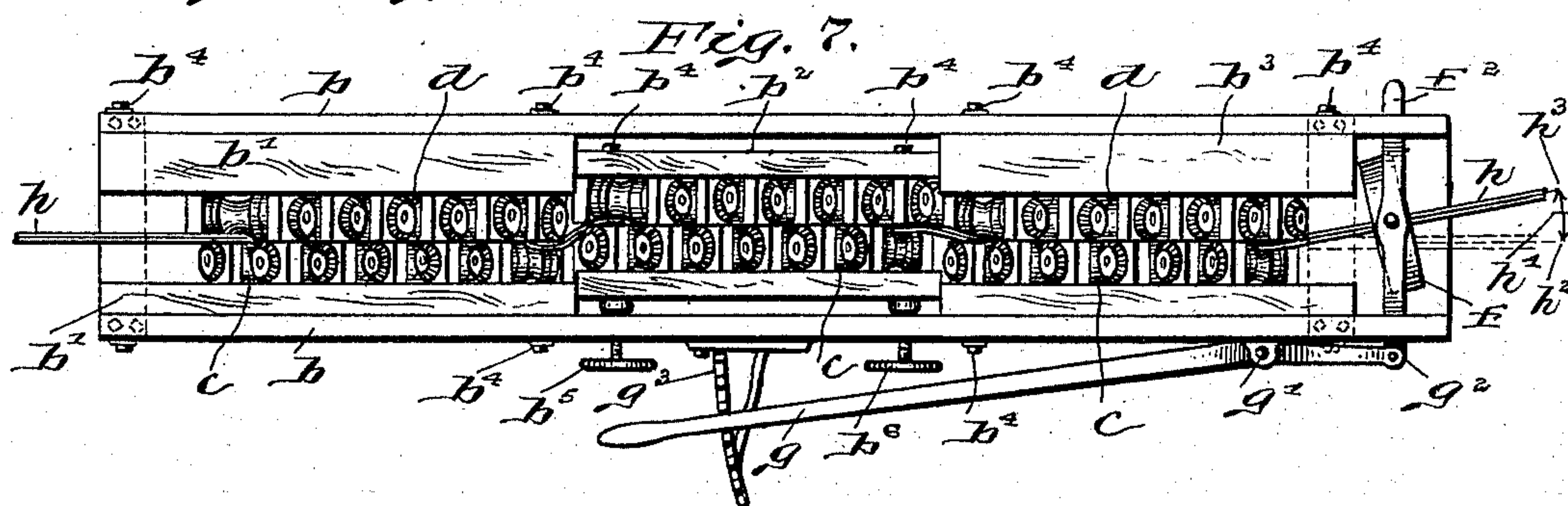
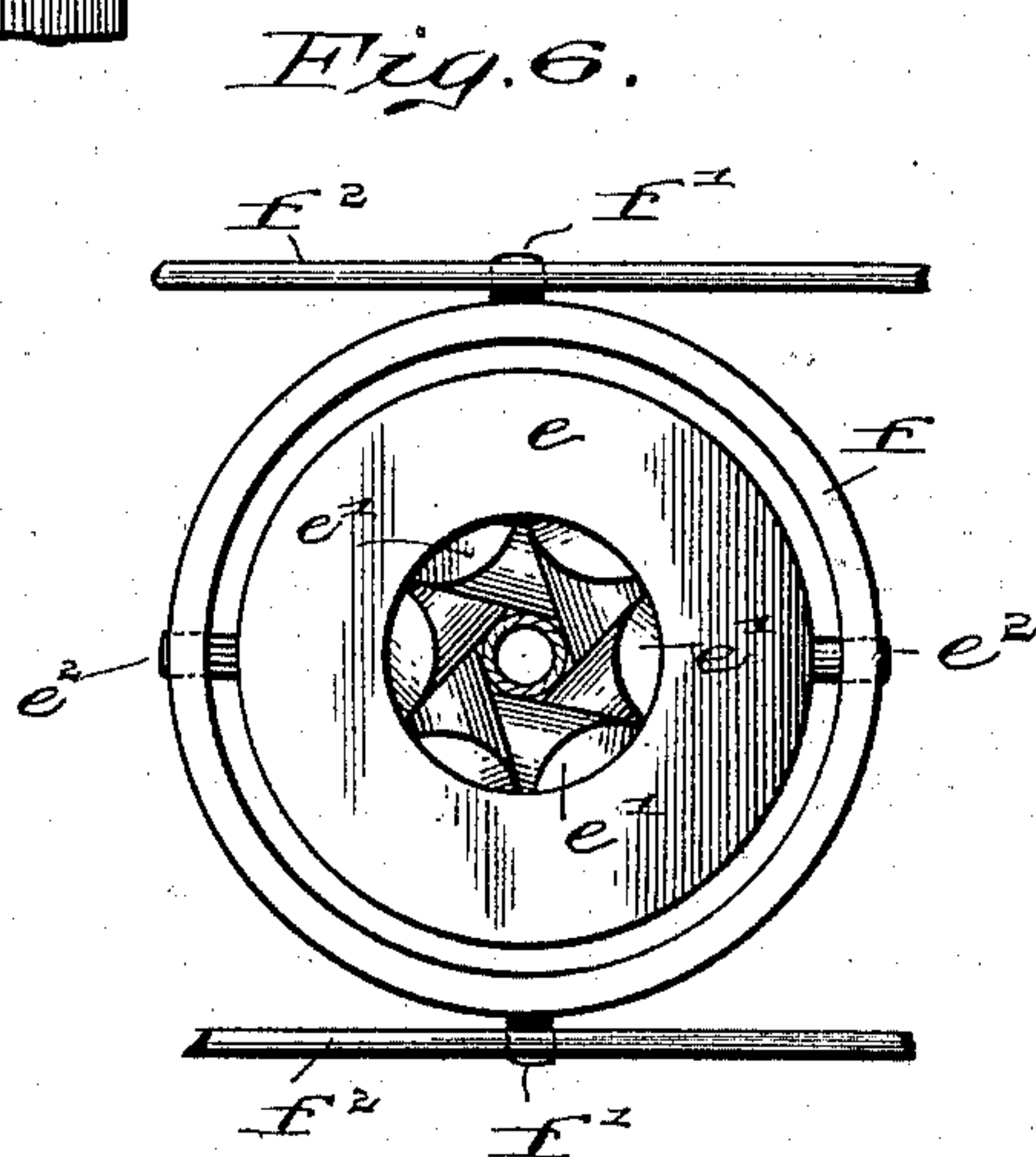
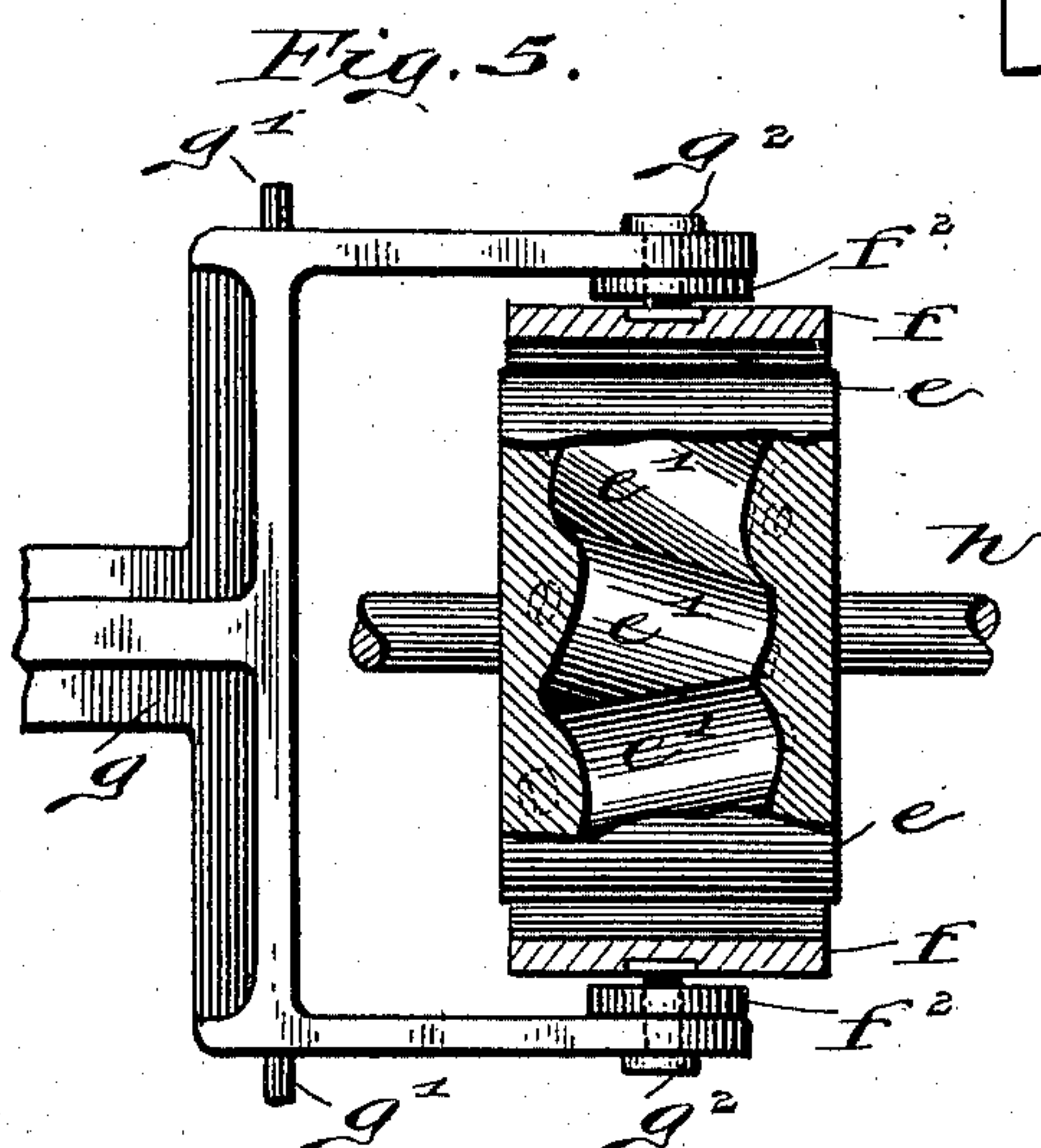
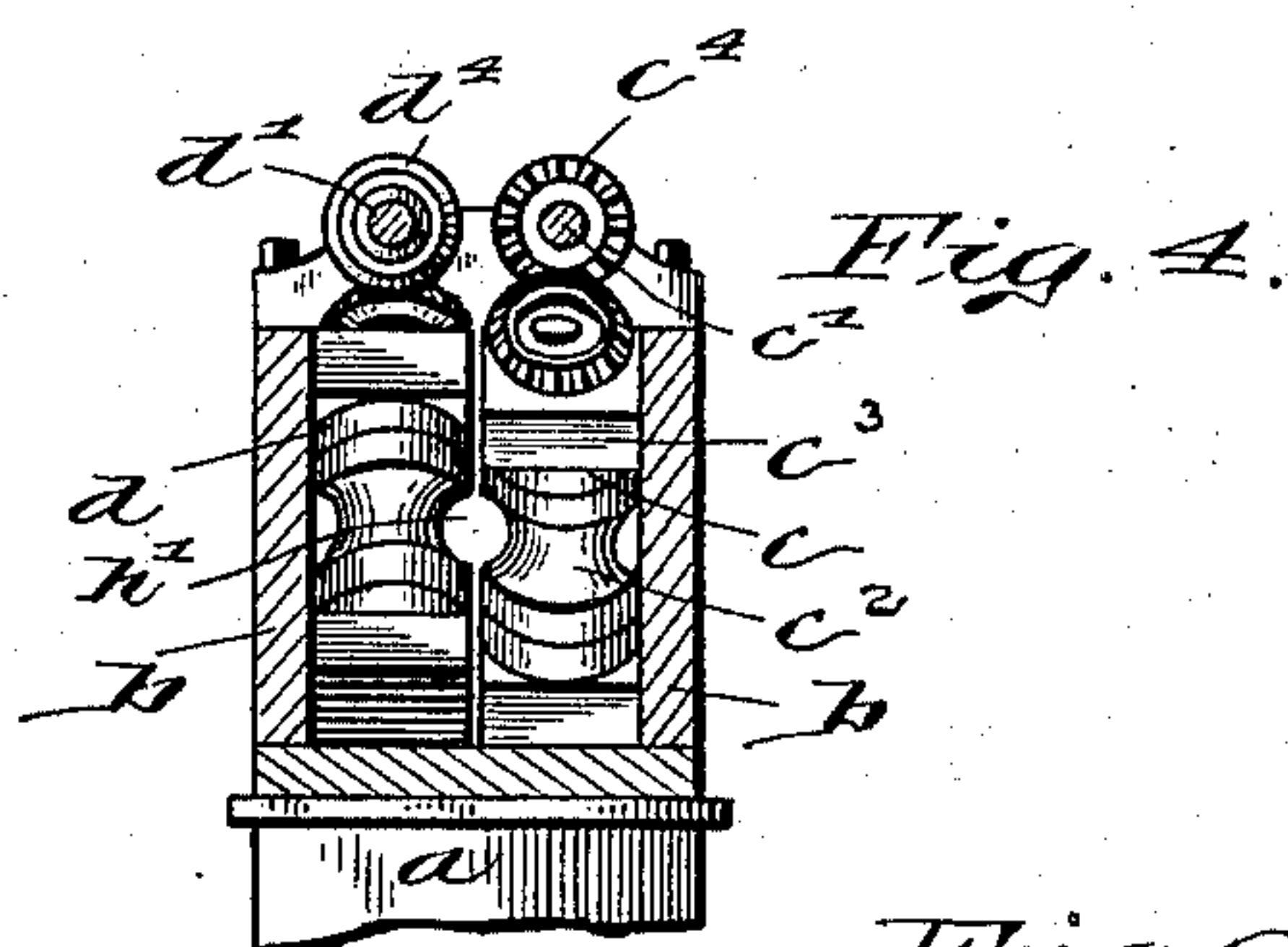
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Z. & C. N. TEETOR.

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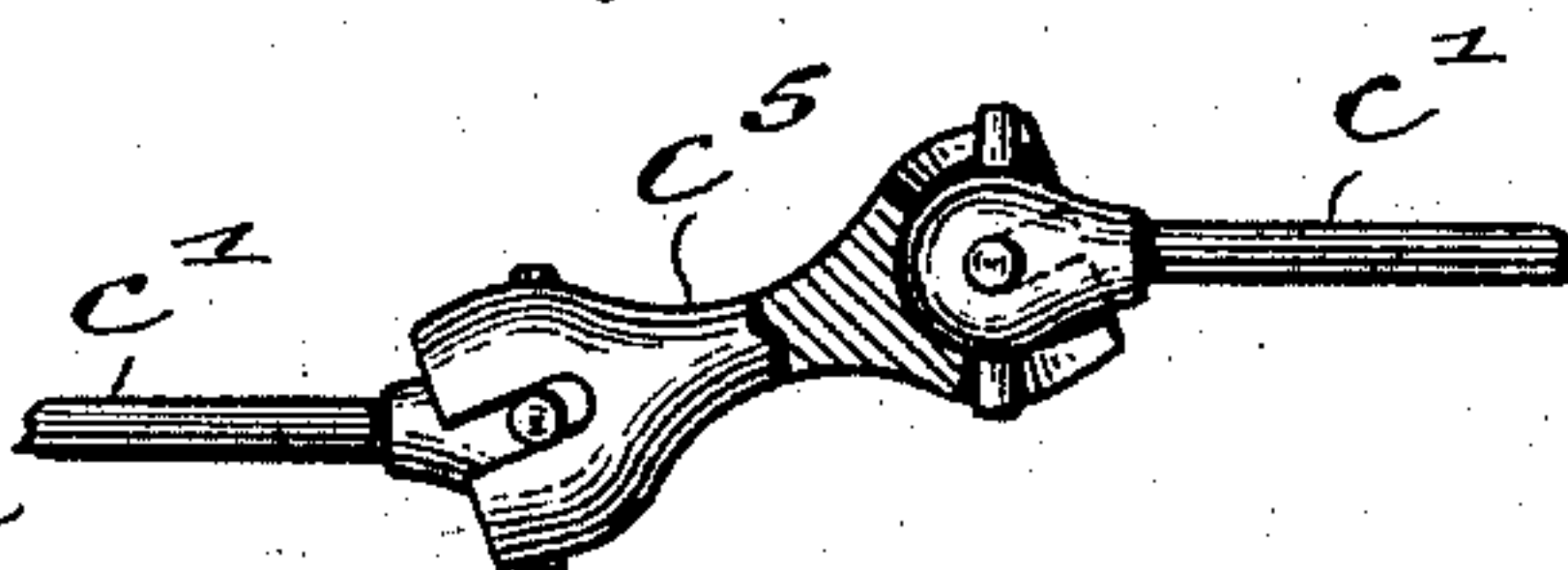
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ZACHARIAH TEETOR AND CHARLES N. TEETOR, OF HAGERSTOWN, INDIANA.

MACHINE FOR STRAIGHTENING TUBING OR SHAFTING.

SPECIFICATION forming part of Letters Patent No. 585,720, dated July 6, 1897.

Application filed February 8, 1896. Serial No. 578,528. (No model.)

To all whom it may concern:

Be it known that we, ZACHARIAH TEETOR and CHARLES N. TEETOR, of Hagerstown, in the county of Wayne and State of Indiana, have invented certain new and useful Improvements in Machines for Straightening Shafting and Tubing, of which the following is a description.

Our invention relates to machines for straightening tubing and shafting, the objects being to straighten tubing of light and delicate gages, such as is used in bicycles and other arts at the present time; second, to true up the walls of flattened or dented tubing; third, to make tubing more smooth on its outer surface. These objects are obtained by the mechanism illustrated in the accompanying drawings and described by the following specification and pointed out in the claims.

In reference to the drawings, Figure 1 is a side elevation of our device complete as it appears in operation, certain parts being broken away to show interior. Fig. 2 is a top view of the straightening-rolls, part of the driving-shafts being broken away and the roll drive-gears omitted. Fig. 3 is a sectional side view of one-half set of the rolls and tubing. Fig. 4 is a detached view of the rolls and a section of the tubing, looking in the direction of arrow 4. Fig. 5 is an enlarged detached sectional view of the universally-mounted guide-rolls and the adjusting-lever, looking in the direction of arrow 5. Fig. 6 is an enlarged end view of the universal guide, looking in the direction of arrow 6. Fig. 7 is a top view of a tube-straightening machine having a number of groups of rolls, the driving mechanism having been partly omitted. Fig. 8 is a view of a tube passing through a multiple-group machine, such as is represented by Fig. 7. Fig. 9 is an enlarged detached partially sectional view of a flexible coupling connecting the different sections of shafting transmitting motion to the different sets of rolls in a multiple-group machine.

Similar letters of reference refer to similar parts throughout the several views.

To the table or plate *a* are attached two side plates *b*, one on each side, between which are secured, by means of journal-blocks *c*³, a

series of rolls *c* and *d*, a journal being provided at each end of said rolls, (not all shown in drawings,) said rolls being provided with one or more longitudinally-concave sections *c*². If more than one concave section is provided on each roll, they are preferably of various sizes, so as to suit the straightening of stock of different sizes at same time, said concave sections being preferably of a depth equaling one-half the diameter of stock to be straightened, the curvity of said concave sections of said rolls representing preferably a true arc of a circle whose diameter is sufficiently greater than the diameter of the stock to be straightened that said rolls may be set at an angle of about forty-five degrees to axis of said stock. Said rolls are fixed in relation to general horizontal line of machine at an angle preferably of about forty-five degrees, the rolls *c* being located on one side and rolls *d* directly opposite to the former and their axis being preferably at right angles thereto, the concave section of rolls of each pair being brought directly opposite to that of the other, as seen in Fig. 4, so they embrace or describe a full circle *h*¹, thus forming a complete circular aperture betwixt each two opposite rolls through which the tubing or rod passes while being straightened. Each roll is preferably provided at upper end with a gear-wheel, which is adapted to mesh with and receive motion from a similar gear-wheel fixed on shaft lying longitudinally with the machine. Thus the shafts *c*¹ and *d*¹, which are the driving-shafts, and *c*⁴ and *d*⁴ are pairs of gears communicating motion from said shafts to rolls, said shafts being coupled together at *c*¹ *d*¹, preferably by spur-gears, and driven by belt-wheel *d*³, mounted on outer end of one shaft. In advance of rolls *c* and *d* is a set of guide and straining or deflection rolls *e*¹, journaled obliquely within case *e*, which latter is pivotally mounted in ring *f*, which in turn is pivotally mounted at opposite quarters *f*¹ in bars *f*², thus forming a universal mounting for said set of guide-rolls, which are controlled by means of lever *g*, which is hinged at *g*¹ to frame and connected at *g*² to bars *f*² and is held in adjustment by saw-toothed bracket *g*³. Said rolls *e*¹ are set at an angle with the axis of tubing or shafting being

straightened, so that while they receive motion from rotation of said tubing or shafting they in turn tend to feed the same forward.

In the matter of straightening tubing which is of ductile or soft material one set or group of rolls and the set of guide-rolls just described, combined as seen in Fig. 2, is all that is required. Thus the tube h is introduced through guide-rolls first, then fed into the rolls c and d , which are drawn together by means of bolts b^4 , so as to clamp tubing very tightly between said rolls, which latter will give the tubing a rotating motion and gradually draw it through longitudinally while a certain side strain or deflection brought upon the tubing by means of lever g , so as to strain it to any desired degree beyond the limit of its elasticity as to straighten. Thus dotted line h^2 shows the position of tubing before being strained, h^3 the deflection, and h^4 amount of deflection.

It has been found that while one group of rolls c and d , in combination with the deflection or guide rolls e' , are sufficient, ordinarily, to straighten tubing or rods made of soft metals it is necessary, to straighten more elastic stock, to extend the number of grooved or concave rolls to the extent of three groups at least, arranged as shown at Fig. 7, in which the driving mechanism has been omitted, which is necessarily the same as for single-group machines, with the exception that the shafts c' and d' are coupled together between the several groups b' , b^2 , and b^3 by short intervening shafts and flexible couplings c^5 .

In the machine having three groups of rolls placed as shown in Fig. 7 sections or groups b' and b^3 are preferably fixed permanently, so that the central opening h' of one group is practically in line with that of the other, while the central group b^2 is adapted to be adjusted laterally by adjusting-screws b^5 and b^6 , so that a piece of tubing passing through the machine assumes the general form shown in Fig. 8 so far as it is confined within the machine. The central section group b^2 is adjustable independently at either end thereof, as it is found desirable to adjust one end to a greater or less degree than the other oftentimes, as the most extreme bending beyond the elastic point should be at or by the guide or deflection rolls e' , and at next bend or between sections b^3 and b^2 , where there are two bends, they should be adjusted by gradually lessening the bending at each point of deflection, last two taking place between groups b^2 and b' , so that tube or rod being straightened will emerge from machine perfectly straightened, or nearly so.

The entire process consists in bending the irregular or crooked portions of a tube or bar sufficiently far in opposite direction to their original crooks to cause a permanent set, this being beyond point of elasticity, and graduating this process at each individual action by means of the lever g and screws b^5 and b^6 , before mentioned.

Indentations are removed from tubing on the latter being passed through our machine by the process of firmly gripping the tubing at two or more sections, said sections being held eccentrically to one another, and said tubing being rotated while thus firmly gripped and fed forward by the action of rotating gripping-rolls. The differential action occurring at line of contact between the concave rolls and tubing or shafting being straightened has the effect of polishing to a greater or lesser degree the entire surface of stock being so straightened.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a machine for straightening tubing a stationary group of concave rolls placed on opposite sides of said tubing and set obliquely thereto, a series of guide-rolls, a universally-mounted adjustable case in which said guide-rolls are mounted and a lever by which said guide-rolls are adjusted laterally, all as set forth.

2. In a machine for straightening tubing a stationary group of concave rolls set obliquely relative to said tubing and in pairs so that concave section of said rolls on one side forms with rolls on opposite side a circular aperture for passage of said tubing, a set of guide-rolls, a universally-mounted case in which are mounted said guide-rolls, a lever by which said case and guide-rolls are adjusted laterally and a ratchet-toothed bracket adapted to engage with said lever to retain said guide-rolls when so adjusted, all as specified.

3. In a machine for straightening tubing two or more fixed groups of concave rolls fixed obliquely on each side of tubing to be straightened inclining in each direction on respective sides and adjacent or intervening groups of concave rolls similarly disposed but laterally adjustable as specified.

4. Three or more groups of concave rolls placed obliquely on opposite sides of stock to be straightened and inclining in opposite directions, each group being independently compressible, alternate groups being fixed in line with each other, one or more groups of concave rolls being placed between said alternate groups laterally adjustable, so as to produce eccentricity in different sections of said stock, a set of universally-mounted deflection-rolls, means for adjusting said latter rolls all to operate as and for the purposes set forth.

That we claim the foregoing as our invention we, this 3d day of December, 1895, subscribe our names hereunto in the presence of two witnesses.

ZACHARIAH TEETOR.
CHARLES N. TEETOR.

Witnesses:

B. F. MASON,
J. M. HARTLEY.