

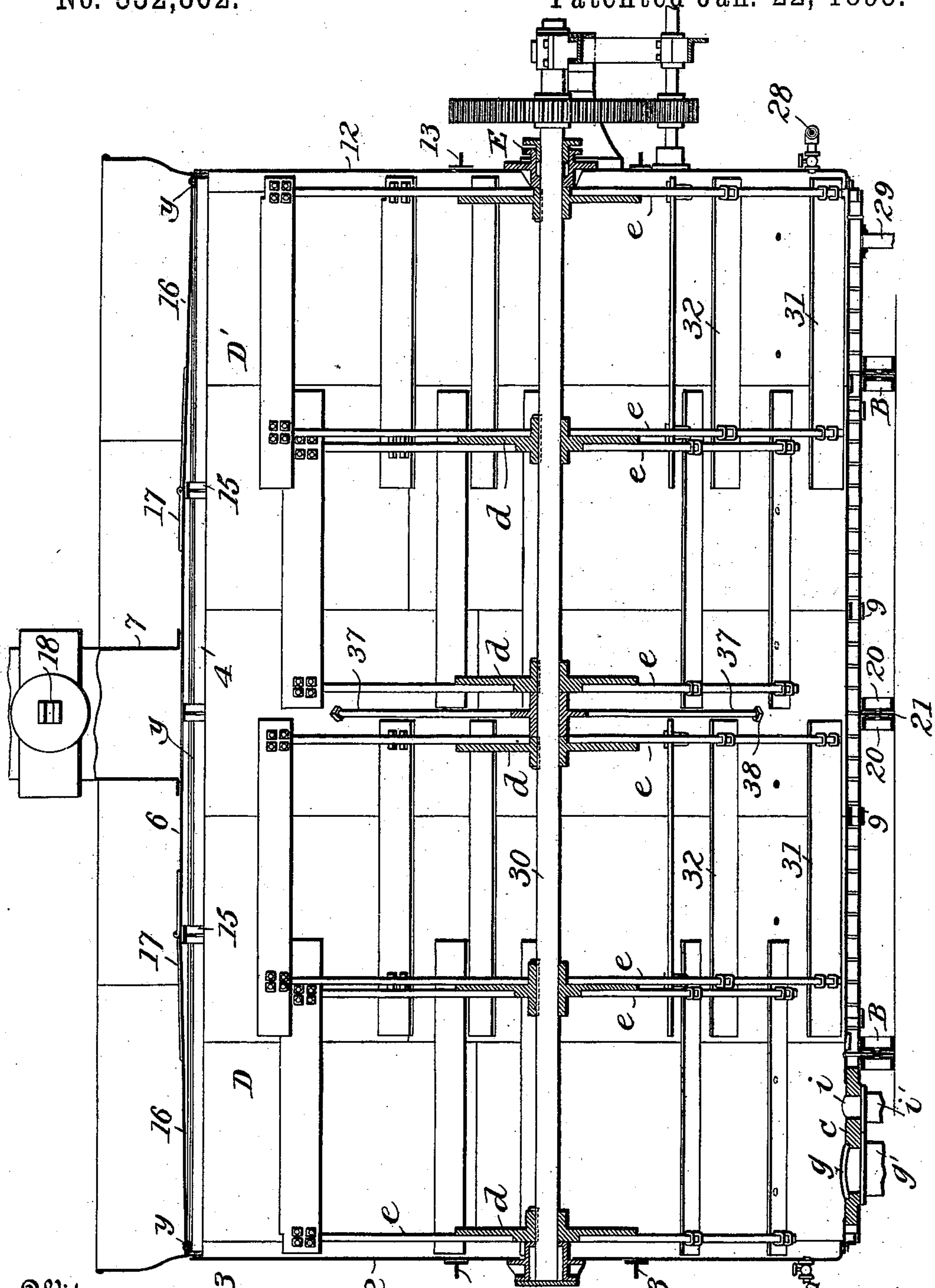
(No Model.)

4 Sheets—Sheet 1.

A. W. BILLINGS.
CONVERTER.

No. 532,862.

Patented Jan. 22, 1895.



Witnesses
J. G. Hinkel
C. E. Church

Fig. 1.

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Attorneys

(No Model.)

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Fig. 2.

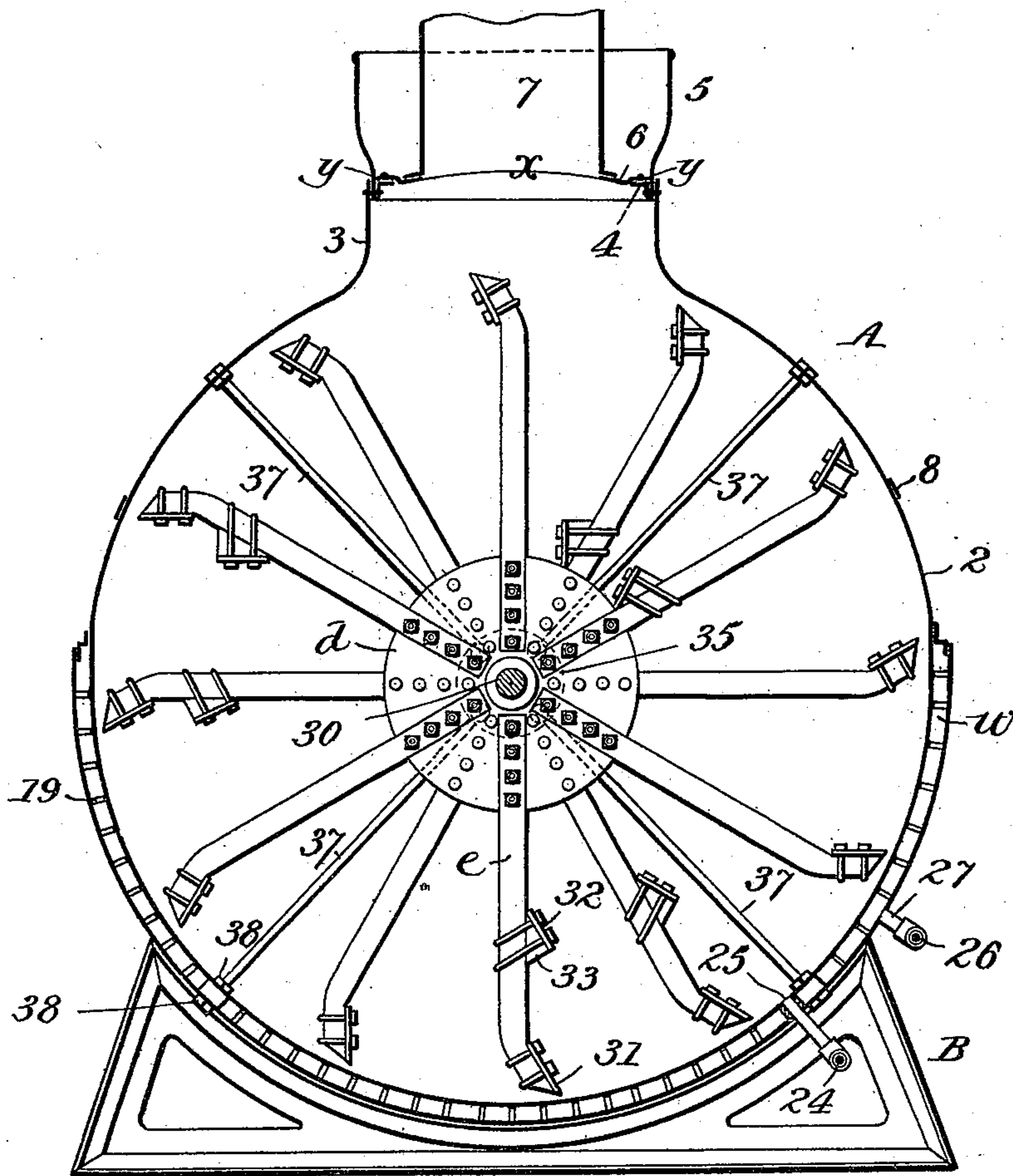


Fig. 4.

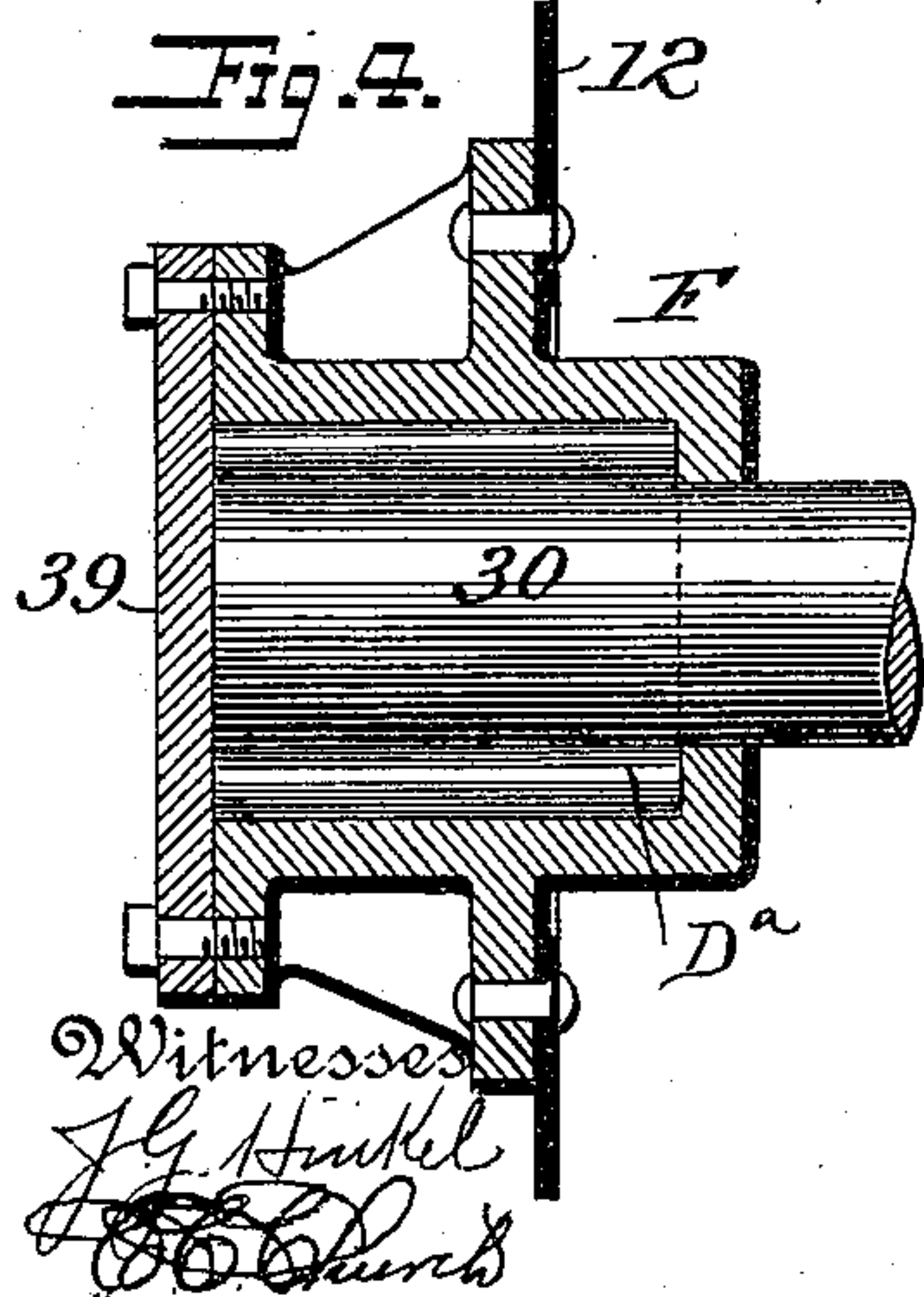


Fig. 5.

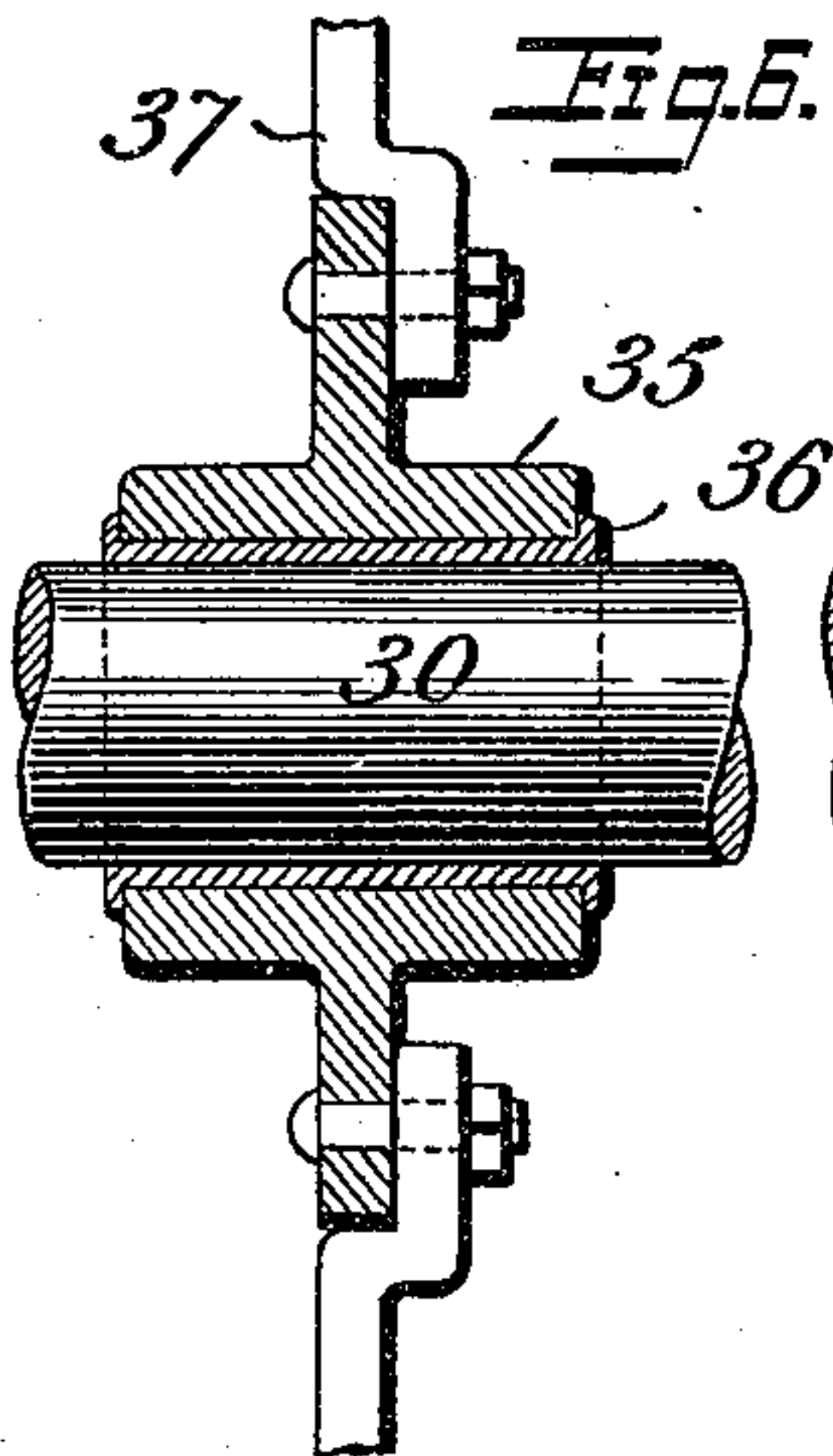
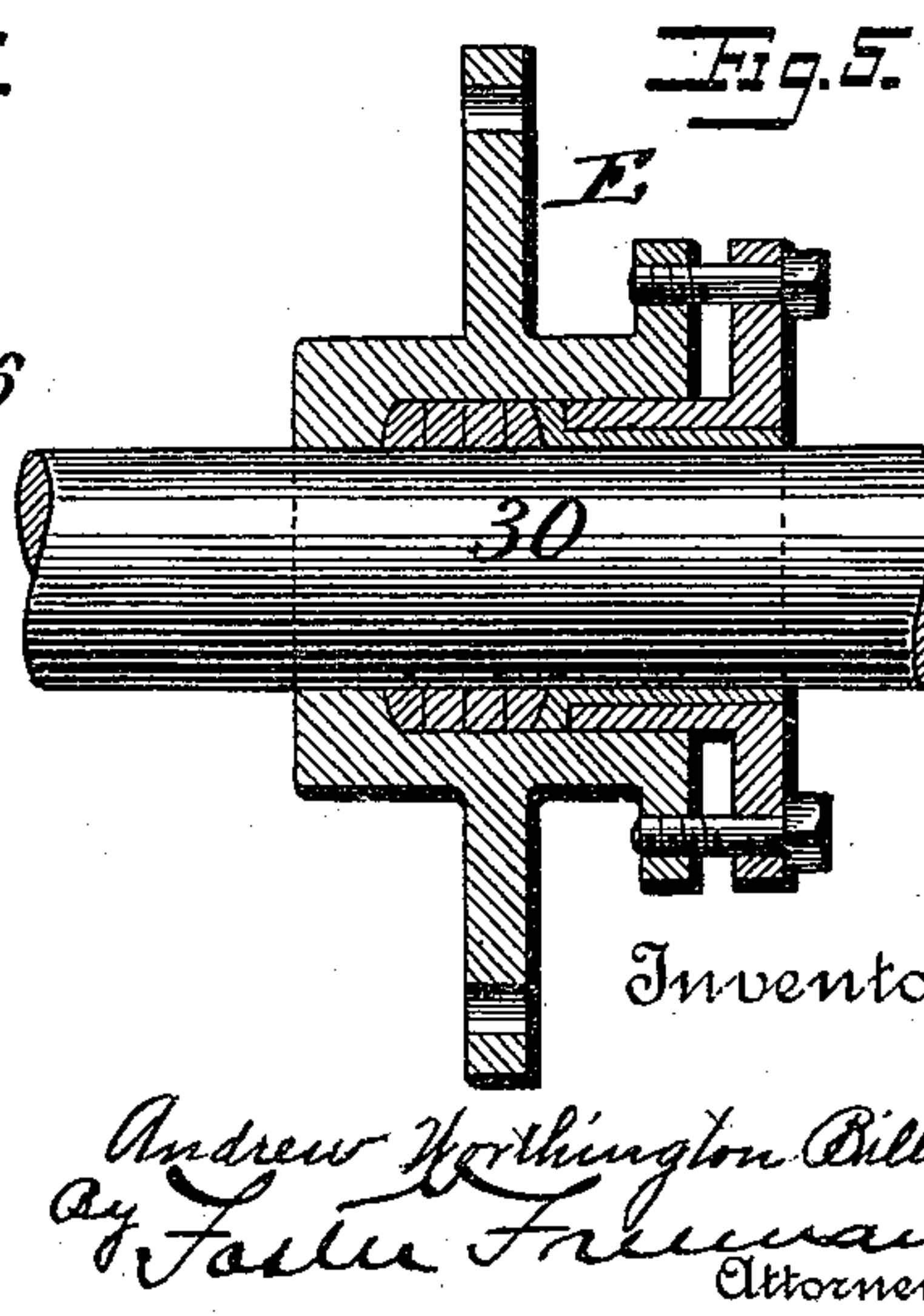


Fig. 5.



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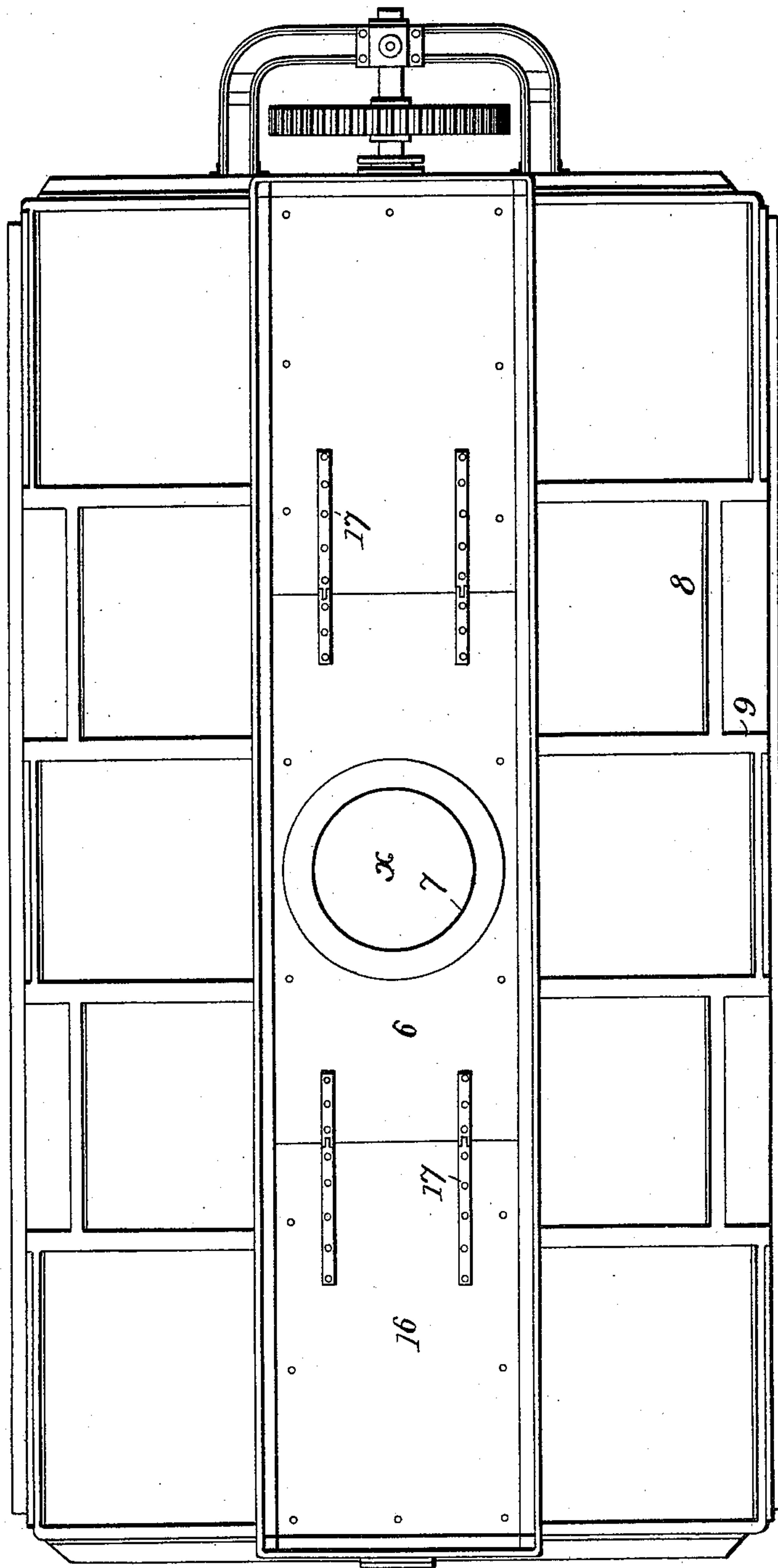
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Fig. 3.



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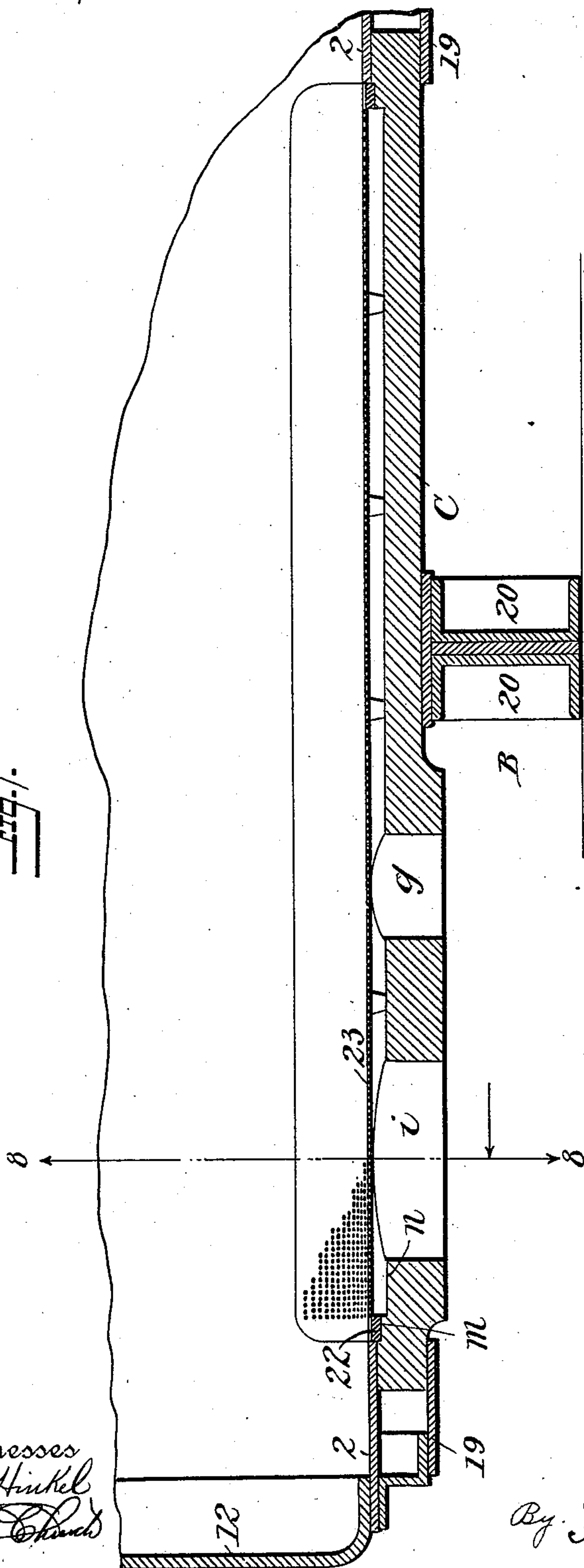
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A. W. BILLINGS.
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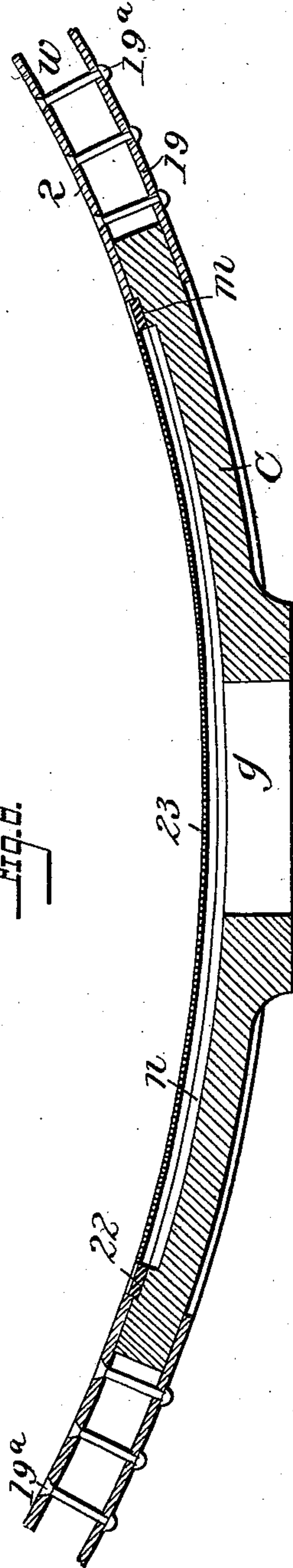
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Fig. 7.



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Fig. 8.



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UNITED STATES PATENT OFFICE.

ANDREW WORTHINGTON BILLINGS, OF BROOKLYN, NEW YORK.

CONVERTER.

SPECIFICATION forming part of Letters Patent No. 532,862, dated January 22, 1895.

Application filed January 16, 1894. Serial No. 497,073. (No model.)

To all whom it may concern:

Be it known that I, ANDREW WORTHINGTON BILLINGS, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Converters, of which the following is a specification.

My invention relates to that class of converters used in the manufacture of malt liquors, and my invention consists in constructing the converter as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1, is a longitudinal sectional elevation of a converter having my improvements. Fig. 2, is a transverse sectional elevation. Fig. 3, is a plan view. Figs. 4 and 5, are enlarged sectional views upon the end bearings of the shaft. Fig. 6, is an enlarged sectional view of the center bearings of the shaft. Fig. 7, is an enlarged sectional view showing the parts connected with the discharge ports. Fig. 8, is a section on the line 8—8, Fig. 7.

A, is the casing which is substantially cylindrical in form, except at the top where a neck 3, extends the entire length of the casing, the said casing and neck being formed of boiler steel, and in order to extend the depth of the neck, and also to prevent the overflowing of liquors when boiling I fit closely within the neck the lower edge of a deep flange or apron 5, coinciding in outline with that of the neck, and within the said flange at the lower edge I rivet an inner rim 4, of angle iron, the rivets extending through the vertical flange of the said rim, and through the overlapping edges of the neck and flange 5, thereby imparting great strength and rigidity at this point.

To further impart increased rigidity, as well as support the cover of the casing I extend cross-bars 15 of T-iron across the neck as shown in Fig. 1, and to these cross-bars I rivet centrally a plate 6, constituting the permanent part of the cover and to which, opposite an opening x , is riveted the flange of the vapor pipe 7.

The movable portions of the cover are in the shape of doors 16, 16, curved toward the sides from the center to allow any overboiling liquor to drain away, and connected by

hinges 17, 17, with the central stationary portion 6, the edges of the doors lying upon the horizontal portions of the rim 4, to which they are clamped with an intervening packing y , when it is desired that the casing shall be steam tight, in which case a close fitting damper or a valve in a valve casing 18, of the vapor pipe is also closed.

The ends or heads 12, 12, of the casing of boiler metal are cut away at their flanged portions opposite the neck 3 and are formed with inturned peripheral flanges which extend into and are riveted to a cylindrical shell 2, and in order to reduce its weight, difficulty of manufacture and expense incident to the use of metal of the thickness otherwise required I strengthen the heads by means of T-bars 13, extending across and riveted externally to the said heads, and I strengthen the plate joints of shell 2, by means of encircling bands or covering straps 9, and longitudinal bands or covering straps 8, substantially as shown.

A steam chamber w , is formed around the lower half of the casing by means of a steam jacket in the form of a shell 19, and the jacketed casing rests upon a number of saddles B, each consisting of two angle steel bars 20, 20, and an intermediate vertical plate 21, riveted together as shown. I thus secure a very firm and stable support capable of sustaining a very heavy weight at a comparatively small cost.

It will be observed that the jacket 19, which constitutes the steam chamber w , is securely riveted to the under side of the shell 2, by a number of strong rivets 19^a, which are scattered throughout the entire surface of said jacket 19, and they are countersunk on their inner ends so as to be flush or smooth with the interior surface of said shell 2. This makes a very secure connection and greatly strengthens the parts.

To avoid any possibility of leaking at the points where the discharge pipes connect with the casing I cut away the inner and outer shells at the bottom, and insert between said shells the edges of a curved block of metal C, of wrought iron, gun metal, or any other suitable material having two openings i, g , for the discharge of the material, which openings

communicate with the outlet tubes g' , i' , the flanges of which are bolted to the under side of the said block.

The inner face of the block C, is not flush with the inner face of the casing, but has a depression m , immediately within the edge of the opening in the inner casing, and another depression n , extending over the entire surface about one inch deeper than the depression m .

Within the depression m , fits a frame 22, which is riveted to the edge of a perforated strainer frame 23, these parts being so formed that when the strainer plate is in place its inner surface will be flush with the inner casing and there will be a space between its underside and the top of the block C, of an inch or so in depth.

A pipe 24, leading from any suitable source of supply communicates through branches 25, with the inside of the casing while a similar pipe 26, communicates through branches 27, with the interior of the steam jacket, while water pipe 28, also communicates with the interior of the casing and a drain pipe 29, serves to conduct the condensed water from the steam jacket. These pipes may be arranged and communicate with the casing and jacket in any suitable manner not necessary to be here described.

The stirrer may be in one, two or more sections. As shown, there are two double sections D, D', supported by and keyed to and turning with a shaft 30, extending centrally through the casing. Each section consists of a hub d , radial arms e , fitting into radial recesses in said hub and projecting outward and bent at the outer end as shown in Fig. 2, and one or more series of longitudinal blades 31, 32, carried by said arms.

The outer blades 31, are suitably clamped to the bent ends of the arms e , with their outer edges near the inner face of the casing, and the inner blades 32, are clamped to the edges of the arms e , and against intermediate angular blocks 33, which serve to insert or fix the said blades at the desired angle. The edges of the blades are beveled so as to present a cutting edge in the direction of movement thereof and for the better mixing of the materials and also to acquire a lateral as well as rotary movement I overlap the blades under the inlet for the raw or other materials to be used.

When there are two or more sections in the stirrer the length of the shaft 30, is such that the necessary rigidity could not be secured without using a shaft of undue weight if supported by end bearings alone. I therefore provide for an intermediate support or supports consisting of a flanged hub 35, recessed to receive a suitable bearing 36, for the shaft 30, and supported in position by radial rods 37, bolted to the flange of the hub extending through the casing and provided with clamping and adjusting nuts 38, 38.

One end of the shaft 30, extends through a

packing box E, at one end of the casing, and in order to avoid the necessity of using a packing at the opposite end and to prevent leakage I form an inside bearing consisting of a box F, having at one end a plate 39, bolted in one of the heads of the casing and having an opening at the other end for the reception of the shaft, the end of which bears against the plate 39, and in order that the shaft may revolve more freely the bearing is turned on the inside and fitted with polished steel rollers D^a.

The apparatus above described answers the purpose of a mash tub, a boiling kettle, a hop back, and an under back.

The entire mash may be made in the converter, the strainer plate 23, being removed during the mashing, and after this is effected the mash is at once discharged into the filter. After this is done the stirrers are revolved during the admission of water which thoroughly cleanses the interior before the grain has a chance to become baked or cemented to the inner surface. The strainer is then inserted in place when the apparatus may be used as a boiling kettle. The clear wort from the filter tub is now pumped directly into the converter and the admission of steam to the jacket w , is regulated so as to hold the wort at the required temperature the proper length of time, the hops being added and the blades set in motion during the boiling of the wort.

I have found that as it is important to maintain the agitation of the wort by boiling, and that by the use of revolving blades the hops are thoroughly disintegrated but without being broken so as to pass through the strainer, the full amount of extracted matter is obtained, the albuminoids are broken up and their coagulation assisted while the froth is beaten down and over-boiling prevented. The boiling also may be completed under pressure which is often essential as in the use of raw grain, but when malt alone is used the hinged covers may be lifted and the converter used as an open kettle. The liquor may be cooled in the converter by passing cold water into the apparatus. The liquor may be then discharged, the strainer preventing the passage of the spent hops after which the strainer may be removed and the waste material washed out and discharged.

By extending the flange 5, above the cover I prevent in case of any over-boiling above the cover, any flowing of the material to and down the outside of the casing.

While the construction of apparatus of the character having often a capacity of five or six hundred barrels is necessarily attended with considerable expense I have been able by adopting the features above set forth to greatly reduce the expense and increase the efficiency of the apparatus securing the desired rigidity, strength, and steadiness and the capacity to perform the required operations by the use of a minimum amount of material and labor in the construction.

Without limiting myself to the precise construction and arrangement of parts shown and described, I claim as my invention—

1. The combination in a converter, of the 5 cylindrical casing, the stirrers, the shaft and its central flanges, hub or bearing, rods extending from said bearing through the shell of the casing and secured, the longitudinal projecting neck, a flange or apron fitting in 10 said neck and rising above the same, internal rims arranged along the lower edges of the neck, and covers closing down upon said rims, substantially as described.

2. A converter provided with a cylindrical 15 casing merging at its upper portion into a longitudinal projecting neck, a deep flange or apron extending for the entire length of the neck and projecting above the same, a rim secured in place within said flange at the 20 lower edge thereof and a cover fitted to and closing the neck and resting upon or supported by said rim, substantially as described.

3. A converter constructed of a cylindrical 25 casing merging at its upper portion into a longitudinal projecting neck closed at the ends, a deep flange or apron fitted to said neck and extending above the same, rims secured in place within said flange along the 30 lower edges thereof, a central fixed section fitting within the neck and supporting a vapor pipe, and hinged lids or covers for closing the neck at each side of said fixed section, substantially as described.

4. A converter provided with a cylindrical 35 casing merging at its upper portion into a longitudinal projecting neck, a flange or apron fitted in said neck and rising above the same internal rims extending along the lower edges of the apron and a cover for closing the

neck constituted of a central fixed section, 40 and outer hinged sections, the surfaces of which are curved downwardly in the direction of the ends of the casing, substantially as described.

5. The combination of the inner and outer 45 shells of a converter cut out at the bottom or under side, a block having an annular depression and a deeper depression extending over the entire upper surface thereof, and a removable screen having a surrounding 50 frame and fitted within the depression first named, substantially as described.

6. The combination of the inner and outer 55 shells of a converter, each cut out correspondingly on the bottom or under side, a curved block fitting between said shells and having an annular depression and a depressed upper surface, and a screen having a 60 frame fitted to the said annular depression, substantially as described.

7. The combination of the inner and outer 65 shells, each cut out correspondingly on the under side, a block fitting between said shells and having an annular depression in its upper surface, and a depression within the first 70 and extending over the entire surface of the block, discharge tubes fitted into openings provided therefor in the block, and a screen fitted to the said annular recess flush with the inner surface of the inner shell, substan-

tially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ANDREW WORTHINGTON BILLINGS.

Witnesses:

JOHN MURRAY,
H. ROACH.