

(No Model.)

5 Sheets—Sheet 1.

W. H. SAWYER.
WIRE DRAWING MACHINE.

No. 367,667.

Patented Aug. 2, 1887.

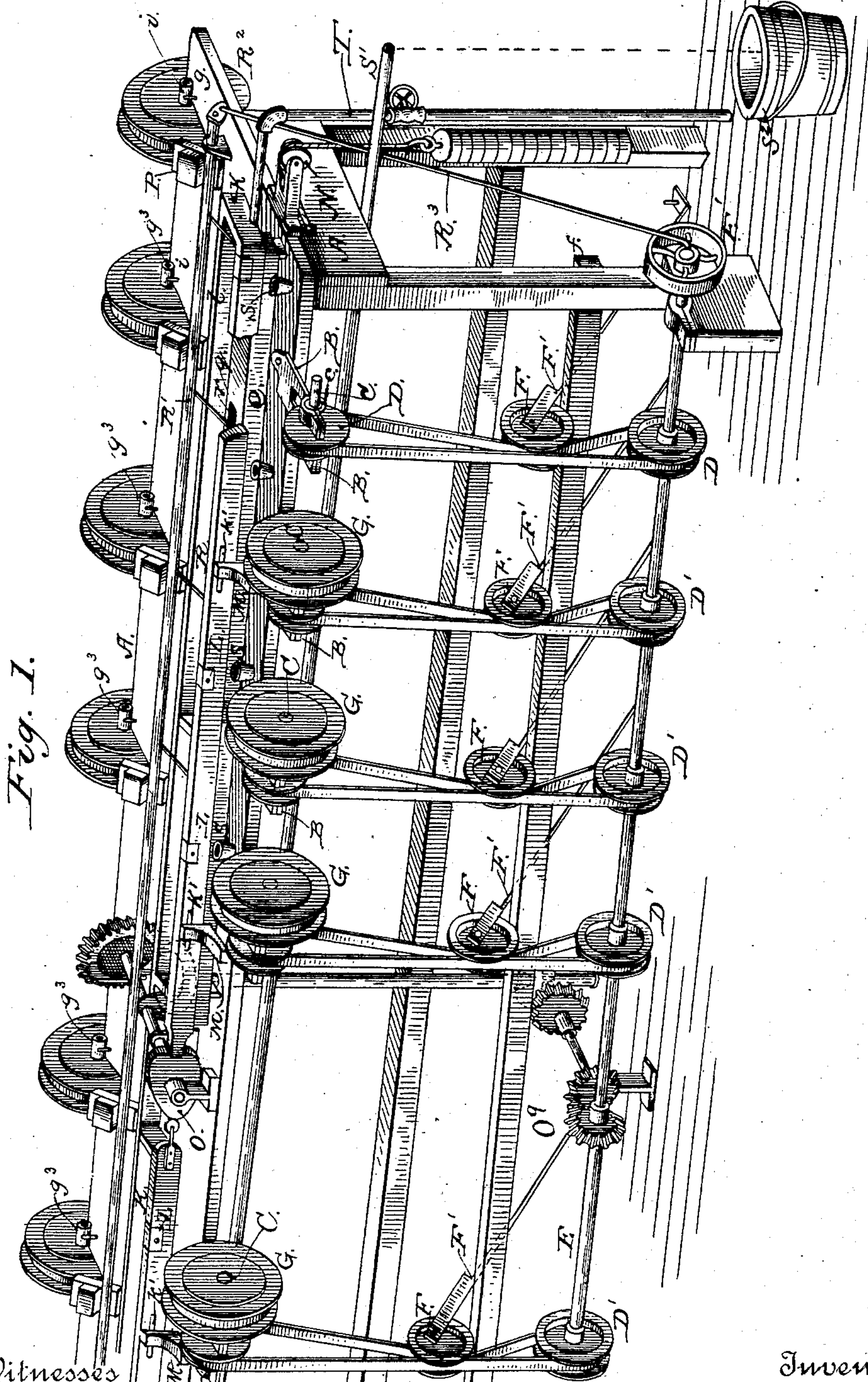


Fig. 1.

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By his Attorney
Fred W. Royce

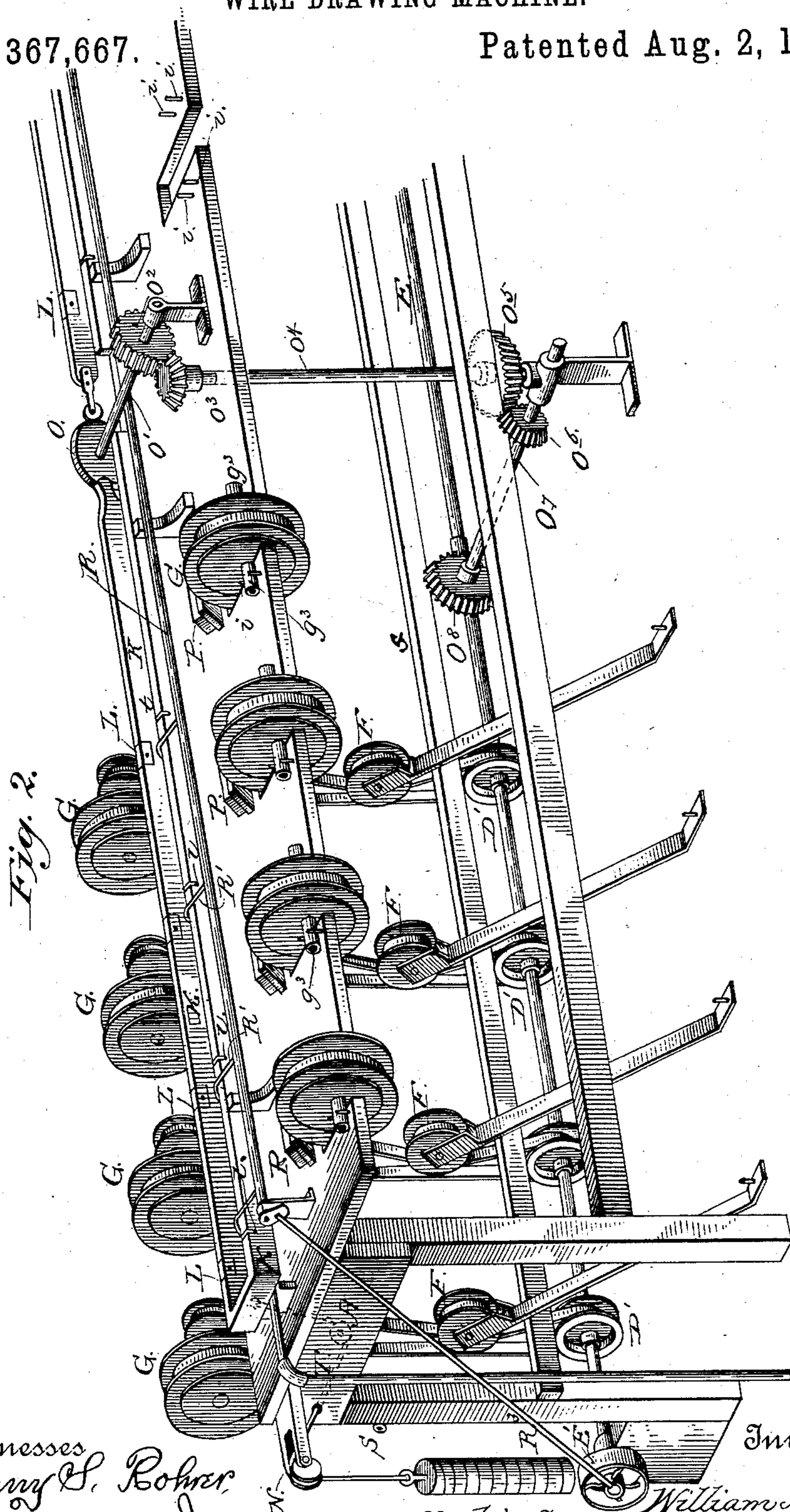
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Patented Aug. 2, 1887.



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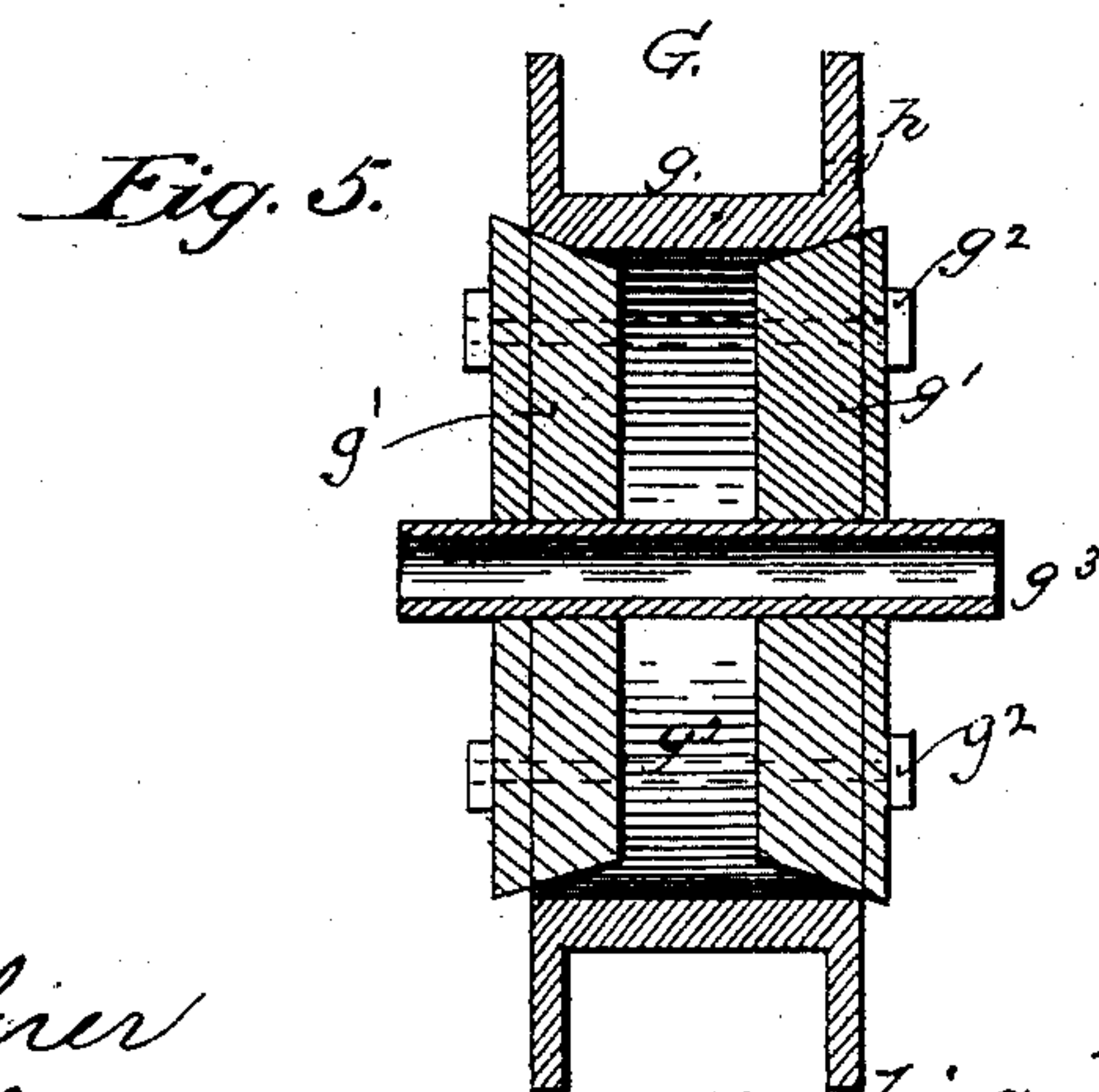
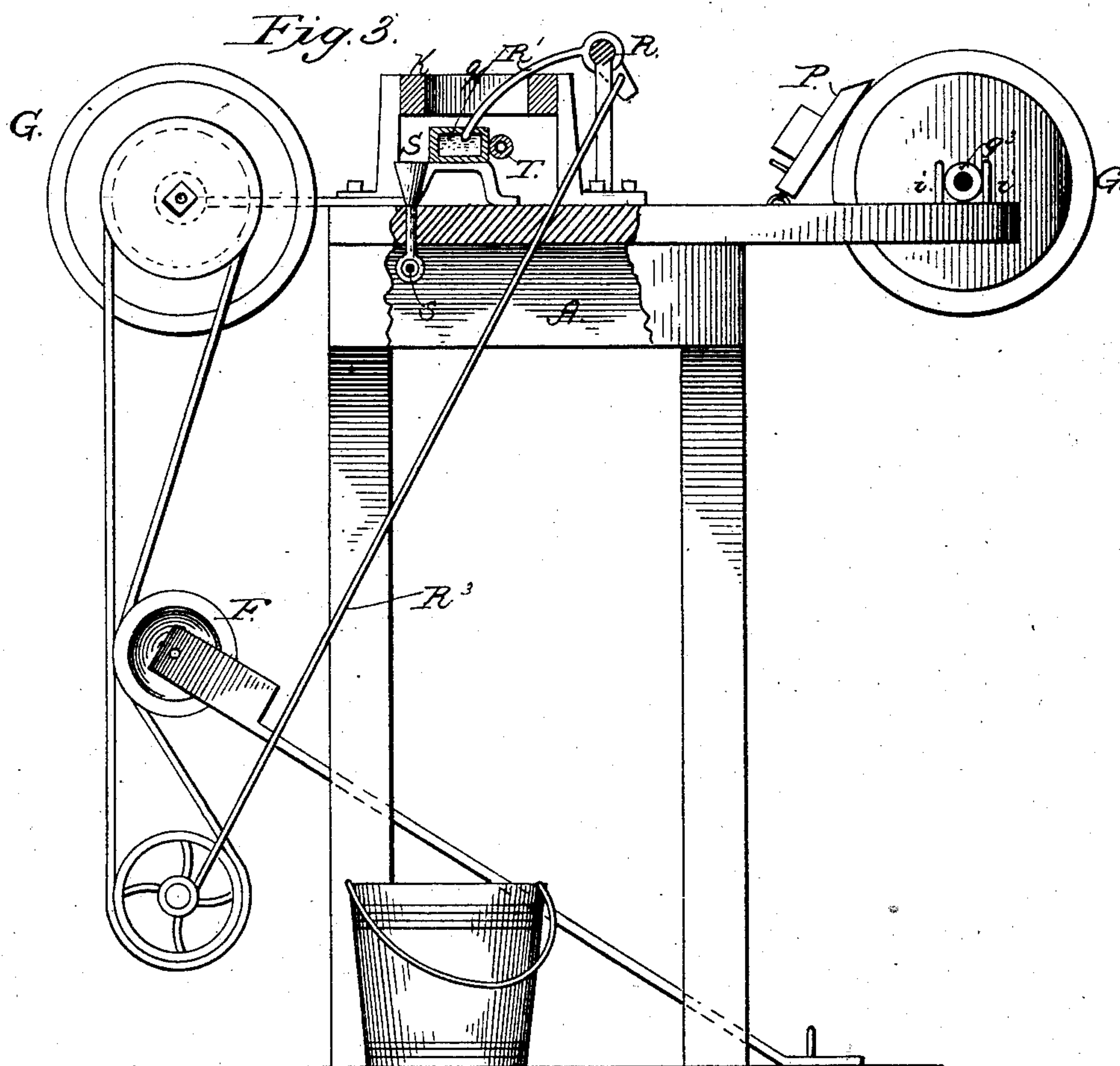
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5 Sheets—Sheet 3.

No. 367,667.

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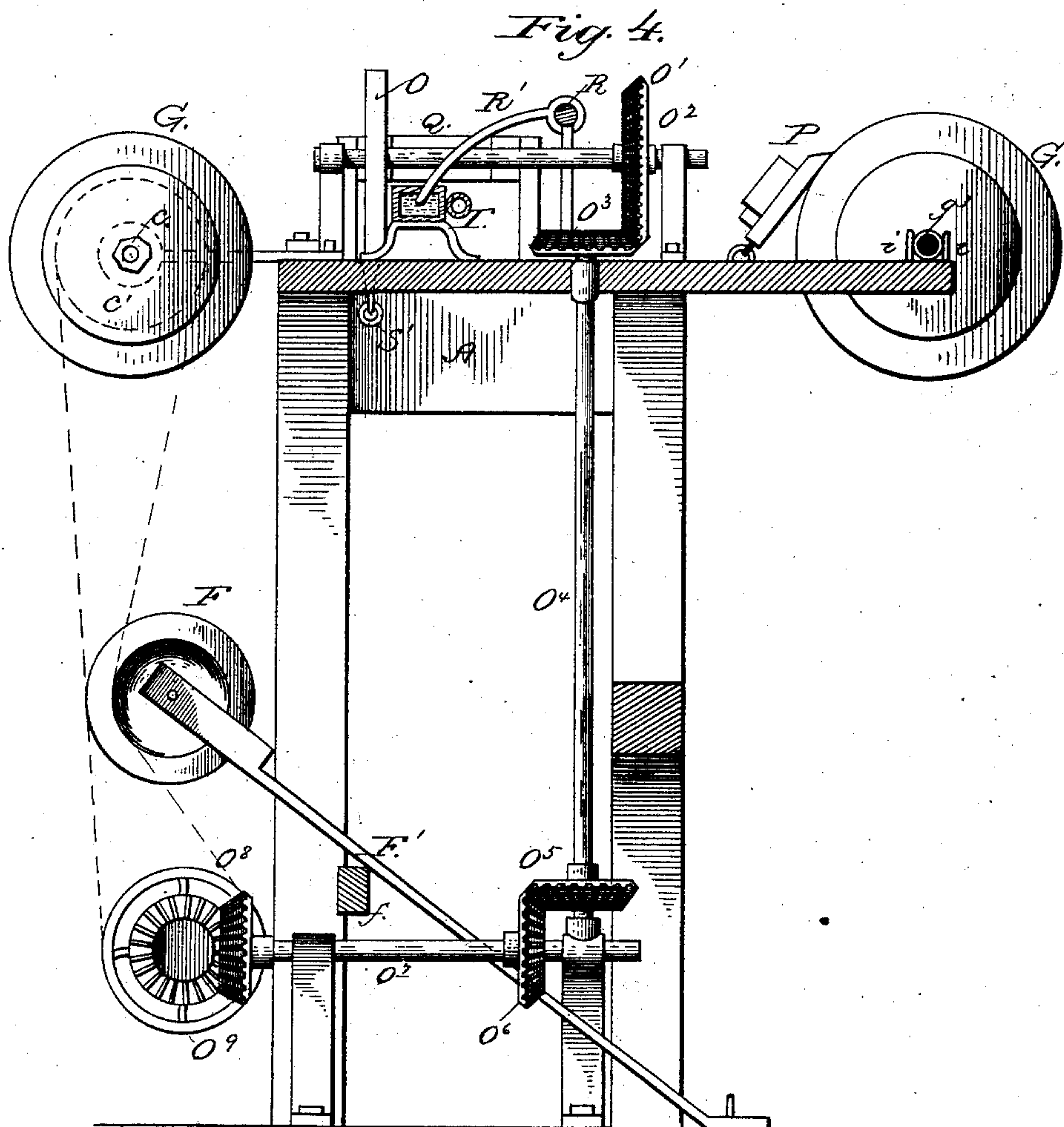
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W. H. SAWYER.
WIRE DRAWING MACHINE.

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Patented Aug. 2, 1887.



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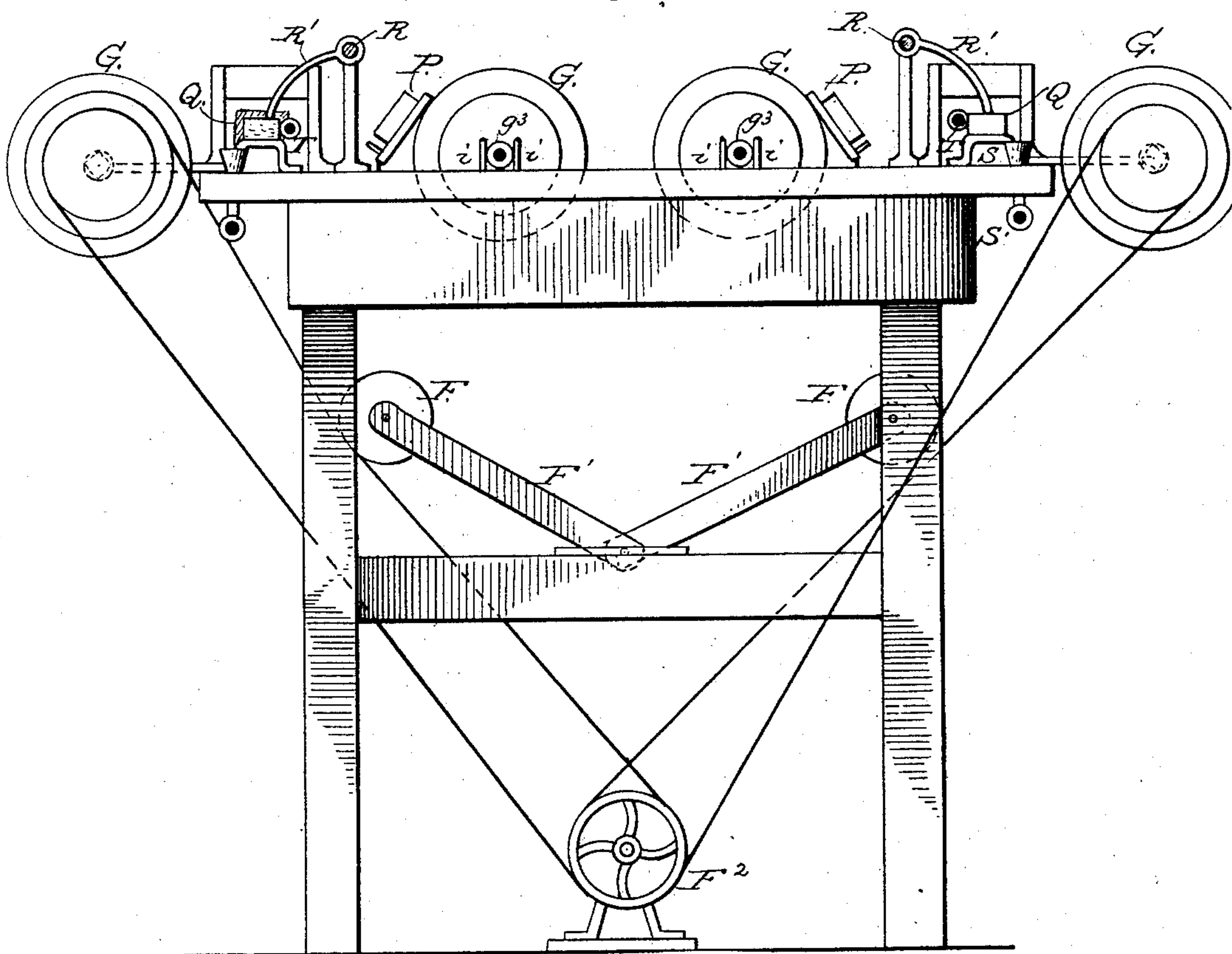
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W. H. SAWYER.
WIRE DRAWING MACHINE.

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Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM H. SAWYER, OF PROVIDENCE, RHODE ISLAND.

WIRE-DRAWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 367,667, dated August 2, 1887.

Application filed June 10, 1886. Serial No. 201,749. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. SAWYER, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island; have invented certain new and useful Improvements in Wire-Drawing Benches; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to a multiple wire-drawing bench, its object being to enable a large number of wire-drawing operations to be carried on at the same time by mechanism deriving motion from a common prime motor and in position to be conveniently superintended by a small number of attendants, my invention being especially designed for the manufacture of wire on a large scale.

In the accompanying drawings, Figure 1 represents a perspective view of a wire-drawing bench constructed according to my invention, the view being taken on the side of the bench on which the drawing-reels are located. Fig. 2 is a similar view on the side of the bench upon which the delivery-reels are located. Fig. 3 is an end view of the bench. Fig. 4 is a vertical section showing the mechanism by which the traversing-frame is operated. Fig. 5 is a view of one of the reels; and Fig. 6 is a vertical transverse section of a modified form of my invention.

Similar letters of reference occurring on the several figures indicate like parts.

The letter A indicates the table which supports the mechanism, and should be strongly constructed, so as to support considerable weight and strain. Secured to one edge of the bench are a series of projecting brackets, B, each having two arms provided with bearings for the spindles C, which receive the drawing-reels G, said spindles projecting to one side of the brackets and provided with a shoulder, *c*, against which the one side of said drawing-reels abut when in position upon the spindles, the outer ends of which are preferably screw-threaded to receive a suitable nut

to hold the reel in position thereon. Upon the spindle between its bearings is secured a belt-pulley, D, from which a belt passes to a similar pulley, D', fixed upon a driving-shaft, E, mounted in bearings below said shaft, the outer end of which is provided with a belt-wheel, E', to receive motion from a belt connected with any suitable motor. A belt-tightening wheel, F, is provided for each belt, said tightening-wheel being carried by an arm, F', having one end pivoted under the table, the outer portion of said arm being supported by a longitudinal bar, *f*, when the tightening-wheel is not in use. Normally the belts run free and loose and will not transmit motion to the spindles unless the tightening-wheels are laid against them, as shown in Figs. 1 and 4.

The spindles C when in use carry the drawing-reels G. The first spindle in the series at the near end of the table is left without a reel, in order to show its construction; but the other spindles are provided with reels, as when in use. Each reel consists of a cylindrical drum or shell, *g*, with outwardly-projecting flanges at its edges, and inside of this shell is a wooden center piece or head, *g'*, composed of two parts, which are inserted from opposite sides and drawn together by bolts *g''*, these two parts being slightly tapered, so that they will be wedged tightly in the shell. Through the center of the center pieces is firmly fixed a tubular shaft, *g'''*, projecting on each side of the center pieces and having a bore of proper diameter to fit snugly on the spindles C. When this tubular shaft is placed upon one of the spindles, its inner end rests against the shoulder *c*, and a suitable nut is screwed up against its outer end to clamp it tightly, so that the reel will be carried around when the spindle is rotated. Near the inner edge of one of the flanges of the reel is a small hole, *h*, through which the end of the wire to be drawn is passed and knotted on the outside to make it fast.

In the opposite edge of the bench from the drawing-reels are a series of recesses, each of which is directly opposite the brackets B, as shown in Fig. 2. Projecting from the top of the table, near the edges of each recess, is a pair of pins, *i i*, at such distances apart as to receive loosely between them the ends of the tubular shaft *g'''* of a delivery-reel. The letter

K designates the traversing-frame, which carries the dies L, through which the wires are to be drawn. This traversing-frame is composed of two sections, as shown, each section being composed of two parallel bars, *k k*, in one of which, next to the spindles, the dies L are arranged, and in the other are formed slits *l*, as shown in Fig. 2, which serve as guides to direct the wire in a straight line with the dies. The bars *k k* are provided at intervals with longitudinal slots *k' k'*, through which horizontal pins project from stout standards M, firmly secured to the top of the table, these slots allowing the longitudinal slowly-reciprocating motion of the frame.

At each end of the table is mounted a pulley, N, over which runs a cord attached to the inner end of the traversing-frame sections, after passing over an intermediate pulley beneath the bench, as shown in dotted lines in Fig. 2, while its other end depends and has connected to it a weight sufficiently heavy to force the frame-section endwise inwardly against the heart-shaped cam O.

At about the middle of the table is mounted a transverse shaft, O', which carries at one end a heart-shaped cam, O, against the periphery of which the inner ends of the traversing-frame sections are forced by the weights, these ends of the frame-sections being provided with small friction-rollers, which bear directly against the periphery of the said cam. Upon the opposite end of the shaft O' is a bevel gear-wheel, O², which meshes with a similar wheel, O³, fixed upon the upper end of a vertical shaft, O⁴, upon the lower end of which is another bevel gear-wheel, O⁵, meshing with a similar wheel, O⁶, on a shaft, O⁷, mounted longitudinally under the table and carrying a beveled gear-wheel, O⁸, which meshes with a pinion, O⁹, upon the driving-shaft E. The gear-wheel O⁸ is very much larger than the pinion O⁹, and when said pinion is rotated a slow motion is transmitted through the gears and shafts just enumerated to the heart-shaped cam, which in turning drives one of the traversing-frame sections slowly outward and allows the other to be driven slowly inward by its weighted cord.

A series of blocks, P, are hinged to the top of the table and arranged to bear against the peripheries of the flanges of the delivery-reels mounted at the recessed side of the table, these blocks being provided with cleats or shelves *p* to support weights to cause the blocks to impinge against the reels with sufficient force to prevent them from turning too freely, the object of these blocks being to keep the wires taut while being drawn from the reels to the dies.

Above the top of the table is supported a longitudinal trough, Q, between the two bars of the traversing-frame, but at a slightly-lower level. This trough or pan is closed at the top, except for certain oblong openings *q*, which are arranged under the paths of the wires. This trough or pan is to hold oil or other material

with which the wires are to be lubricated as they pass to the dies; and in order to apply such material to the wires I mount upon the table a longitudinal rock-shaft, R, provided with arms R', bent at right angles at their outer ends, these arms R' being of such length that when the shaft R is turned in one direction their bent ends will be dipped into the lubricating material through the openings *q*, and when the shaft is turned in the other direction these bent ends will be raised and touch the wires above, imparting to each a small portion of the lubricating material with which said bent ends become covered.

In order to give the arms R' a proper rising and falling motion, I fix a radial arm, R², to the shaft R, and to the outer end of this radial arm I connect the upper end of a rod, R³, the lower end of which is connected with the hub of belt-wheel E' on the main shaft E. Directly under each die is a funnel, S, having its spout extended downward through an opening in the table, in proper position to discharge into an inclined pipe, S', arranged under said table and having under one end a receptacle, S², to receive whatever may flow from said pipe. Along the top of the table, directly behind pans Q, runs a steam-pipe, T, which at one end of the table is provided with suitable means for connection to a steam-supply pipe, and its other end may lead off to any desired point to discharge; or said pipe may be arranged for connection in any well-known manner to secure through it a continuous circulation of steam, its object being to keep the lubricating material at a proper consistency on the wires.

The operation of the invention above described is as follows: A rod of iron or other metal to be reduced to wire is wound upon one of the reels G, which is then placed in one of the recesses in the edge of the table, with the ends of its tubular shaft between the pins *i i* on each side of the recess. The outer end of the rod is then drawn through the guide-slit and die in the traversing-frame to a reel fixed upon a spindle on the opposite side of the table, and is secured to said reel by being passed through the hole *h* and knotted on the outside. Brake-block P is then laid against the periphery of the flanges of the reel from which the wire is to be drawn. The trough or pan Q is properly filled with lubricating material, and if the weather is cold steam is turned on through the pipe T. Reels supplied with rods to be drawn may be arranged in all the recesses of the table, and have their rods led through the dies to reels or opposite spindles, as already described. The belt-tightening wheels are laid against the belts, and motion being then communicated to the main shaft E by a belt passing around the reel E', the reels on the spindles will be rotated in the direction to draw the rods off the reels on the opposite side of the table, reducing said rods in the ordinary manner, according to the size of the dies. While the wire is being drawn the

traversing-frame K is moved slowly lengthwise by the action of the heart-wheel O, as heretofore explained, so that the wire is wound in uniform layers upon the drawing-reels.

5 Meanwhile a rocking motion is communicated to the shaft R, through the connection already described, and the bent ends of the arms R' are alternately dipped into the lubricating material and raised to touch the
10 wires and give them a suitable lubrication.

As the wires are then drawn through the dies a portion of the lubricating material is scraped off and falls into the funnels S, being directed by the spouts of the funnels to the inclined
15 pipe under the table, by which the dripping material is conducted to the receptacle arranged to receive it. When the drawing-reels are filled with wire and the reels on the opposite side of the table emptied, the filled reels

20 may be removed from the spindles and the empty reels removed from the recesses and placed upon the spindles, being themselves replaced by the filled reels, from which the wires may be drawn in the same manner as already

25 described, but each wire being drawn through a smaller die than that through which it first passed, this interchange of filled and empty reels being continued and successively smaller dies used until the wires are reduced to the desired size. The dies may be successively removed from the traversing-frame and replaced
30 by smaller ones, or they may be arranged to successively decrease in size from one end of the traversing-frame to the other, and the

35 reels, when interchanged, may be shifted successively to smaller dies, so that while at one end of the bench the first drawing of a rod is taking place, at the other end, or at some intermediate position, the last reduction is being given to a wire which has been passed
40 through a series of dies. The process of drawing may be commenced at either of the spindles, or at two or more spindles, if desired, simultaneously, for different kinds of wires

45 from those being commenced or in process of completion at other spindles.
At any time when it is desired to stop the rotation of any of the spindles for any purpose, it may be done by shifting the tightening-wheel from its belt, the operation of the other spindles continuing without interruption.

50 Fig. 6 is a vertical transverse section of a modified form of my invention, being a double multiple drawing-bench, with drawing-spindles at both edges and employing two traversing-frames, the filled reels from which the wires are drawn being arranged in openings along the longitudinal center of the double
60 table. A single main drum shaft, F², serves to transmit motion to both sets of spindles, the belts for driving one set of spindles being crossed, as shown at the right-hand side of the figure. Such a double drawing-bench is

65 substantially the same as if two of the single benches had their recessed edges placed together, except that a single driving-shaft is used with suitable belts for driving both sets of spindles, and with duplicate sets of gearing and shafts to operate two heart-wheels for imparting the proper motion to both traversing-frames.

70

As another modification, I may provide each of the traversing-frames with two sets of dies, opposite each other and supported by
75 the bars of each frame—that is, instead of the guide-slits in the inner bars, I may use dies of larger gage than those in the bars next to the spindles, so that any or all of the wires may be subjected to two reductions in one drawing. 80 This form of traversing-frame will, however, be made the subject of another application for patent covering an invention intended to produce not only two but a larger number of reductions at a single drawing by providing the
85 traversing-frame with a series of successively-smaller dies for each wire to pass through at a single drawing.

Having now fully described my invention and explained the operation thereof, what I
90 claim as new and useful is—

1. In a multiple wire-drawing bench, the combination, with the series of drawing-reels provided with belt-pulleys, a common driving-shaft provided with belt-pulleys, and the
95 normally-loose belts, of the shiftable belt-tightening wheels, substantially as described, whereby motion is transmitted to each of the drawing-reels independently and the rotation of any of said reels may be stopped without
100 interrupting the others, substantially as described.

2. The herein-described drawing-bench provided with interchangeable drawing and delivering reels, substantially as described. 105

3. The herein-described wire-drawing bench provided with interchangeable cylindrical drawing and delivering reels, substantially as described.

4. A wire-drawing bench having at one side
110 rotary supports for drawing-reels and opposite supports for delivery-reels, said supports being adapted to receive interchangeable cylindrical reels, substantially as described.

5. In a wire-drawing bench, the combination, with the reducing-dies and lubricating-troughs, of the heating device arranged adjacent to said dies, whereby the lubricating material is kept in a liquid condition, substantially as and for the purpose specified. 120

6. In a wire-drawing bench, the combination, with the traversing-die-supporting frame, of a cam-wheel arranged to move said frame in one direction, and suitable automatic means for moving said frame in the opposite direction, substantially as described. 125

7. The combination, with the drawing-bench and its devices for drawing and reducing wire, of automatic means for applying lubricating material to the wires, substantially as described. 130

8. The combination, with the wire-drawing

bench and its devices for drawing and reducing wire, of the trough or pan for holding lubricating material, a rock-shaft provided with projecting arms having their outer portions
5 arranged to alternately dip into the lubricating material in the pan or trough and touch the wires, and means for producing a proper rocking motion to the shaft, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. SAWYER.

Witnesses:

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HENRY B. ROSE.