

No. 741,549.

PATENTED OCT. 13, 1903.

J. ROGER.
ORE ROASTING FURNACE.
APPLICATION FILED FEB. 13, 1903.

NO MODEL.

4 SHEETS—SHEET 1.

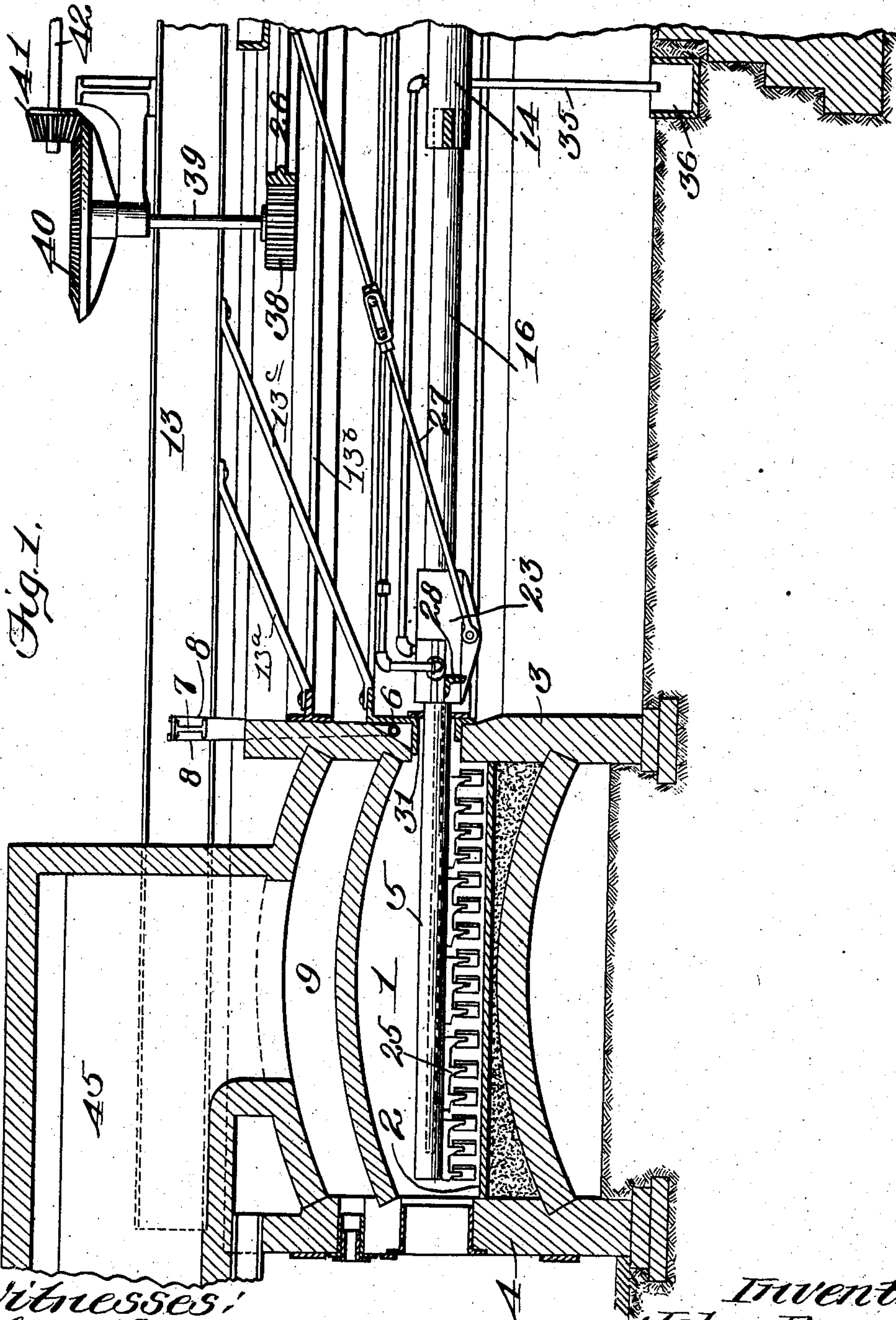


Fig. 1.

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Inventor
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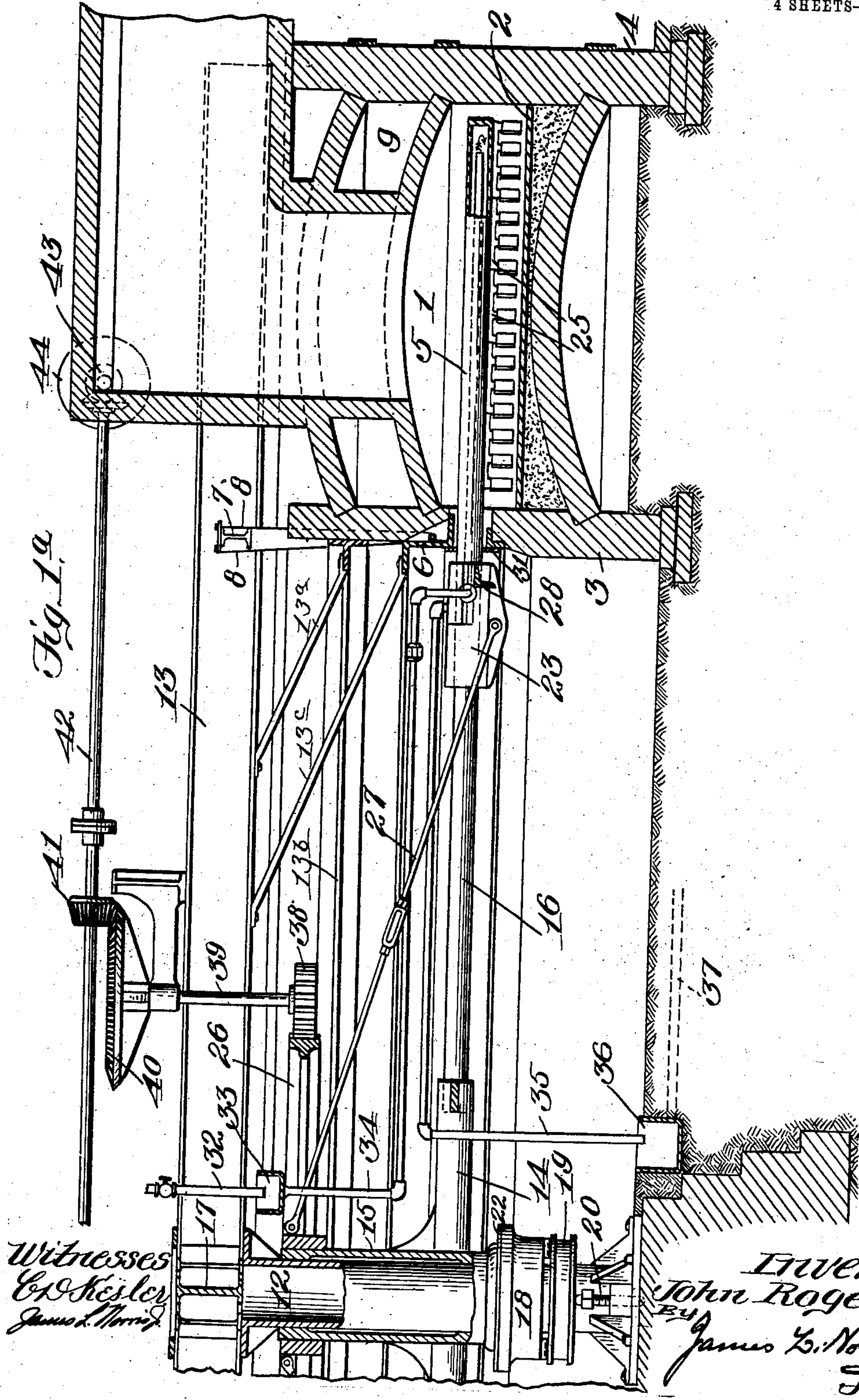
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4 SHEETS—SHEET 2.



THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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4 SHEETS—SHEET 3.

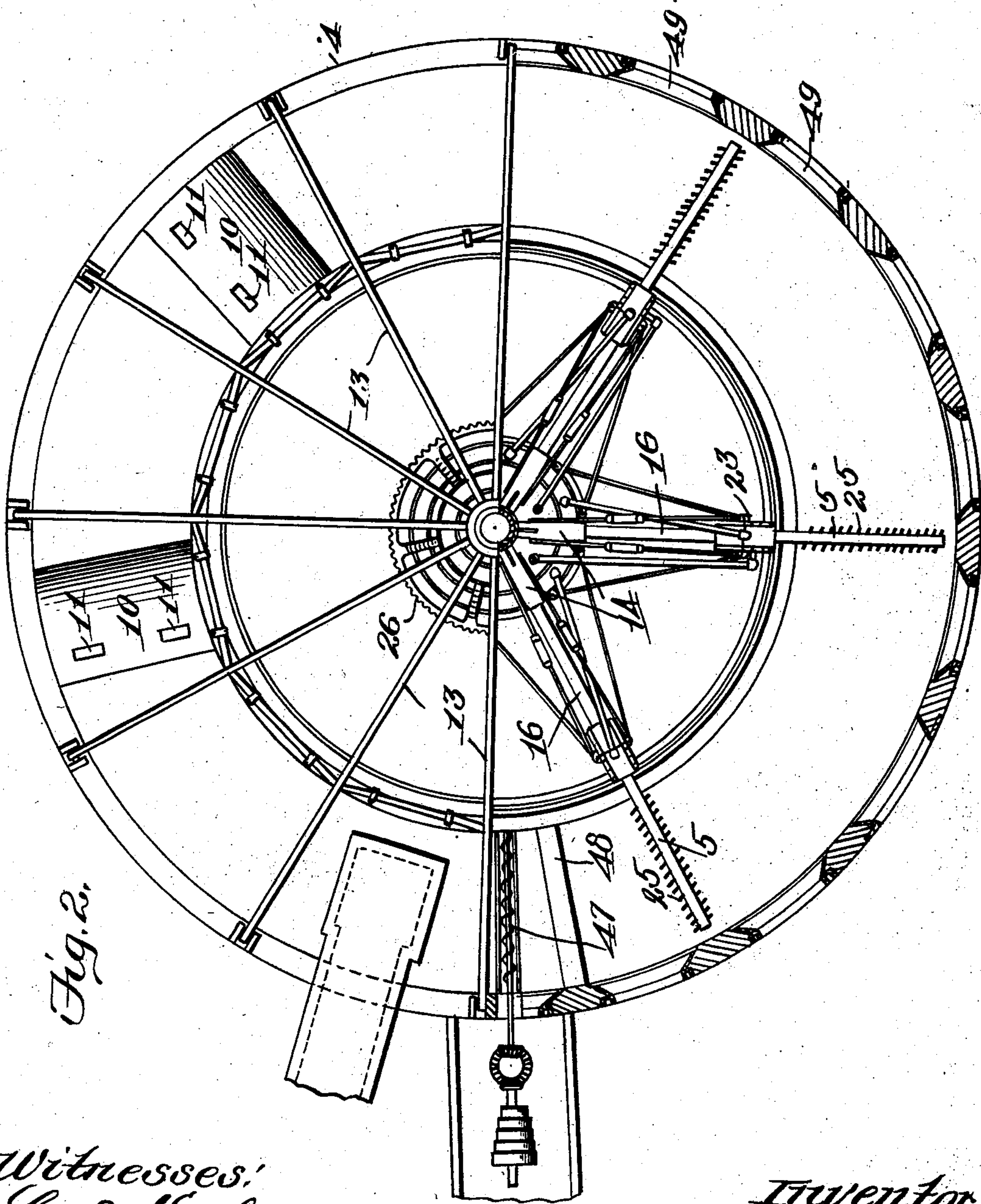


Fig. 2.

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4 SHEETS—SHEET 4.

Fig. 3.

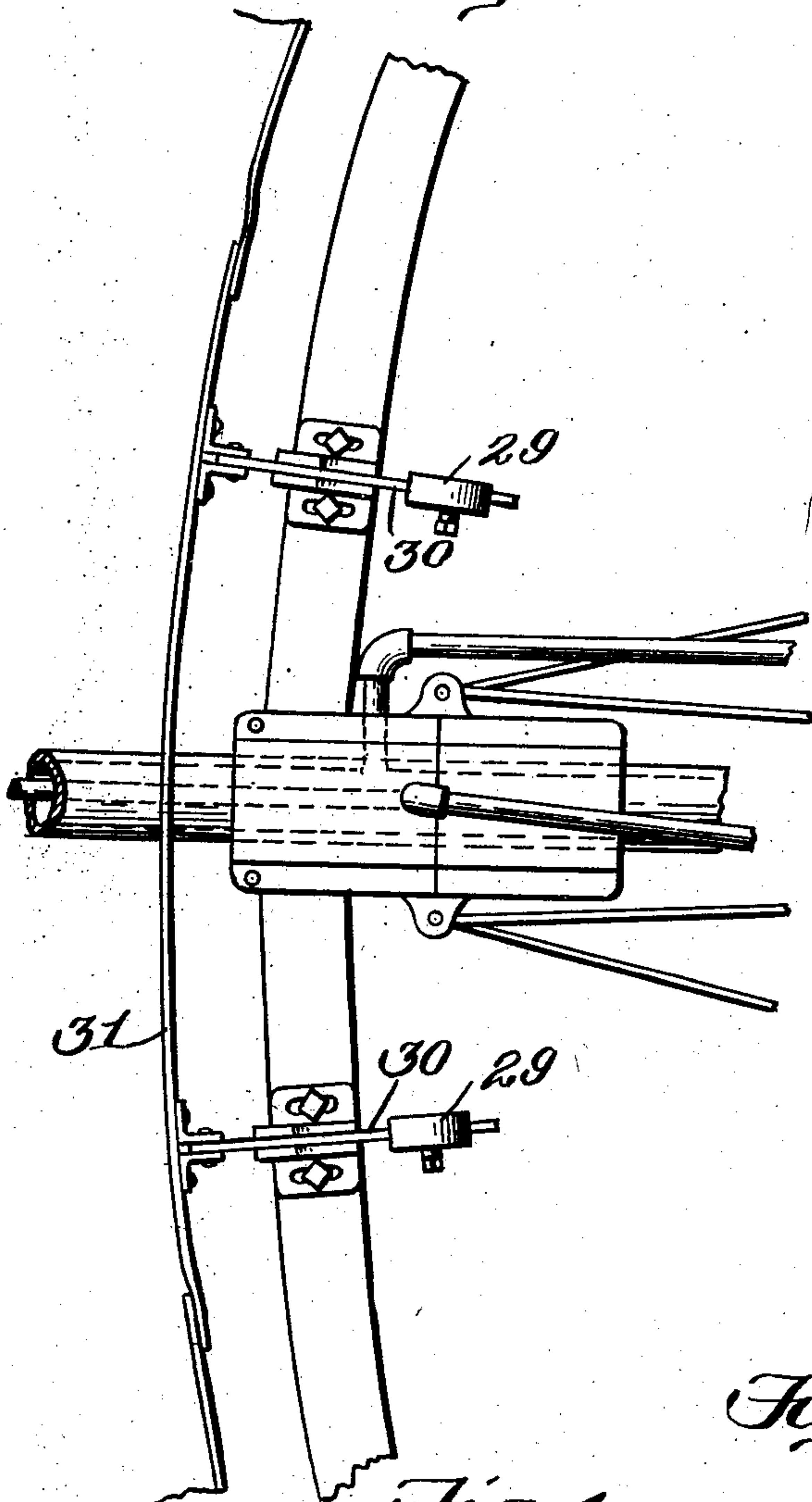


Fig. 5.

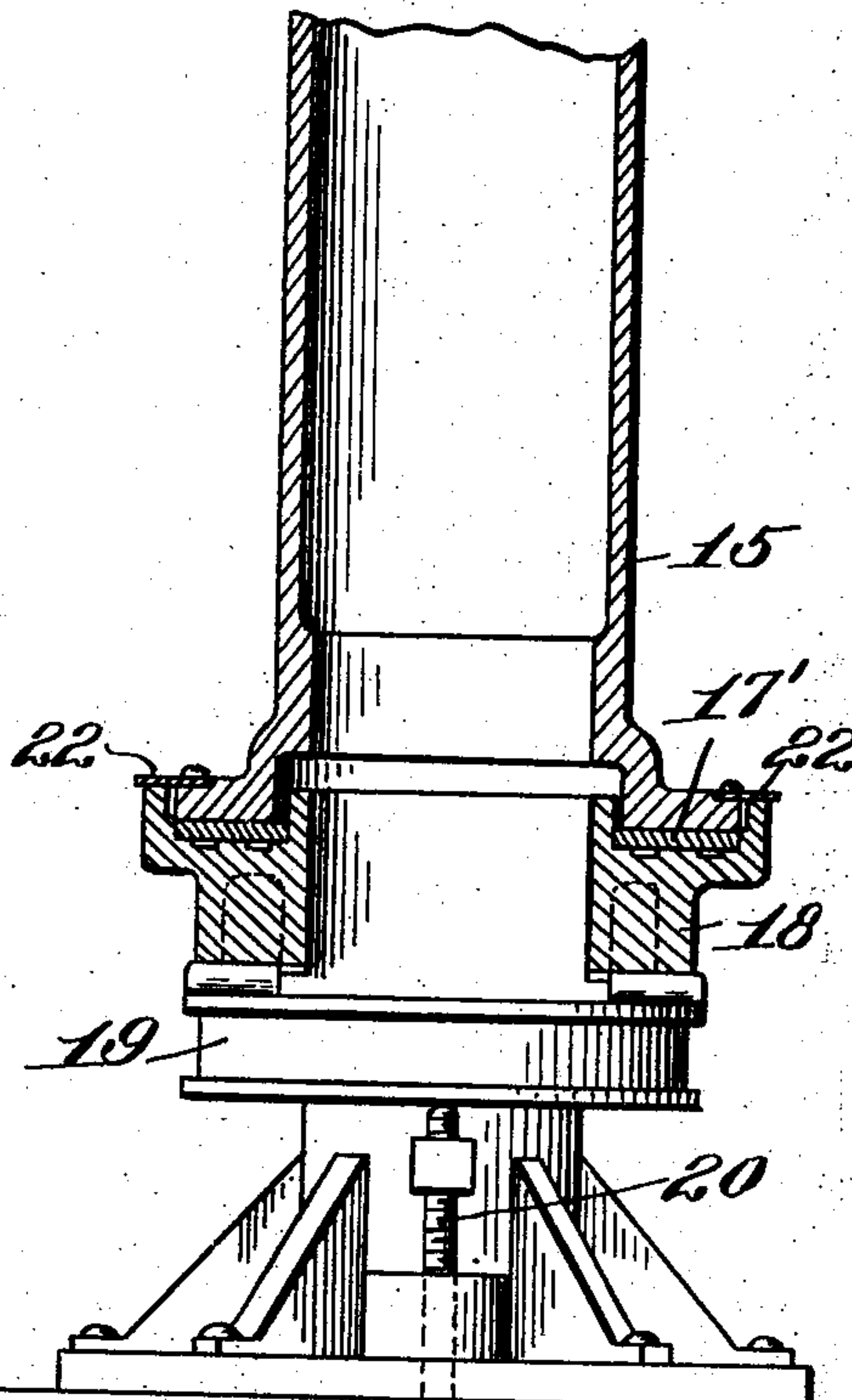


Fig. 6.

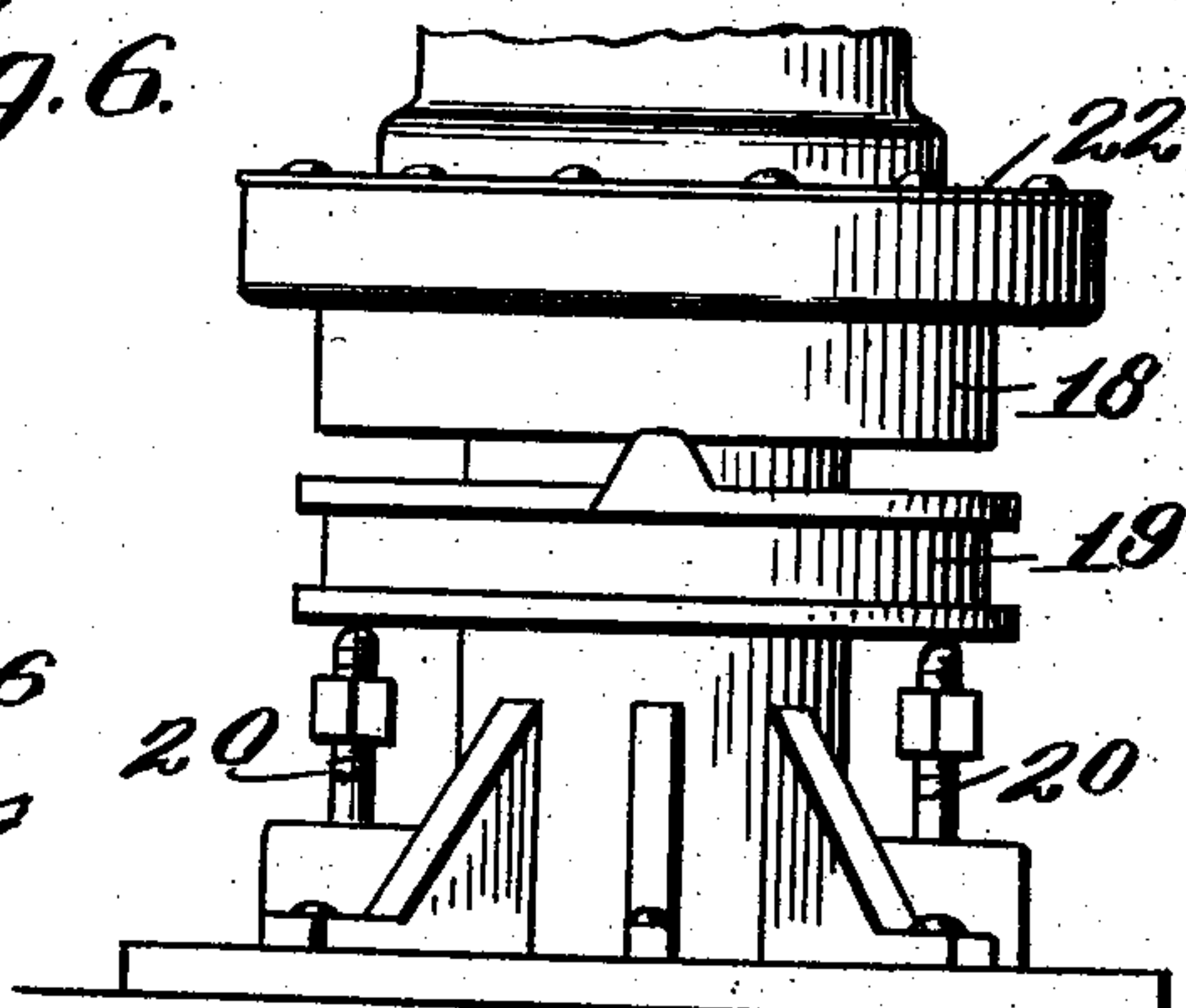
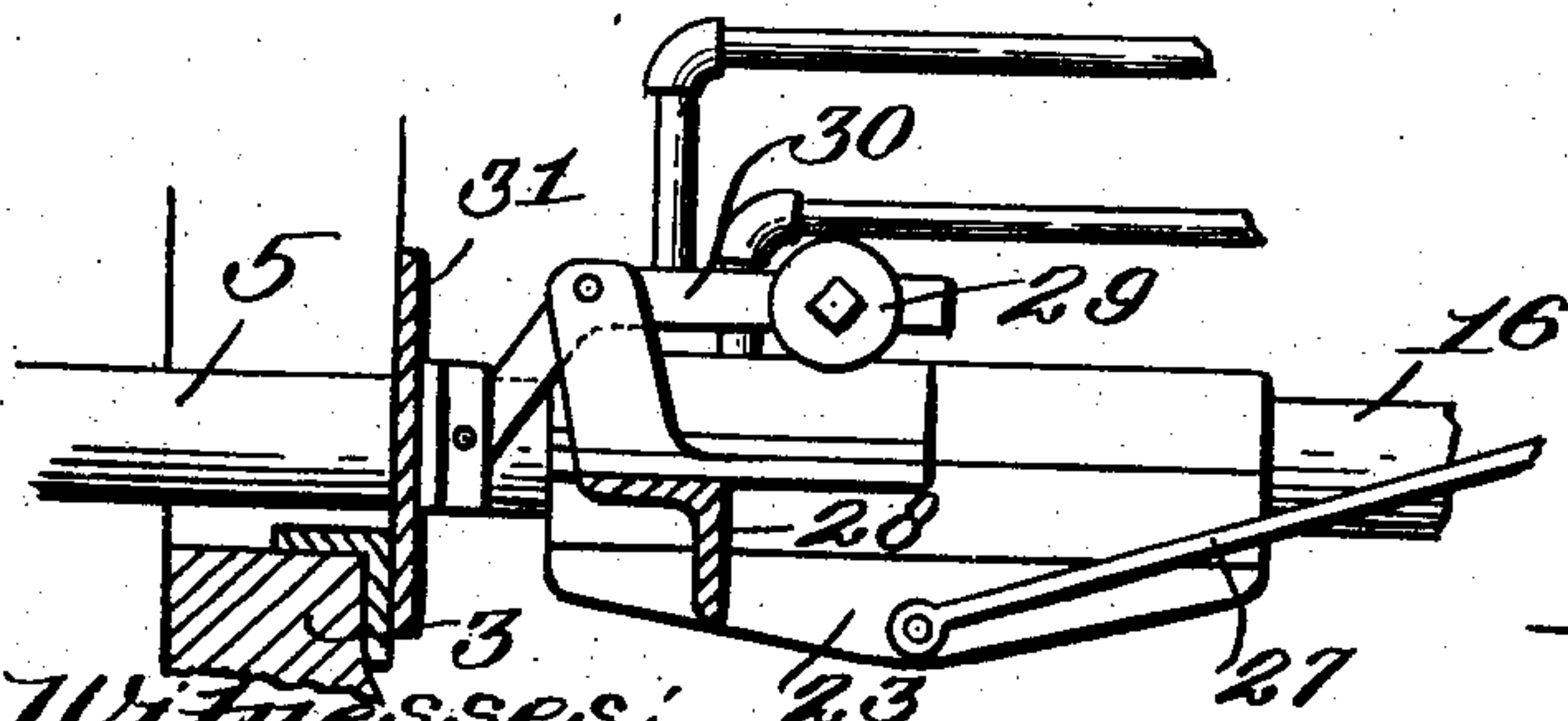


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN ROGER, OF DENVER, COLORADO.

ORE-ROASTING FURNACE.

SPECIFICATION forming part of Letters Patent No. 741,549, dated October 13, 1903.

Application filed February 13, 1903. Serial No. 143,232. (No model.)

To all whom it may concern:

Be it known that I, JOHN ROGER, a subject of the King of Great Britain, residing at Denver, in the county of Arapahoe and State of Colorado, have invented new and useful Improvements in Ore-Roasting Furnaces, of which the following is a specification.

This invention relates to ore-roasting furnaces.

The object of the invention is to simplify the construction of the furnace by eliminating the employment of the track-carrier and rollers for supporting the stirring mechanism and in lieu thereof provide a construction in which the entire stirring mechanism will be sustained on adjustable bearings mounted upon a central column.

A further object is to dispose the driving mechanism in such manner as to afford increased facility for access to the furnace for purposes of repairs and at the same time to simplify the construction of the furnace.

Other and salient objects of the invention will appear in the specification and claims.

With the above and other objects in view, as will appear as the nature of the invention is better understood, the same consists in the novel construction and combination of parts of an ore-roasting furnace, as will be herein-after fully described and claimed.

In the accompanying drawings, forming a part of this specification, and in which like numerals of reference indicate corresponding parts, there are illustrated two forms of embodiment of the invention capable of carrying the same into practical operation, it being understood that the elements therein exhibited may be varied as to shape, proportion, and exact manner of assemblage without departing from the spirit thereof.

In the drawings, Figure 1 is a view in vertical section through a part of the furnace, and Fig. 1^a is a similar view showing the other portion of the furnace, the two views when combined exhibiting the complete furnace. Fig. 2 is a view in plan showing a slightly-modified form of heating device. Fig. 3 is a view in plan showing the water-circulating mechanism. Fig. 4 is a view in side elevation showing more particularly the shield for closing the opening in the muffles through which the rabble-arms project. Fig. 5 is a view in

elevation, partly in section, showing the pillar for supporting the stirring mechanism. Fig. 6 is a similar view of the lower portion of the pillar.

Referring to the drawings, 1 designates the annular chamber or muffle in which the ore is roasted, the same being placed on the hearth or lower surface 2 of the chamber. The chamber is closed by an inner wall 3 and an outer wall 4 and has its top covered by an arch, as usual.

The inner wall of the furnace over the opening through which the rabble-arms 5 pass is carried on Z-segments 6, supported by I-beams 7 and rods 8. The furnace shown in Figs. 1 and 1^a is adapted for indirect firing; but this is not an essential feature of the improvement. In this furnace the firing is done in the upper chamber or muffle 9, and the heat is applied to the ore by radiation from the arch over the roasting-hearth.

In the form of furnace shown in Fig. 2 provision is made for employing gas or oil for firing purposes, 10 designating the firing-boxes, having openings 11 therein to permit the injection of the fuel into the firing-chamber, and the gas or oil fuel will be delivered to the chambers by pipes not necessary to be shown.

Arranged centrally of the furnace is a stationary column 12, which is rigidly supported upon a suitable foundation and extends upward and supports the upper structure 13 of I-beams, which extend radially from the outside wall 4 and rest on the column, the I-beams being braced against lateral movement by stay-rods 13^a, secured to the said beams and the beams 13^b, and by stay-rods 13^c, secured to the beams 13 and to the Z-segments, as clearly shown in Figs. 1 and 1^a. These beams are provided to carry the driving mechanism and the upper inner wall of the furnace through the medium of the I-beams 17. Upon the column 12 is loosely fitted a sleeve 15, having extensions 14 to receive arms 16. This sleeve is provided at its lower surface with a suitable metal step-bearing 17', preferably of hard brass, supported by a ring-piece 18 and an adjusting-ring 19, the latter being carried on adjusting-screws 20. The parts 18 and 19 are stationary, and thus do not revolve with the sleeve 15, are adjustable

vertically by means of the screws 20, and have a tilting or binnacle movement, so that the bearing 17' will at all times come within true alinement and contact with the sleeve 15. The bearing 17' is set in a recess or well in the ring 18, which acts as an oil-holder to supply the bearing with the proper lubricant, and covering-strips 22 are provided, which are secured to the sleeve 15 and with flexible connections thereto, thus to prevent entrance of dust or foreign matter into the oil holder or well.

On the projecting arms 16 of the sleeve 15 are secured brackets 23 for carrying the rabble-arms proper, 5, the said brackets being provided with loose adjustable caps. The rabble-arms are inserted in the extensions and properly secured therein and are provided with the usual stirrer-blades 25 for agitating the ore in the furnace.

On the upper portion of the revolving sleeve 15 is a large gear-wheel 26, which operates to revolve the rabbling mechanism. The rabble-arms are carried at a proper level by means of adjustable rods 27, extending from the upper end of the revolving sleeve to the brackets 23. Secured between the brackets 23 is a circular ring 28, extending from one bracket to the next succeeding one, and the said ring is provided to present a support for the shield that covers the opening through which the rabble-arms pass, the said ring being firmly secured to the brackets at each point of contact. The ring 28 at frequent intervals is provided with counterweights 29 and levers 30, these in turn supporting the metallic shield or strip 31, above referred to.

The counterweights 29 are adjustable on the levers 30, as clearly shown in Fig. 3, in order to cause positive coaction between the shield and the openings through which the rabble-arms pass, thus in a certain manner to prevent escape of gases and the like.

For the purpose of maintaining a suitable working temperature in the arms a water circulation is provided therefor and comprises a water-supply pipe 32, supported on the I-beams 13, said pipe discharging into a circular trough 33, revolving with the mechanism of the furnace. From this trough lead pipes 34, which are connected with the stirrer-arms and with a pipe 35, extending to the farther end of each of the arms. It will be seen that water delivered through the pipe 34 will return in the rabble-arm and will be delivered back through the pipe 35, which also revolves with the mechanism, and thence passes into a central trough 36, which is provided with a drain 37 for carrying off the hot water as it is delivered from the arms in the furnace.

The driving mechanism consists of spur-pinions 38, which engage with the gear-wheel 26. These pinions are mounted on shafts 39, which are secured by suitable brackets to the stationary framework of the furnace and to the I-beams 13. The shafts are further provided with bevel-gears 40, which are engaged

by pinions 41, carried by the shaft 42, which latter is rotated by a shaft 43 through the medium of driving-pulleys 44. It will be seen that as the pulleys 44 are rotated by any suitable means the pinions 38 will impart to the gear-wheel 36 a revolving motion, which will be transmitted to the sleeve 15, arm 16, brackets 23, and to the arms 24, carrying with them the water-trough 33 and the pipe connections running therefrom. As the arms 24 revolve around the central column the ore in the hearth is stirred up in the manner usual to furnaces of this construction, and the whole revolving mechanism will be supported on the central rings 18 and 19 and the adjusting-screws 20, thereby dispensing entirely with all tracks and outside supports such as have heretofore been employed in structures of this kind.

As before indicated, the exact method of heating this furnace is immaterial, and in the form herein shown the heating-chamber 9 is provided independently of the roasting-chamber; so that the gases of combustion may not mix with the gases evolved from the ore in roasting. The gases of combustion are taken off at the flue 45, while the gases from the roasted ore are taken off by the flue 46, which connects directly with the roasting-chamber 1.

In providing furnaces for roasting material in which it is not necessary to keep the gases apart the upper chamber or muffle 9 may be dispensed with and the gases of combustion be permitted to pass directly through the chamber 1 in contact with the ore being roasted. The fire-boxes and other appliances for heating purposes used in connection with this furnace may be of any of the well-known forms, such as step or flat grate fire-boxes, constructed to suit the fuel available and the conditions as they may exist at the point of operation.

In the operation of the furnace, oil, gas, or other fuel may be used to bring the roasting-chamber up to the necessary temperature for roasting the ore to be treated, this ore being delivered from a storage bin or hopper onto the hearth of the furnace by a screw under feed mechanism 47, the stirrer-arms 5 being made to revolve around the central column and while passing through the ore will stir up the latter and carry it forward at each pass until it is carried through the whole circuit of the furnace and delivered into an opening 48, which is made in the hearth of the furnace and from which the ore may be removed by the car, conveyer, or elevator, as the case may require.

The time of exposure of the ore on the hearth of the furnace will depend upon the speed of the revolving arms, and the character of the stirring or rabble blades on these arms will depend upon the character of the ore to be treated.

To furnish access to the furnace for the purpose of barring out or removing any in-

crustations, lateral openings 49 are provided, as shown in Fig. 2.

It will be seen from the foregoing description that by the peculiar manner of supporting or mounting the stirring mechanism the employment of tracks and rollers such as heretofore employed for supporting the outer extremities is rendered absolutely unnecessary, and the elimination of these features not only simplifies the construction of the furnace, and thus materially reduces its cost of production, but the arms are capable of being adjusted with great nicety and in such manner as to positively insure proper operation in use. Moreover, by disposing the driving mechanism as shown—that is to say, overhead—access to the interior of the furnace is rendered easy, and the necessity of taking down any part of the furnace for the purpose of gaining access thereto is thus entirely obviated.

Having thus described the invention, what I claim is—

1. The combination with a circular furnace, of a column or pillar disposed concentrically thereof, a sleeve rotatably mounted upon the column, rabble mechanism having their inner portions supported by the sleeve, means for adjusting the sleeve to raise and lower the outer portions of the rabble mechanism, and adjusting mechanism connecting the upper portion of the sleeve and the outer portion of the rabble mechanism.

2. The combination with a circular furnace, of a column or pillar disposed concentrically thereof, a sleeve rotatably mounted upon the column, rabble mechanism supported wholly by the sleeve, and means for adjusting the sleeve upon the column thus to raise or lower the outer ends of the rabble mechanism.

3. The combination with a circular furnace, of a column or pillar disposed concentrically thereof, a sleeve rotatably mounted upon the column, rabble mechanism supported by the sleeve, means for adjusting the sleeve upon the column, and adjusting mechanism connecting the upper portion of the sleeve and the outer portion of the rabble mechanism.

4. The combination with a circular furnace, of a column or pillar arranged concentrically

thereof, a sleeve rotatably mounted upon the column, a bearing arranged at the lower portion of the column, an adjustable ring supporting the bearing, rabble mechanism carried by the sleeve, and stay-bolts or guy-rods connecting the upper portion of the sleeve and the outer portions of the rabble mechanism.

5. The combination with a circular furnace, of a pillar arranged concentrically thereof, a stationary ring disposed near the lower portion thereof, adjusting-screws bearing against the under side of the ring, a stationary bearing resting upon the said ring and provided with a depression constituting an oil-well, a sleeve mounted upon the column and working at its lower end in said well, means for sealing the well against entrance of extraneous material, rabble mechanism carried by the sleeve, and means for adjusting the outer ends of the rabble mechanism with relation to the furnace.

6. The combination with a circular furnace, of a column or pillar disposed concentrically thereof, a sleeve adjustably mounted on the pillar and carrying a trough rotatable therewith, rabble-arms connected with the pillar, means for supplying water to the trough, water-feed pipes connecting the trough with the rabble-arms, and water-return pipes connecting with the rabble-arms and leading to a point of discharge.

7. In a furnace of the class described, the combination with a column supported concentrically of the furnace, of a sleeve mounted thereon, rabble-arms carried by the sleeve, and guy-rods or stay-bolts connecting the upper portion of the sleeve with the outer portions of the arms, thereby to support the said outer portions directly from the sleeve and obviating thereby the necessity of the employment of underneath means for supporting said arms.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN ROGER.

Witnesses:

JAMES HENDERSON,
ALFRED W. PICK.