

(No Model.)

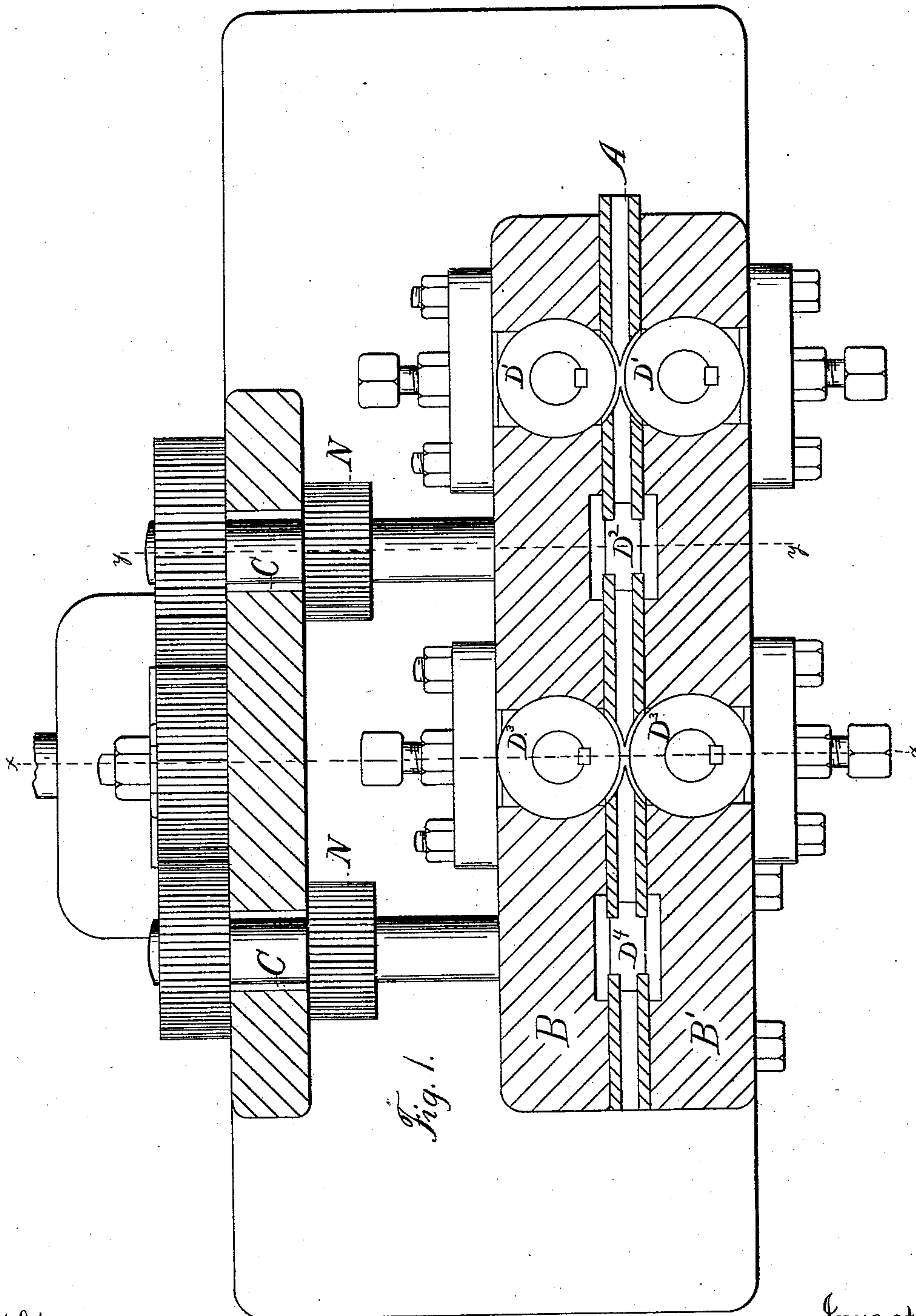
6 Sheets—Sheet 1.

E. CROFT.

MACHINE FOR ROLLING HORSESHOE NAILS.

No. 285,800.

Patented Oct. 2, 1883.



Witnesses.

John Edwards Jr.
J. V. Whiting

Inventor

Edward Croft.
By James Shepard
att'y

(No Model.)

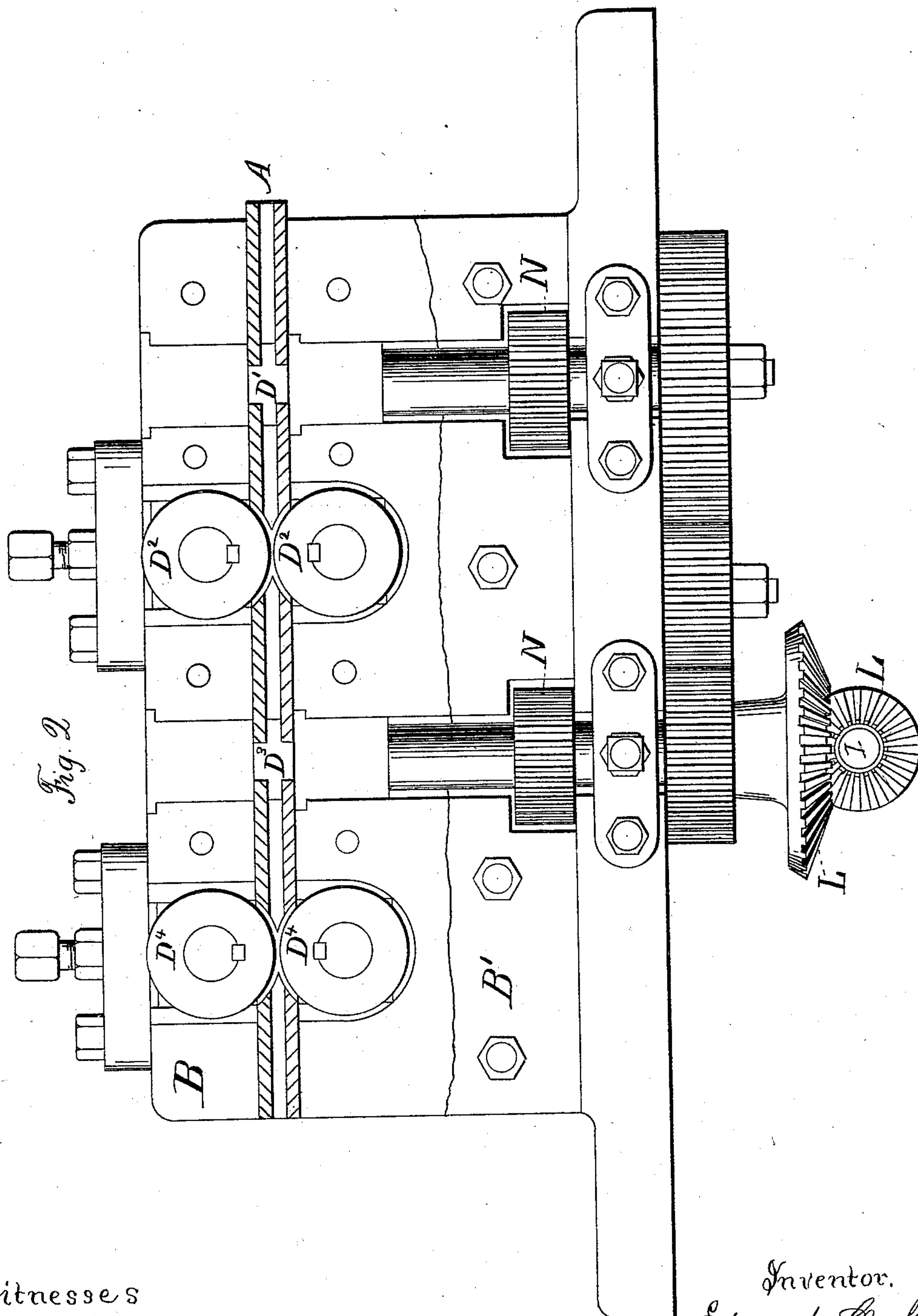
6 Sheets—Sheet 2.

E. CROFT.

MACHINE FOR ROLLING HORSESHOE NAILS.

No. 285,800.

Patented Oct. 2, 1883.



Witnesses

John Edwards Jr.
L. W. Whiting.

Inventor.

Edward Croft.
By James Shepard
att

(No Model.)

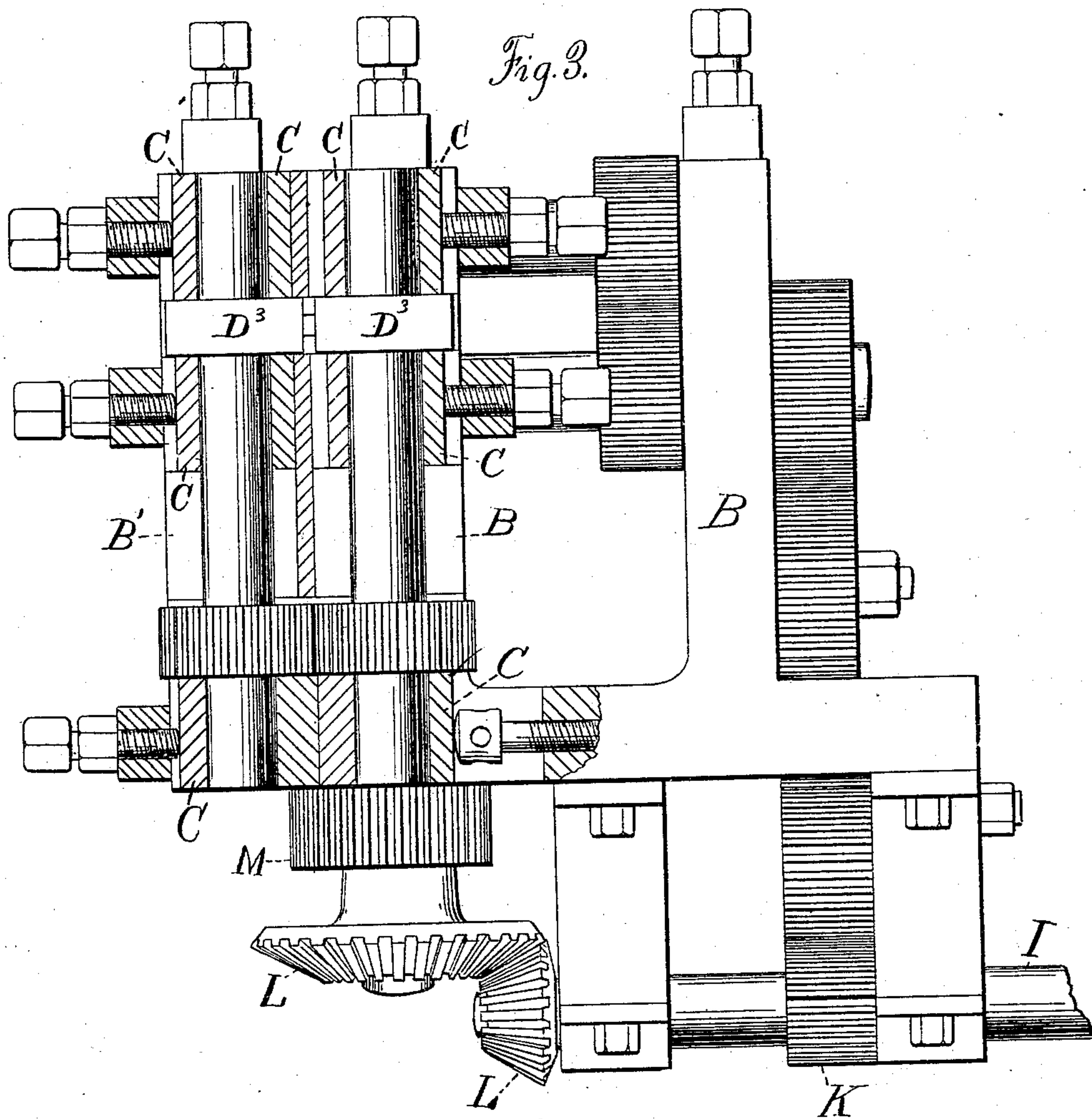
6 Sheets—Sheet 3.

E. CROFT.

MACHINE FOR ROLLING HORSESHOE NAILS.

No. 285,800.

Patented Oct. 2, 1883.



Witnesses.

*John Edwards &
D. W. Whiting*

Inventor

Edward Croft.

By James Shepard atty

(No Model.)

6 Sheets—Sheet 4.

E. CROFT.

MACHINE FOR ROLLING HORSESHOE NAILS.

No. 285,800.

Patented Oct. 2, 1883.

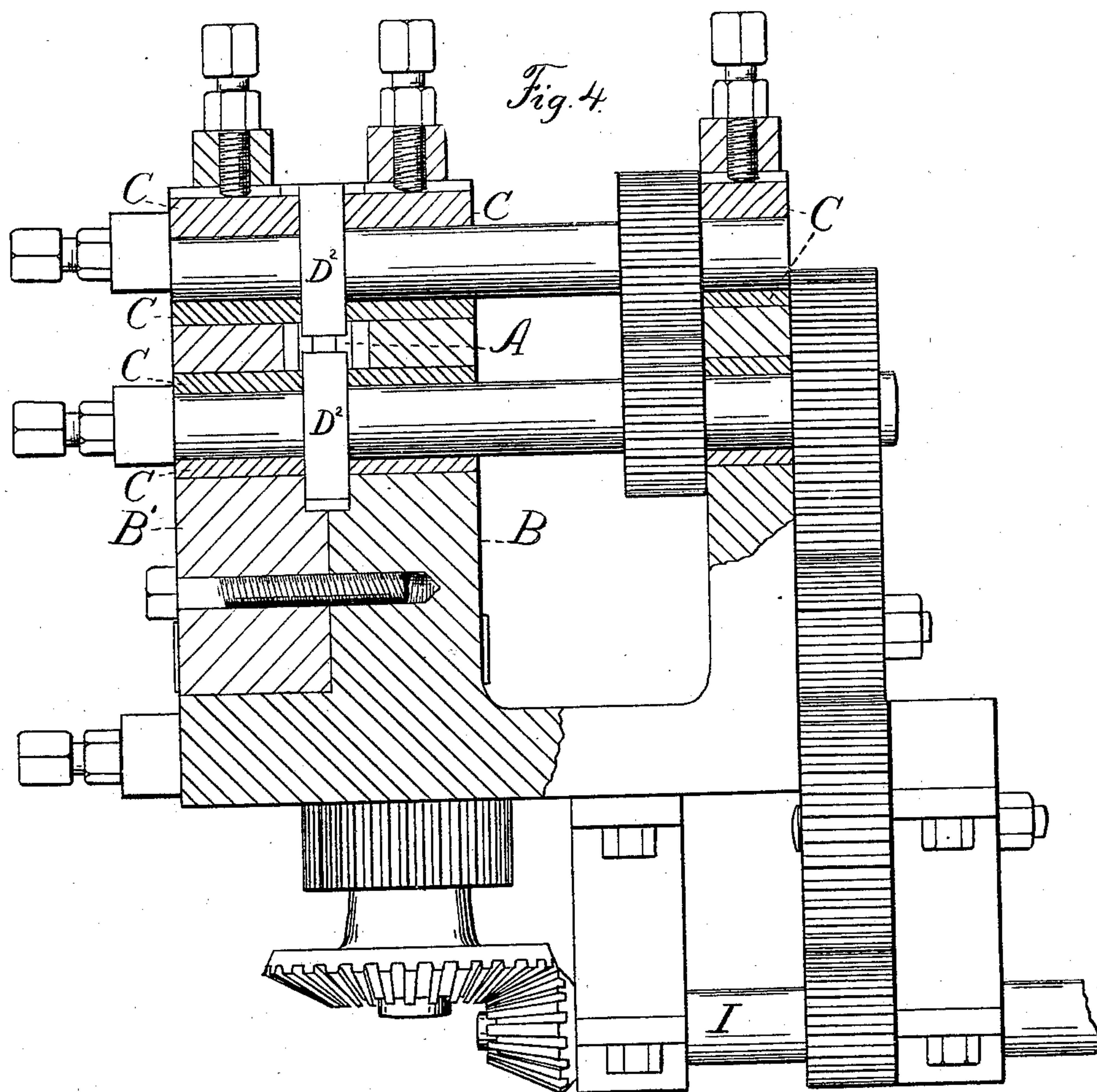
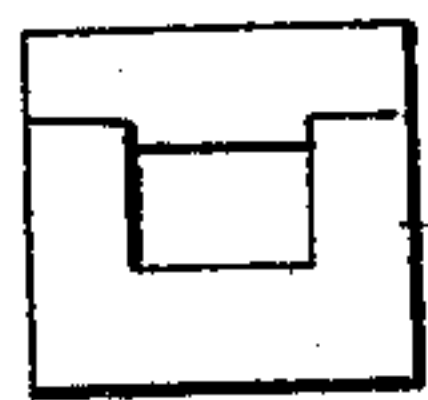


Fig. 5.



A

Witnesses

John Edwards Jr.
Howard V. Whiting

Inventor.

Edward Croft.

By James Shepard

(No Model.)

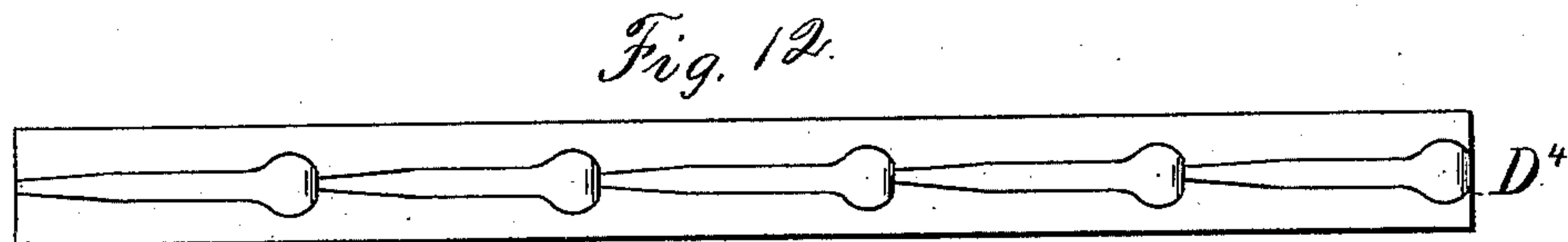
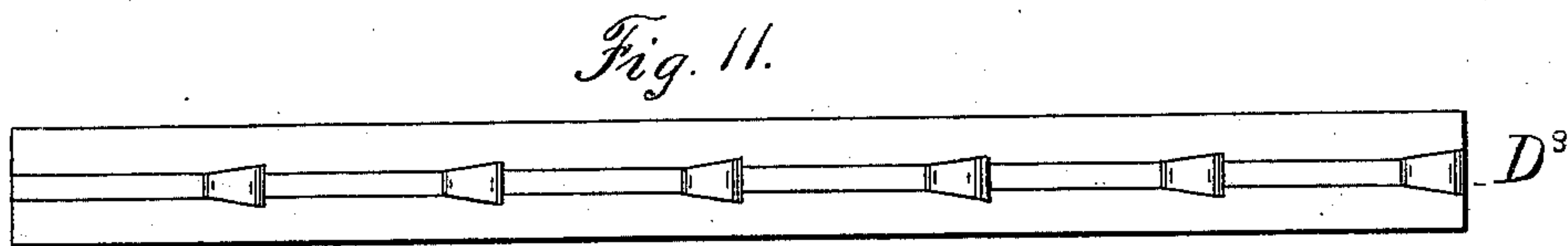
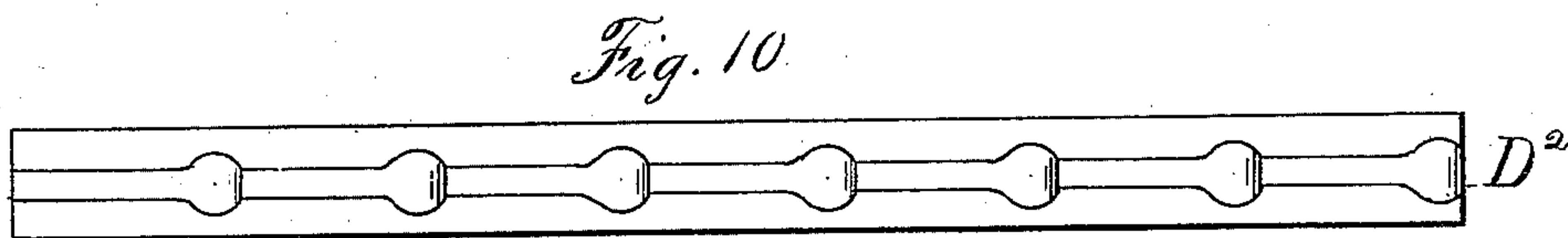
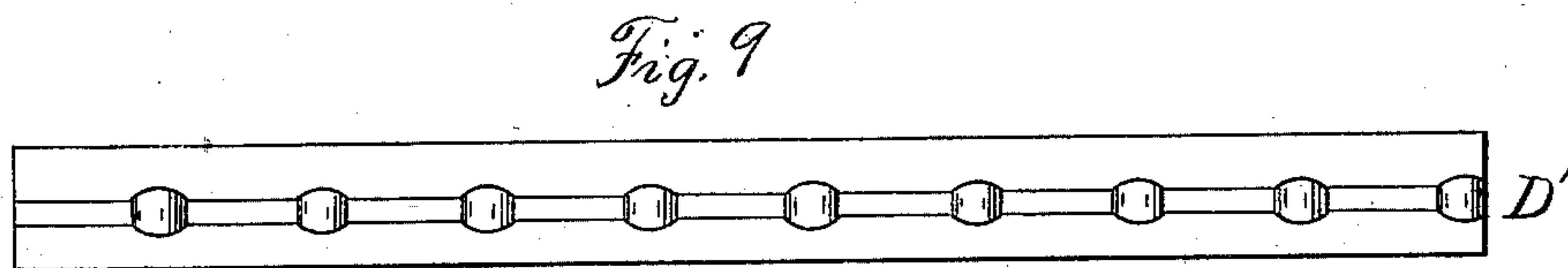
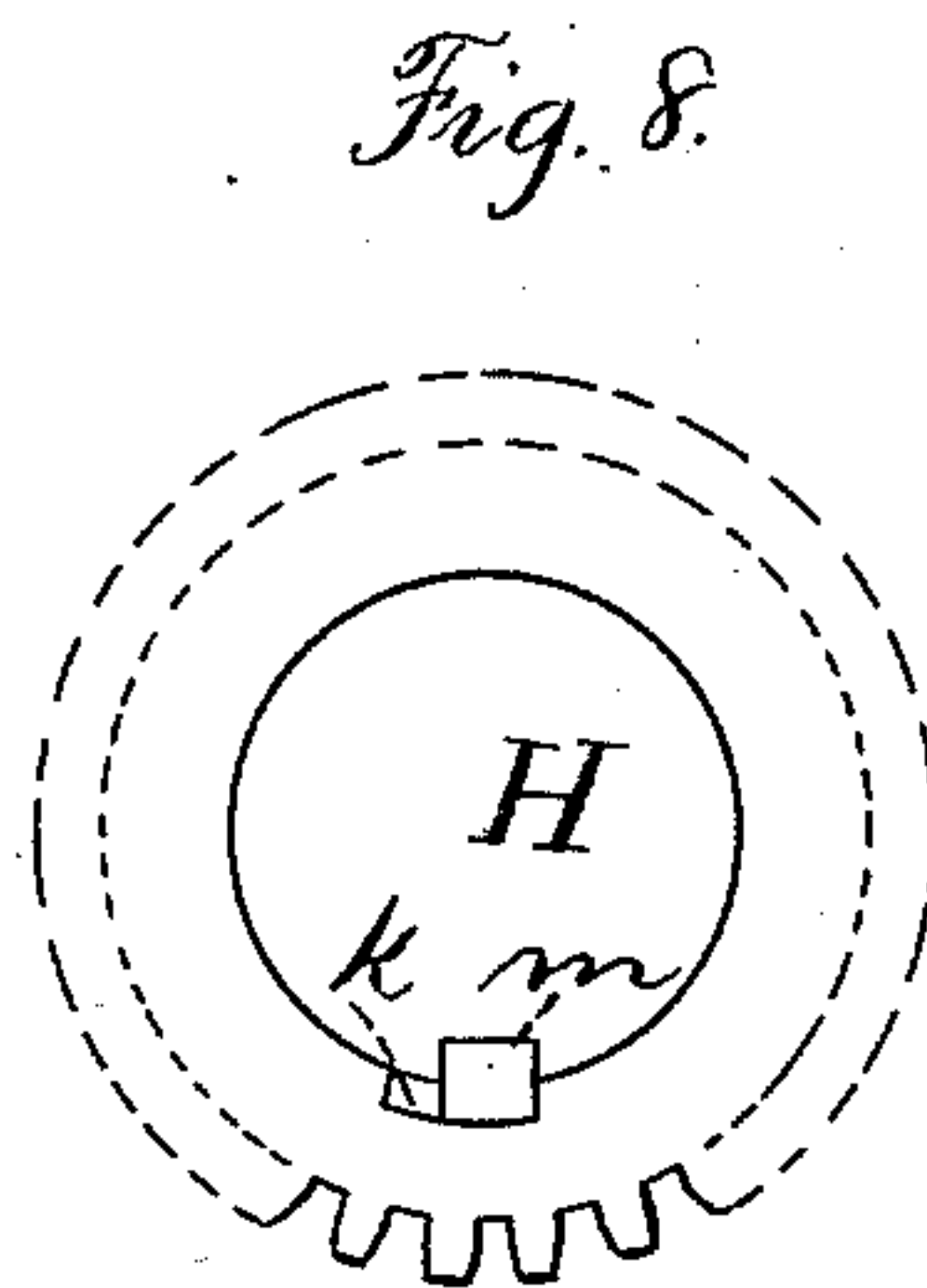
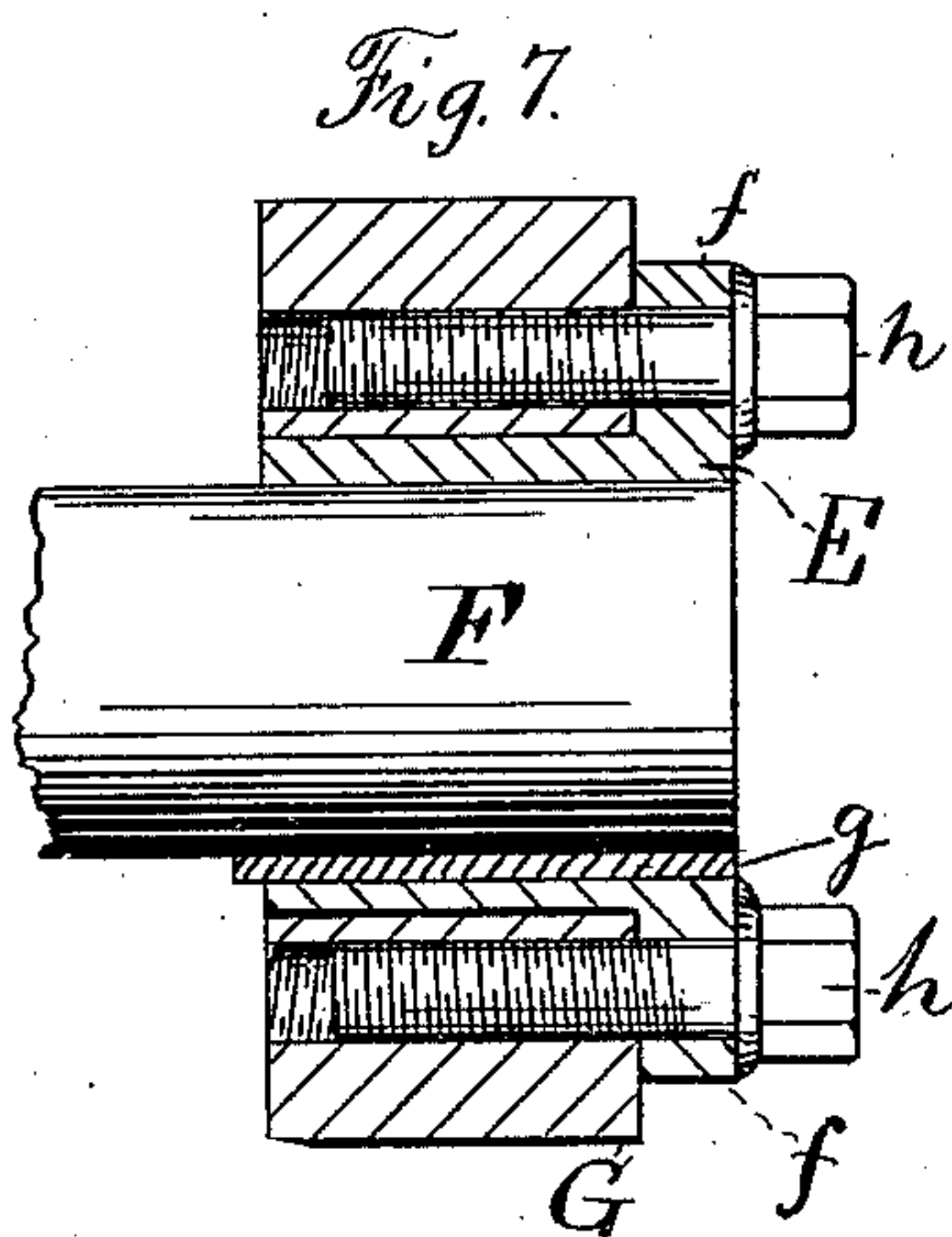
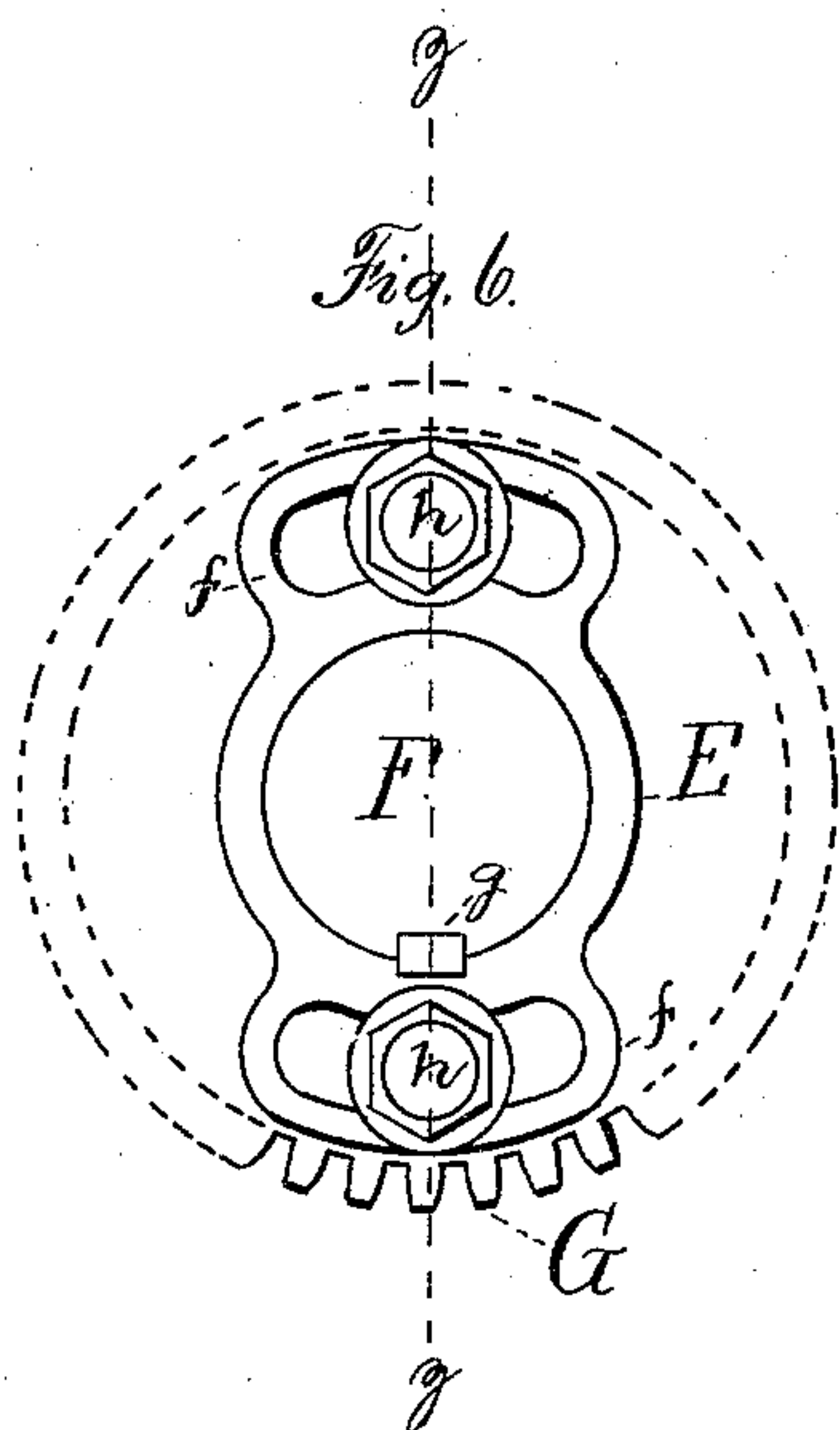
6 Sheets—Sheet 5.

E. CROFT.

MACHINE FOR ROLLING HORSESHOE NAILS.

No. 285,800.

Patented Oct. 2, 1883.



Witnesses.

John Edwards Jr.
C. V. Whiting

Inventor.

Edward Croft.
By James Shepard atty

(No Model.)

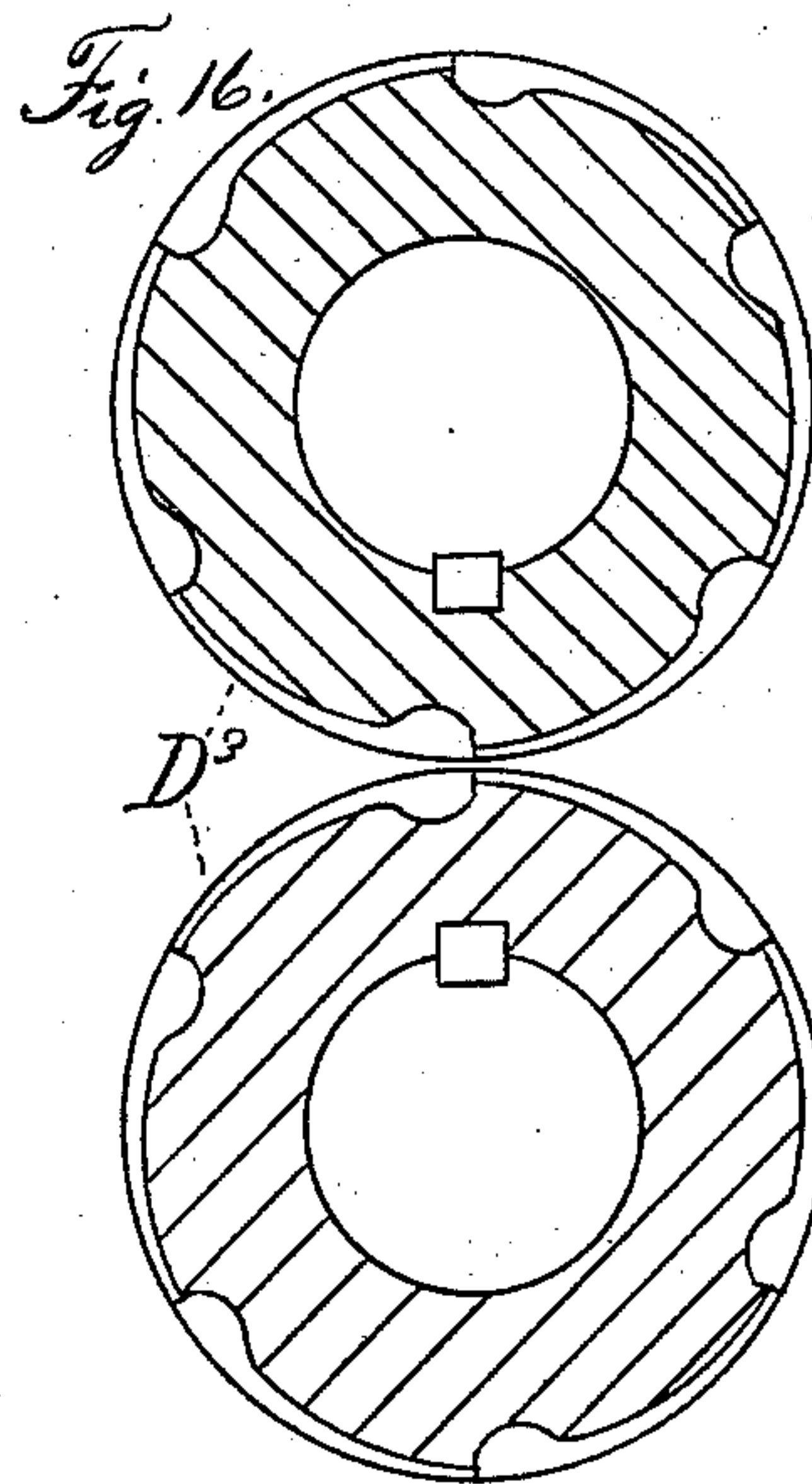
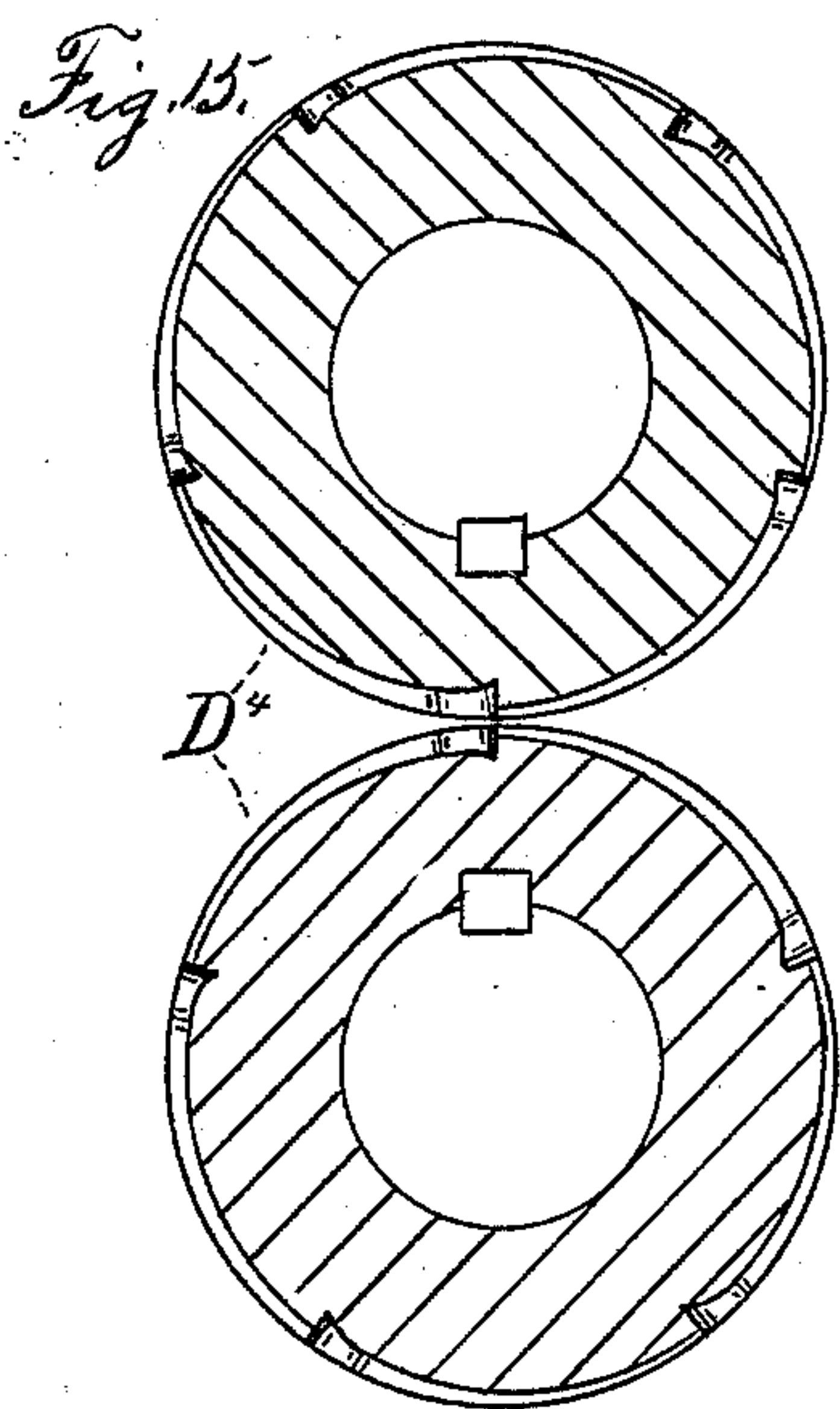
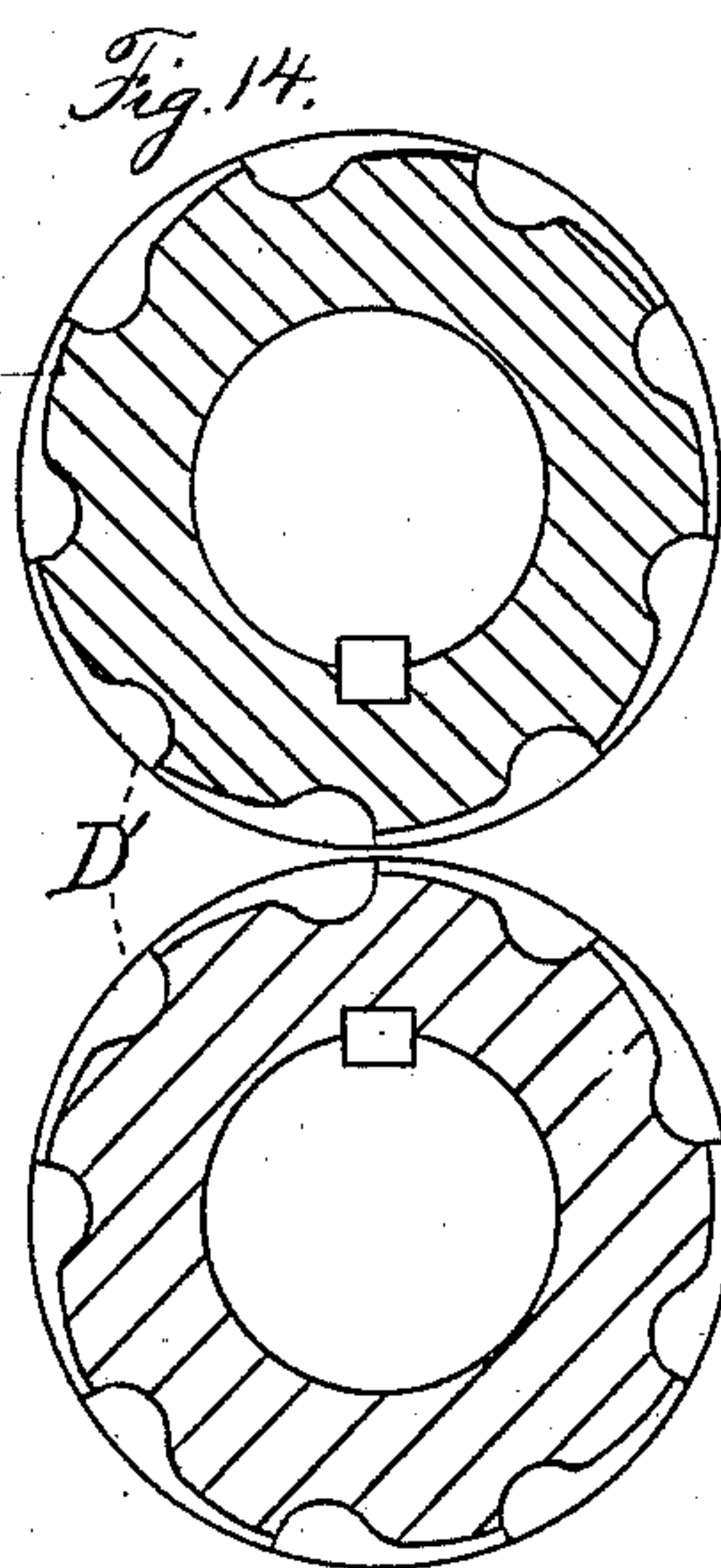
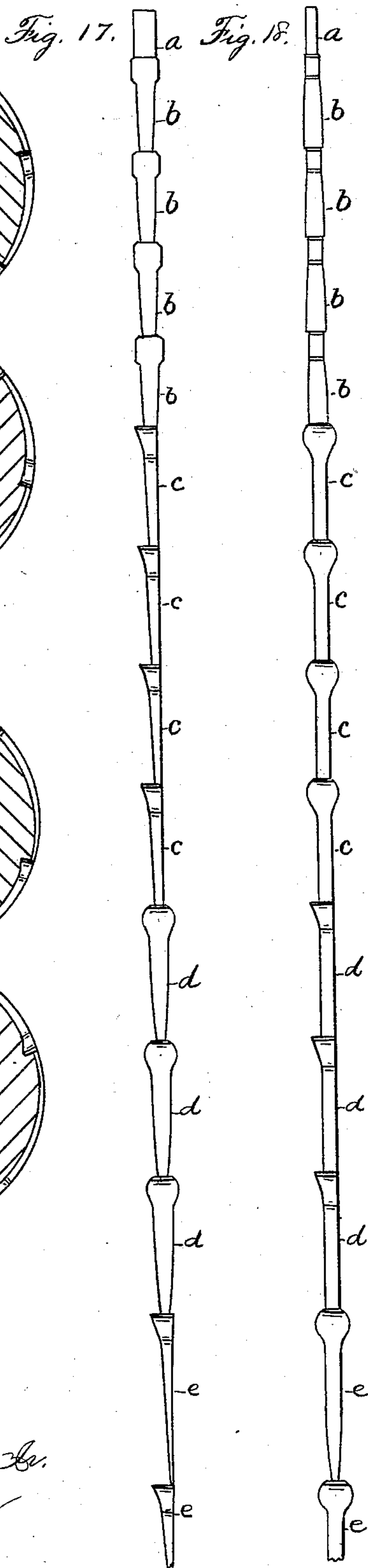
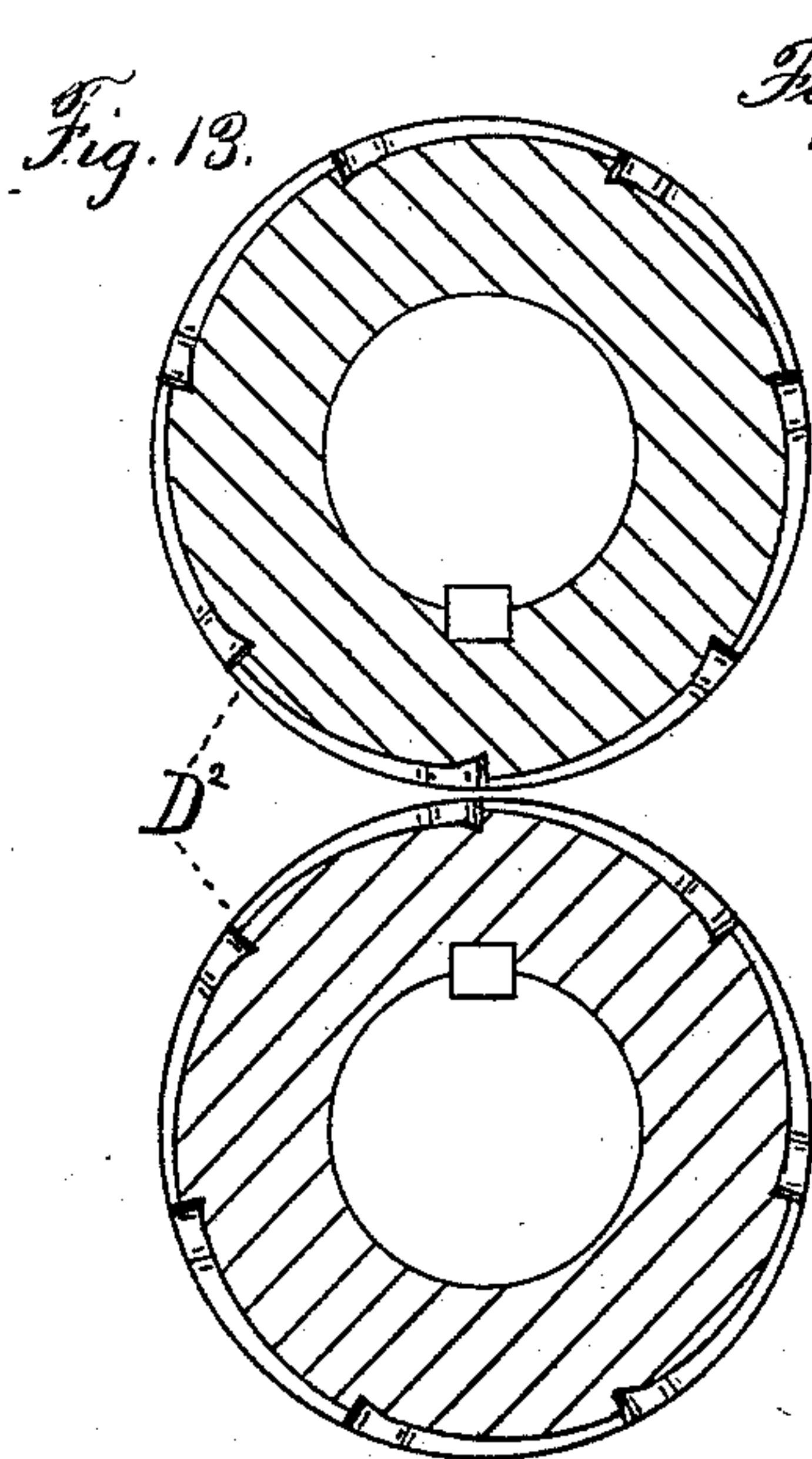
6 Sheets—Sheet 6.

E. CROFT.

MACHINE FOR ROLLING HORSESHOE NAILS.

No. 285,800.

Patented Oct. 2, 1883.



Witnesses,
John Edwards & Co.
Fred W. Morey Jr.

Inventor,
Edward Croft.
By James Shepard
Atty.

UNITED STATES PATENT OFFICE.

EDWARD CROFT, OF WATERBURY, CONNECTICUT, ASSIGNOR TO THE
WATERBURY HORSE NAIL COMPANY, OF SAME PLACE.

MACHINE FOR ROLLING HORSESHOE-NAILS.

SPECIFICATION forming part of Letters Patent No. 285,800, dated October 2, 1883.

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

To all whom it may concern:

Be it known that I, EDWARD CROFT, of Waterbury, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Machines for Rolling Horseshoe-Nails, of which the following is a specification.

My invention relates to improvements in machines for rolling horseshoe-nails in which a series of pairs of roller-dies having continuous die-grooves extending around the entire periphery of said rollers are placed upon horizontal and vertical axes in such relation to each other that all of said roller-dies are simultaneously acting upon corresponding parts of the blanks. The blanks made by each successive pair of roller-dies are of gradually-increasing lengths, and the rollers are speeded so that each pair of rollers will make a blank in the same time whether the blank be longer or shorter. A conductor is combined with said roller-dies to guide the rod or bar to the dies, and to guide the series of connected blanks from each pair of roller-dies to the succeeding pair.

The objects of my improvements are to produce a nail which closely resembles one made by hand in regard to strength and toughness, to make the nails with little or no waste of stock, and to make them rapidly at a small expense. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a horizontal section, partly in elevation, on a line through the middle of the conductor A, Fig. 2. Fig. 2 is a side elevation with a part of the housing broken away, showing the conductor A in vertical section. Fig. 3 is a vertical section on line *xx* of Fig. 1, except the right-hand portion, which is shown in elevation. Fig. 4 is a vertical section on line *yy*, Fig. 1, also partly in elevation. Fig. 5 is an end view of the conductor. Fig. 6 is a side elevation of means adapted for adjusting the relative positions of the roller-dies. Fig. 7 is a sectional view of the same on line *zz* of Fig. 6. Fig. 8 is a side elevation of another means for the same purpose. Figs. 9, 10, 11, and 12 are developments of the peripheries of the different roller-dies. Figs. 13, 14, 15, and

16 are vertical sections of the different pairs of roller-dies. Fig. 17 is a side view of a portion of the rod and series of connected blanks as they appear when going through the machine, and Fig. 18 is an edge view of the same.

My machine is principally designed for making horseshoe-nails by rolling the metal into a connected series of nail-blanks or nearly-finished nails; but it is evident that it may be used for rolling metal into a bar consisting of a series of connected blanks of other forms, from which to make other articles.

I have herein shown four pairs of roller-dies, with every alternate pair mounted upon axes which are at right angles to the axes of the other rollers; but a greater or less number of pairs may be employed, and, if desired, there might be more than one pair in succession mounted to revolve in the same plane, provided always that there are rolls which act upon both the edges and sides of the bar or blanks.

B designates the main frame or housing of the machine; B', the cap-plate, forming, also, a part of the housing; and C, the boxes in which the various shafts take their bearings.

D' D² D³ D⁴ designate roller-dies having connected and continuous sunken grooves or dies formed in their peripheries without changing the circular form of the roll; or, in other words, the sunken grooves extend around the peripheries of the rolls, instead of lengthwise to them, and their confining side walls meet the cylindrical faces of the rolls, so as to confine the metal fed into said grooves upon all of its four sides.

The sunken grooves or dies in the rollers are not illustrated in Figs. 1, 2, 3, and 4, the rollers only being shown in said figures; but the grooves are clearly shown in Figs. 9, 10, 11, 12, 13, 14, 15, and 16.

The rollers D' and D³ are mounted on vertical axes, while D² and D⁴ are mounted on horizontal axes. The frame or housing, the manner of securing the rollers and shafts therein, the driving-gears, the manner of and means for adjusting the rolls in each pair to and from each other, and various details of the machine, except in the particulars hereinafter specified as essential, are generally well

known, and may be varied or changed at pleasure, according to the taste or judgment of the mechanic, and it is considered unnecessary to give a detailed description of the same.

A hollow trough or conductor, A, of the same general contour inside (see Fig. 5) as that of the rod to be operated upon, is placed in the housing and leads to the first pair of rollers, and then from one pair to another, as shown in Figs. 1 and 2.

In the particular form of grooves and dies herein shown the first pair of rollers, D', has depressions sunk in it for forming nine rudimentary nail-blanks. The second pair, D², has depressions for seven blanks, the third pair, D³, six, and the fourth pair, D⁴, five, those in each succeeding pair being longer, and for making longer blanks than those in its immediate predecessor. The rolls D' and D³ act upon the edges of the bar or stock, and the rolls D² and D⁴ upon the sides thereof, and all of the rolls revolve in such a direction as to draw the stock through the machine, the same being entered first between the rolls D'. A rod of any indefinite length, after being brought to a proper heat, is passed into the conductor and between all of the rollers, and if said rod is as long as or longer than the distance from the first to the last pair of rollers, all of said rollers will be acting simultaneously upon the stock or series of connected blanks. It is therefore necessary that each pair of rollers shall, as near as is practicable, act upon a like part of the blank at the same time—that is, when the part of the stock which is to be formed into a nail-head is being acted upon by one pair of rollers, all of the rollers in the machine should also be acting upon the head part of the blanks. This is of greater importance at the beginning than at the end of the operation. The shorter blanks must remain between the rollers the same length of time as the longer blanks. The latter result may be accomplished either by making the peripheries of the rollers containing the longest grooves travel faster than the other by means of the connecting-gearing, (which method is the one employed as the machine is illustrated in the drawings;) or the rollers containing the longer grooves may be made larger, so that all of the rollers shall contain grooves for a like number of blanks, and all geared to make the same number of revolutions in a given time; or it may be attained partly by the varying speed of revolution and partly by the varying sizes of rollers.

Each succeeding pair of rolls must be set a distance from its preceding pair which is about equal to the length of a certain number of blanks made by said preceding pair. For instance, as shown in the drawings, the rollers D² are a distance from D' equal to the length of four blanks as made by the rolls D'. The rolls D³ are a distance from D² equal to the length of four blanks as made by D², and the rolls D⁴

are a distance from D³ equal to the length of three blanks as made by D³. The rod, or rod and connected blanks, Figs. 17 and 18, show the result of this. The unaltered portion of the original rod *a* is of just the proper length to produce one nail. The four lengths *b b b b* are formed by the rolls D', the next four lengths *c c c c* are formed by the rolls D², the next three lengths *d d d* by the rolls D³, and the nails or blanks *e* by the rolls D⁴. When the connected blanks leave the machine, by passing through all of the rolls, a rod consisting of a series of connected blanks, like those marked *e*, is the result or product. The rod Figs. 17 and 18 is such as would result from stopping the rolls when they are all acting upon a bar and taking the rod out of the machine without allowing any further action of the rolls thereon.

Notwithstanding the proper speeding of the rolls and setting the several pairs at the proper distance apart, still the different pairs would not act upon like parts of the blanks at the same time unless the rolls were started right and all started together.

As before stated, the manner of and means for adjusting the rolls in each pair—that is, one roll with reference to its fellow roll—is generally well known; but this is not the adjustment that I refer to for the purpose of making the several pairs of rolls start right and all start together.

The rolls can be approximately adjusted to start right by slipping the connecting-gears between two pairs of rolls out of mesh and turning one pair of rolls and their driving-gear to the proper point, while the other pair and their gear remain stationary, and then slipping the gears into engagement again. For a closer adjustment I make use of the devices shown in Figs. 6 and 7, in which E designates a sleeve having slotted arms *f f*, and secured to the shaft F by a key, *g*, or in other proper manner. Upon this sleeve E the gear-wheel G is mounted. Bolts *h h* pass through the slotted arms *f f* of the sleeve E into the body of the gear-wheel. By loosening the bolts *h h* the gear-wheel may be changed into the desired position upon the sleeve and shaft while the shaft remains stationary, when the bolts can be tightened. When the gear-wheel is too small to use the adjustment shown in Figs. 6 and 7, the key-slot *k* in the gear may be made wider than the key *m*, by which the gear is keyed to the shaft H, as shown in Fig. 8, and then wedges of different thicknesses may be placed upon either or both sides of the key to bring the gear into the desired position. The gears to be so adjusted are those which connect two or more pairs of rolls together. It is of course understood that when the gear is so moved it slips upon the shaft which it drives, so that one pair of rolls will remain stationary, while the gears and other pair of rolls will rotate to bring the two pairs of rolls to the proper relative position.

The power is applied to the machine through the shaft I; the rolls having a horizontal axis are driven by the gear K and connecting-gear, and those on a vertical axis by the bevel-gears L L, gear M, and connecting-gear, while the rolls in each pair are made to move in unison by means of the gears N. After the series of connected blanks are produced, they are cut apart and finished in any desired manner.

I am aware that prior patents show two or more pairs of roller-dies placed alternately upon horizontal and vertical axes; also, with the succeeding rollers moving at a gradually-increasing speed; also, with conductors for guiding the stock combined with said rollers. I am also aware that a prior English patent shows one pair of rolls having sunken die-grooves in their peripheries, substantially like those in mine, combined with a second pair of smaller size, placed on an axis at right angles to the first pair, the character of the grooves in the second pair of rollers not being clearly defined in said patent, except to say that they are the same length as those in the first pair. Said two pairs of rolls had also combined with them a pair of larger rolls grooved lengthwise to form their surfaces into segments, but without anything to confine the metal laterally, and also conductors arranged between the several pairs of rolls. In this patent, also, the distance from one pair of rolls to its predecessor is not equal to a given number of blanks as formed by said predecessor. Another English prior patent shows a series of pairs of rolls arranged on axes at right angles and grooved longitudinally for their whole length, so as to form a series of eccentric faces on each roll without any cylindrical faces or other means for confining the metal laterally. One

pair of these rolls are set stationarily in the machine, while the other pairs were what may be termed "floating rollers," because they were arranged in sliding bearings to vary the distance between the several pairs of rolls under influence of the expansion of the rod being rolled therein. I am also aware that one roll of a pair has been adjusted with reference to its fellow roll by means substantially such as is illustrated in Figs. 6, 7, and 8. All of said prior art is hereby disclaimed.

I claim as my invention—

1. The combination of a connected series of pairs of roller-dies arranged alternately upon axes at right angles to each other, each roll in said series of pairs having a series of connected die-grooves in its periphery and cylindrical faces by the sides of said die-grooves, each succeeding pair in said series of pairs being stationarily affixed at a distance from its predecessor substantially equal to the length of a given number of blanks as formed by said predecessor, the die-grooves being of gradually-increasing lengths in each successive pair of rolls in said series, substantially as described, and for the purpose specified.

2. The combination of a series of pairs of rolls connected by gearing, as described, each roll having a series of connected die-grooves in its periphery, and mechanism adapted for adjusting the relative position of each pair of rolls with reference to the other pair or pairs, substantially as described, and for the purpose specified.

EDWARD CROFT.

Witnesses:

JAMES SHEPARD,
JOHN EDWARDS, Jr.