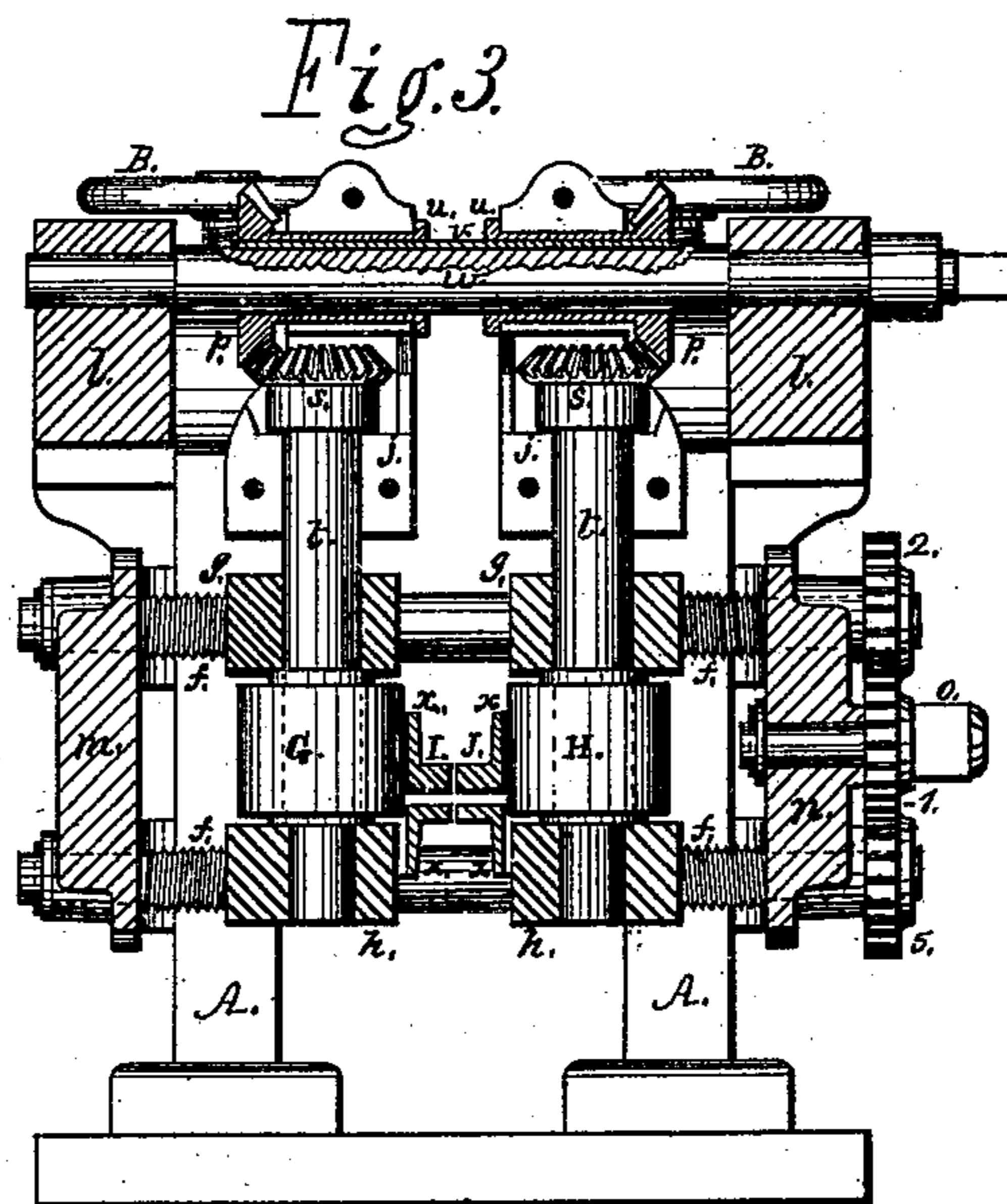
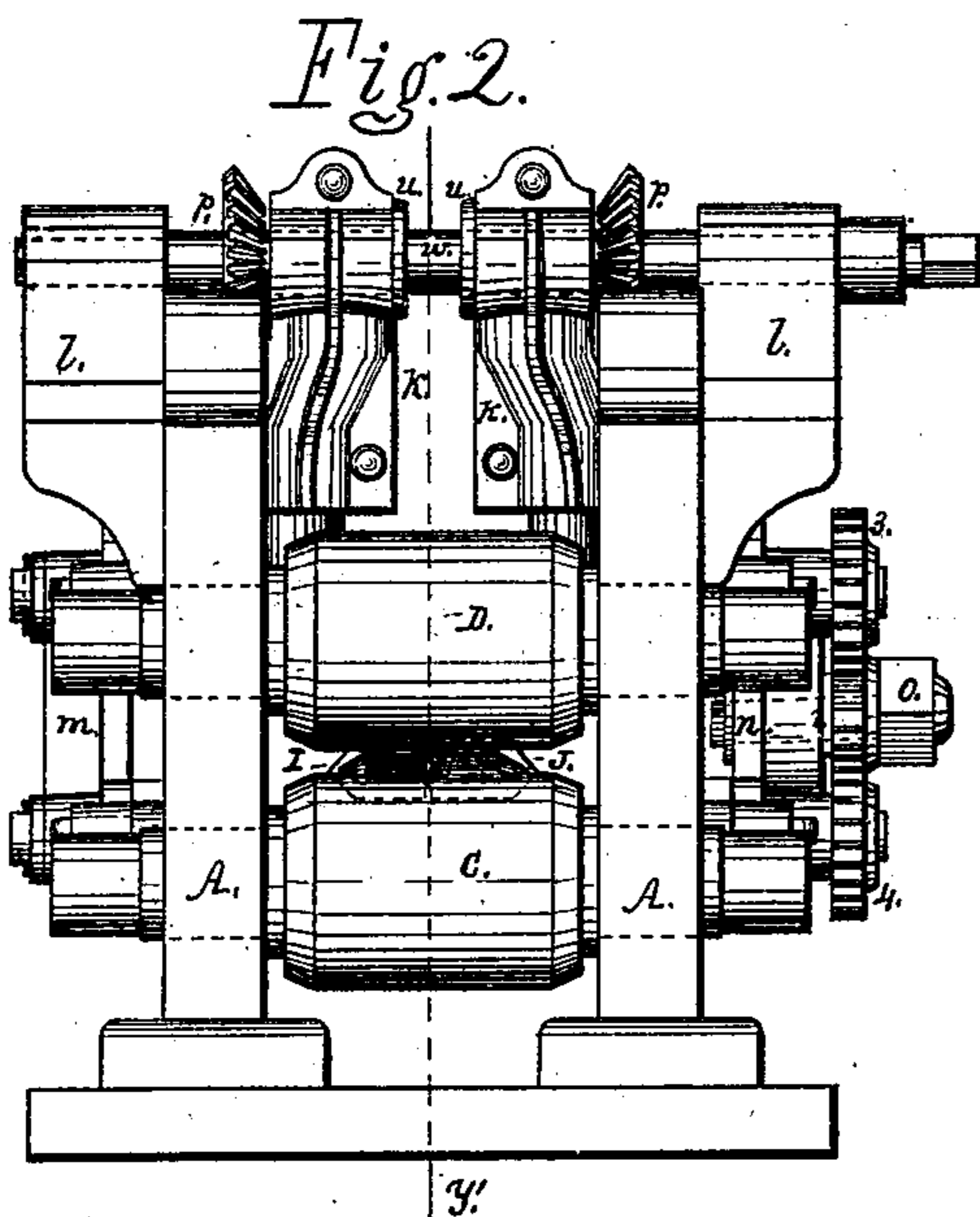
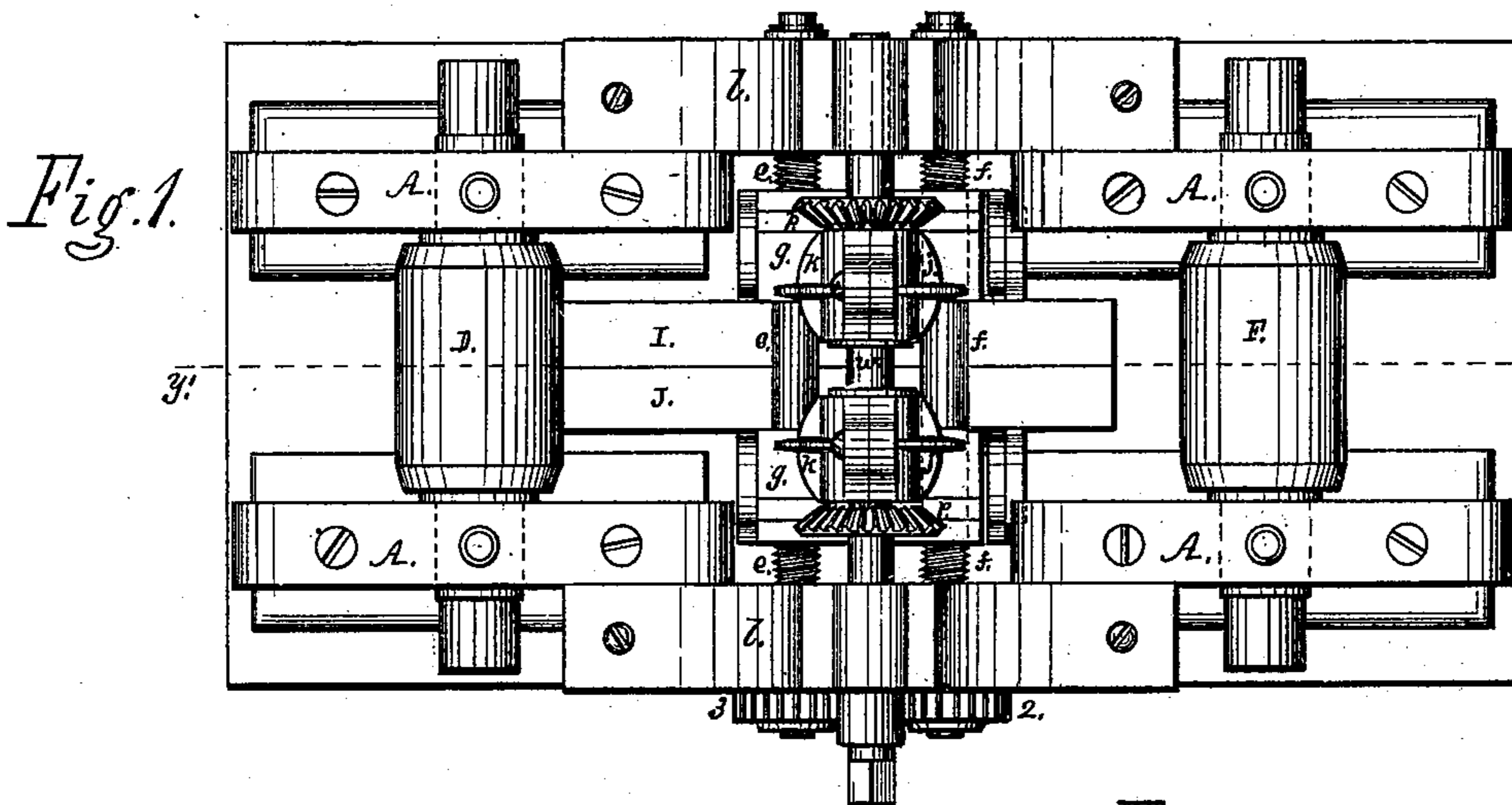


G. MATHESON.
Rolling-Mill.

No. 227,636.

Patented May 18, 1880.



Witnesses

James J. Johnston
D. C. Allen

Inventor

Geo. Matheson

G. MATHESON.
Rolling-Mill.

No. 227,636.

Patented May 18, 1880.

Fig. 4.

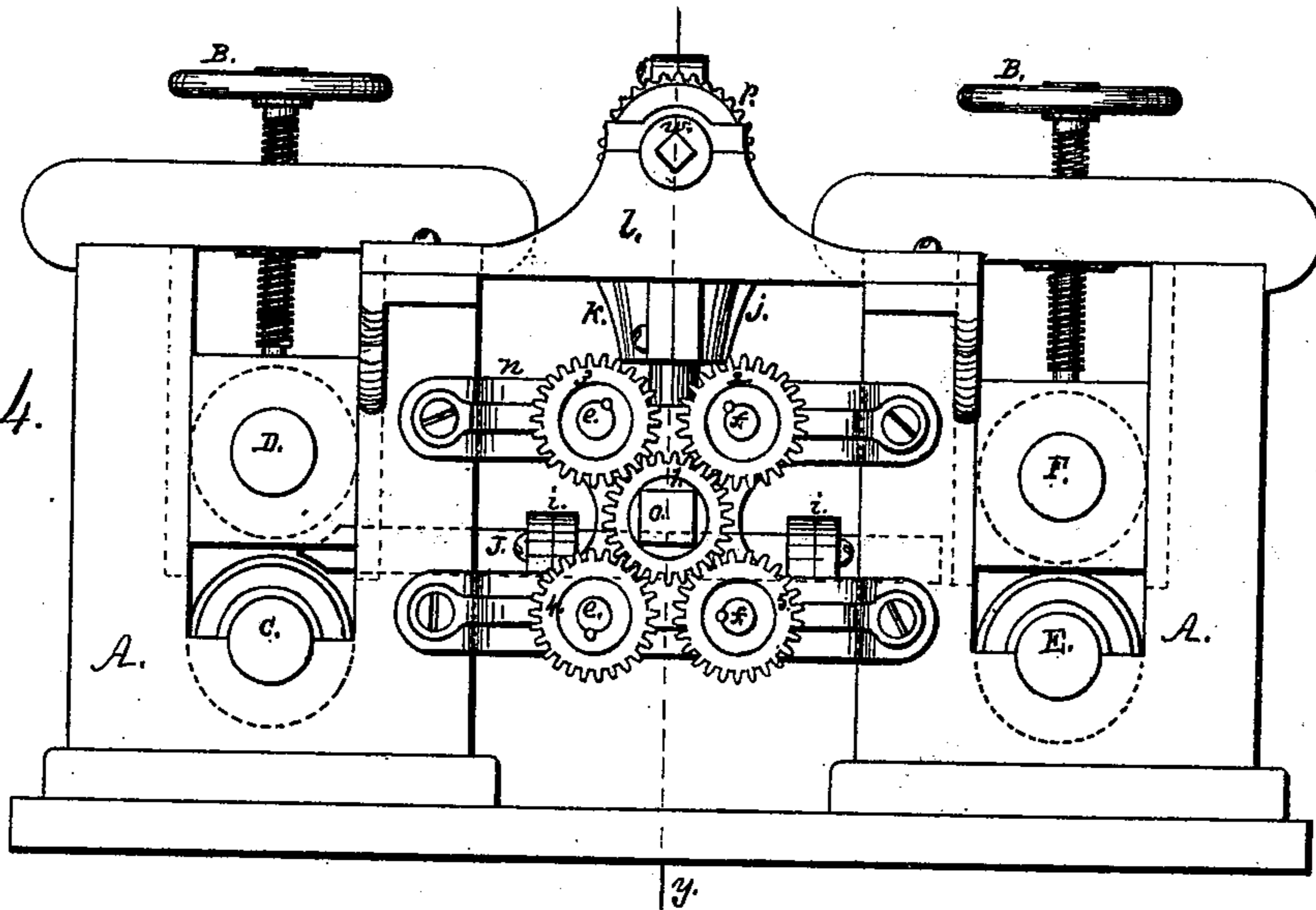
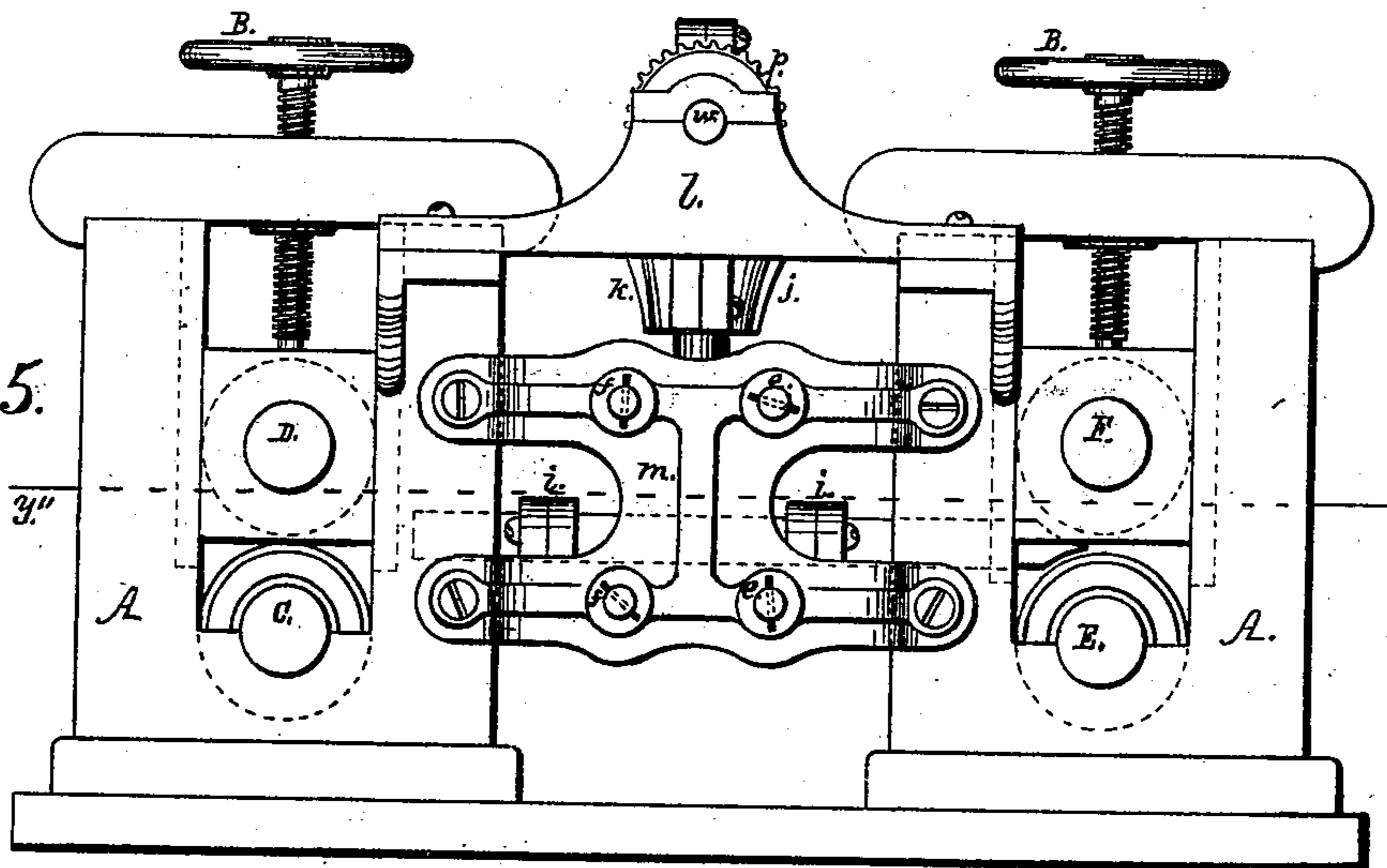


Fig. 5.



Witnesses

James J. Johnston
D. C. Allen

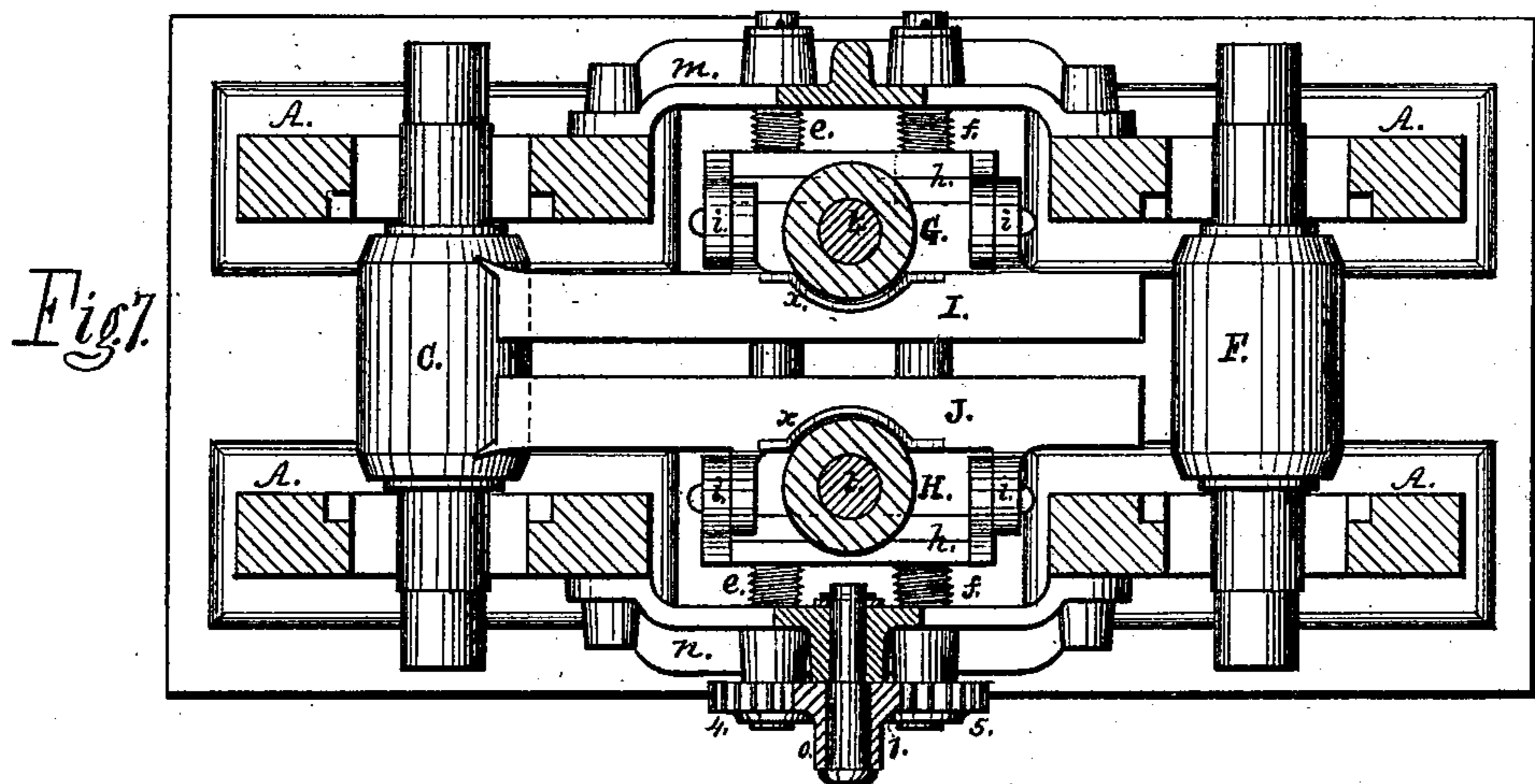
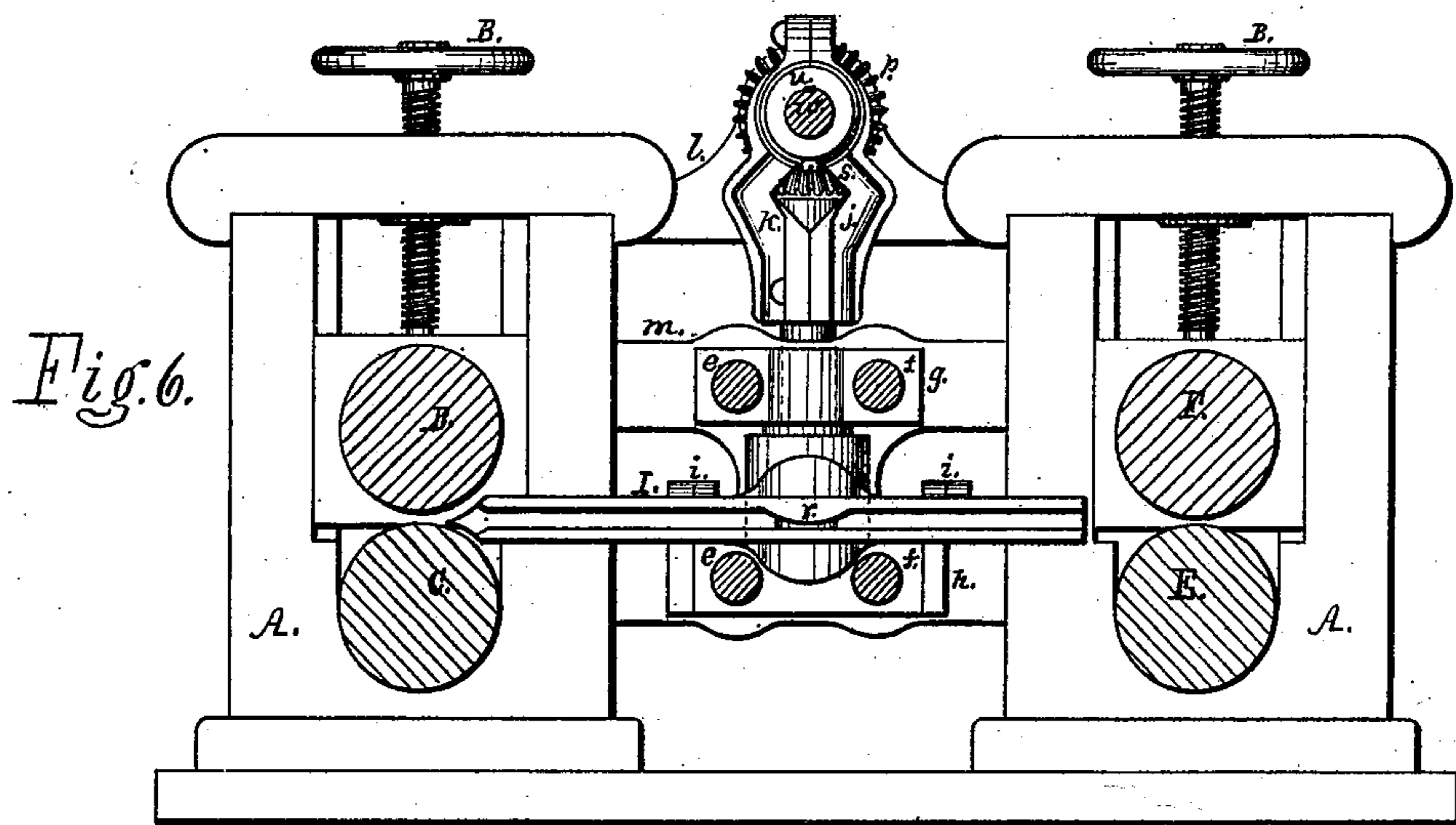
Inventor

Geo Matheson

G. MATHESON.
Rolling-Mill.

No. 227,636.

Patented May 18, 1880.



Witnesses
James J. Johnston.
D. C. Allen

Inventor
Geo Matheson

G. MATHESON.
Rolling-Mill.

No. 227,636.

Patented May 18, 1880.

Fig. 8.

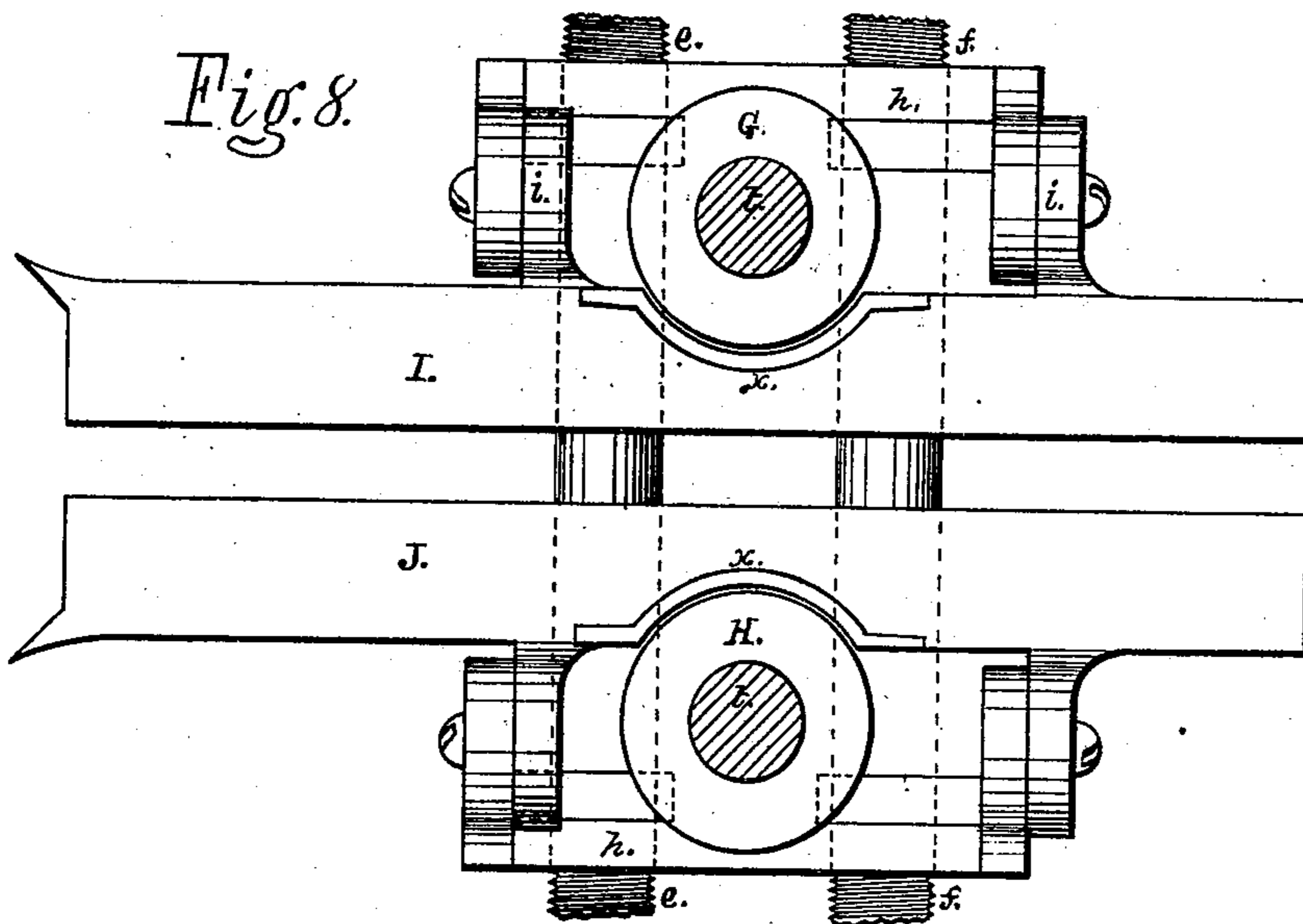


Fig. 9.

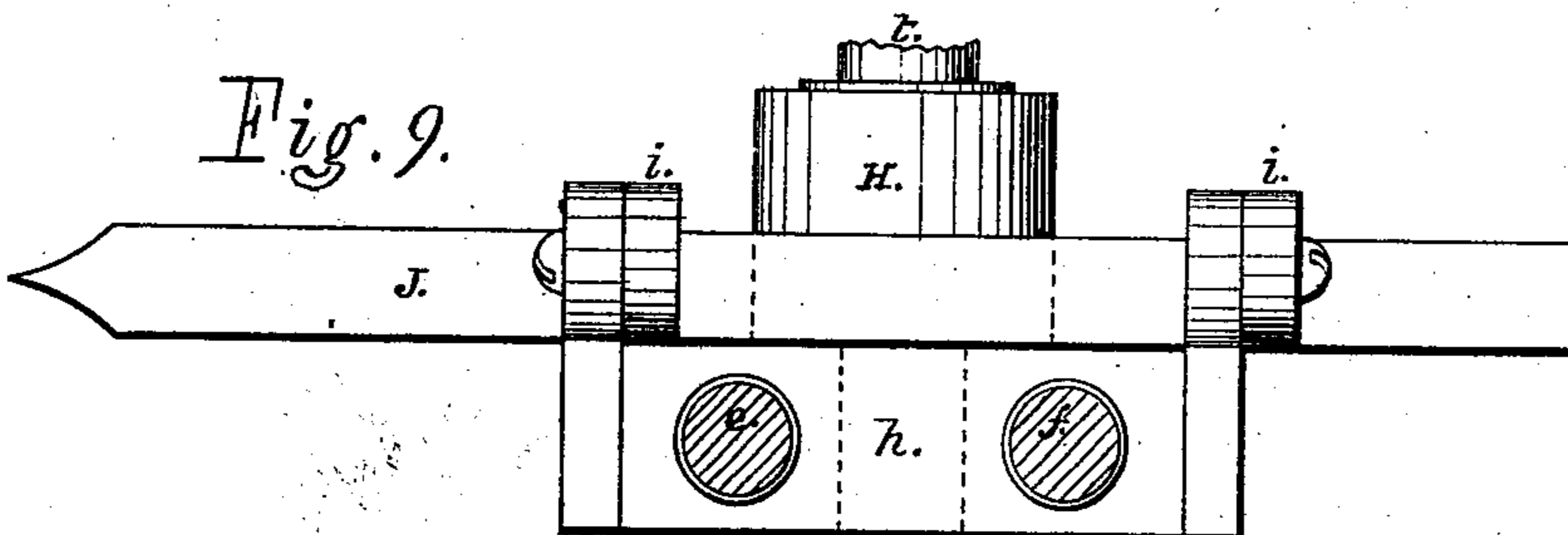
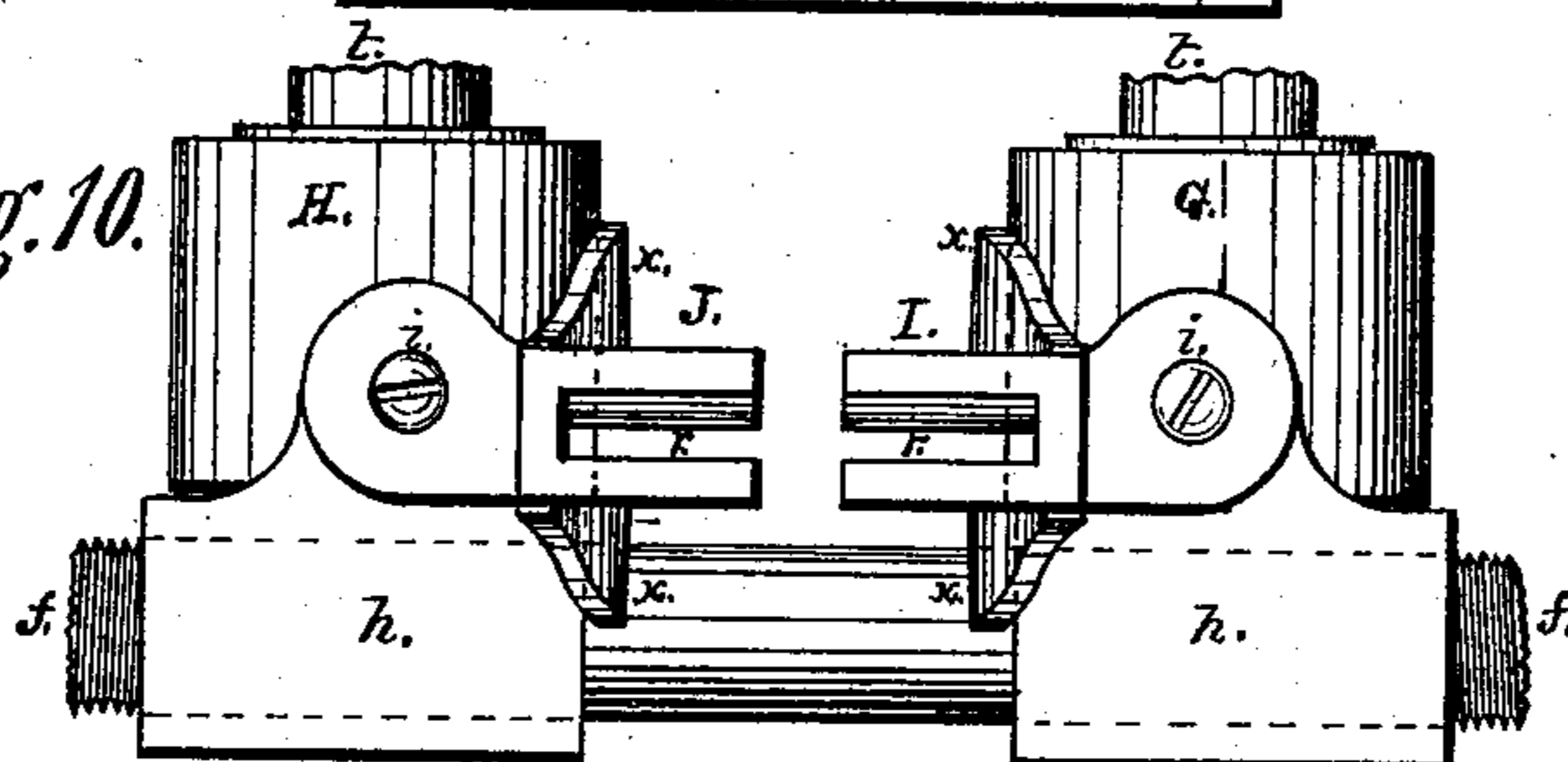


Fig. 10.



Witnesses

James F. Johnston
D. C. Allen.

Inventor

Geo Matheson

UNITED STATES PATENT OFFICE.

GEORGE MATHESON, OF McKEESPORT, PA., ASSIGNOR TO HIMSELF AND THE
NATIONAL TUBE WORKS COMPANY, OF BOSTON, MASS.

ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 227,636, dated May 18, 1880.

Application filed August 22, 1879.

To all whom it may concern:

Be it known that I, GEORGE MATHESON, of McKeesport, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Rolling-Mills; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon, similar letters in the several figures referring to the same parts.

My invention relates to certain new and useful improvements in the class of rolling-mills especially designed for rolling iron or steel into the desired form.

My invention consists in the combination of horizontal and vertical rolls and guides, said vertical rolls and their driving-gear being mounted in adjustable bearings, which rolls, bearings, driving-gear, and said guides, through the medium of screw-threads on four shafts provided with wheels coupled with a single driving-wheel, are made to move simultaneously toward and from each other for adjusting the vertical rolls to the rolling of iron of different widths.

To enable others skilled in the art with which my invention is most nearly connected to make and use it, I will proceed to describe its construction and operation.

In the accompanying drawings, which form part of my specification, Figure 1 is a top or plan view of my improvement in rolling-mills. Fig. 2 is a front-end elevation of the same. Fig. 3 is a vertical and transverse section of the same at line *y* of Fig. 4. Figs. 4 and 5 are opposite side elevations of the same. Fig. 6 is a vertical and longitudinal section at line *y'* of Figs. 1 and 2. Fig. 7 is a horizontal section of the same at line *y''* of Fig. 5. Figs. 8, 9, and 10 are detail sections, representing the detail parts enlarged.

In the accompanying drawings, A A represent the housings for the horizontal rolls C D E F, and are provided with the usual bearings for the rolls and with adjusting-screws B.

G H are vertical rolls placed upon shaft *t*, which are mounted in adjustable bearings *g h*, which are supported on shafts *e f*, which are

mounted in supports *m n*, and are provided with right and left hand screw-threads, which turn in openings in the bearings *g h*, having corresponding screw-threads.

The shafts *e f* at one end are provided with wheels 2, 3, 4, and 5, which are coupled with a single driving-wheel, 1.

To the bearings *h* are attached guides I J, secured to the bearings, as indicated at *i*. The vertical rolls G H project into the sides of the guides I J, at which point the guides are provided with strengthening-flanges *x x*. The inner and upper walls of the guides I J are provided with a downward projection, *r*, contracting the opening in the guides to about the amount of reduction of the iron or steel in its passage through the horizontal rolls.

On the upper end of the shafts *t* of the vertical rolls G H are beveled-gear wheels *s s*, which mesh into bevel-gear wheels *p p* on the shaft *w*, having its bearings in the supports *l l*, secured to the upper part of the housings A A. The bevel-wheels *p p* are provided with hollow shafts, the inner ends of which are provided with flanges *u*, which shafts move upon the shaft *w*, having a feather, *v*, which projects into a groove in the hollow shafts of the bevel-gear wheels *p p*. The hollow shafts of the bevel-gear wheels *p p*, between the inner faces of the wheels and the flanges *u*, are inclosed in carriers constructed in two parts, *j k*, and the lower end of said carriers are fitted to the upper portion of the shafts *t* of the vertical rolls G H and inclose the bevel-wheels *s s*.

The several pairs of rolls and the shafts of the driving-wheels *p p s s* may be operated by driving wheels or pulleys so constructed and arranged as to give the desired power and speeds, which will be readily comprehended by the skillful millwright.

In the foregoing description the construction of a single continuous rolling-mill is described; but it is proposed to have a number of such mills arranged in line with each other, so as to combine their action in the reduction of the bloom or pile to the desired size and form of the finished iron or steel.

As the construction of the herein-described

rolling-mill will be readily understood from the foregoing description and by reference to the accompanying drawings, I will therefore proceed to describe the operation.

5 In the manufacture of iron the puddled ball from the furnace or bloomery is subjected to the hammering process, and while still hot is placed in the heating-furnace and brought to a welding-heat. The rolls *CD* being adjusted
10 for the first pass and reduction, and the rolls *E F* for the second pass and reduction, and the vertical rolls *G H* and the guides *I J* adjusted to the width of the iron for the pass through the rolls *C D*, the operator passes
15 the bloom or pile between the rolls *C D*, and it enters the guides *I J*, the vertical rolls *G H* properly edging up the passing iron, which passes on through to the rolls *E F*, which further reduces the iron, and, passing from
20 said rolls to vertical and horizontal rolls arranged in consecutive pairs and series and guides, the iron continues passing, and is thereby reduced to the desired form and size. The iron, in passing through the first pairs of hori-
25 zontal and vertical rolls, is reduced about one-third, and in passing through the second pairs of horizontal and vertical rolls is reduced about another third, and so on consecutively until the desired size and form of the iron are
30 obtained. The second pairs of horizontal and vertical rolls travel about one-third faster than the first pairs of horizontal and vertical rolls, and the third pairs of horizontal and vertical rolls travel about one-third faster than the
35 second pairs of said rolls, and so on, consecutively, increase in speed of travel.

Through the medium of the bearings *g h* and the shafts *e f*, wheels 2, 3, 4, and 5, and the carriers composed of the parts *j k*, the
40 vertical rolls *G H*, and their driving-gear, consisting of wheels *p p s s* and the guides *I J*, are simultaneously moved toward or from each other by simply revolving the wheel 1

by means of a crank placed upon the axis *o* of said wheel.

It will be observed that each of the vertical rolls *G H* is furnished with independent guides *I J*, and said guides move simultaneously with the movement or adjustment of each of said rolls and their driving-gear.

By the method and means hereinbefore described iron or steel may be reduced to the desired size and form at one heat and one operation, the advantage of which will be apparent to the skilled mechanic and manufacturer of iron and steel.

Having thus described my improvement, what I claim as of my invention is—

1. In a rolling-mill containing pairs of vertical and horizontal rolls, the vertical rolls and their bearings being adjustable toward and from one another, grooved guide-pieces, as *I J*, attached to the bearings of said vertical rolls and moving with them, substantially as described.

2. In a rolling-mill, the combination, with the rolls *G H*, of the bearings *g h*, shafts *e f*, furnished with right and left hand screws and provided with gear-wheels 2, 3, 4, and 5, operated by a single driving-wheel, 1, substantially as herein described, and for the purpose set forth.

3. In a rolling-mill, the combination, with the vertical rolls, of the guides composed of the two parts *I J*, the bevel-wheels *p p s s*, shafts *t w*, and adjustable bearings *g g h h*, substantially as herein described, and for the purpose set forth.

4. In a rolling-mill, the guides *I J*, having on their upper and inner walls the downward projection *r*, substantially as herein described, and for the purpose set forth.

GEO. MATHESON.

Witnesses:

JAMES J. JOHNSTON,
D. C. ALLEN.