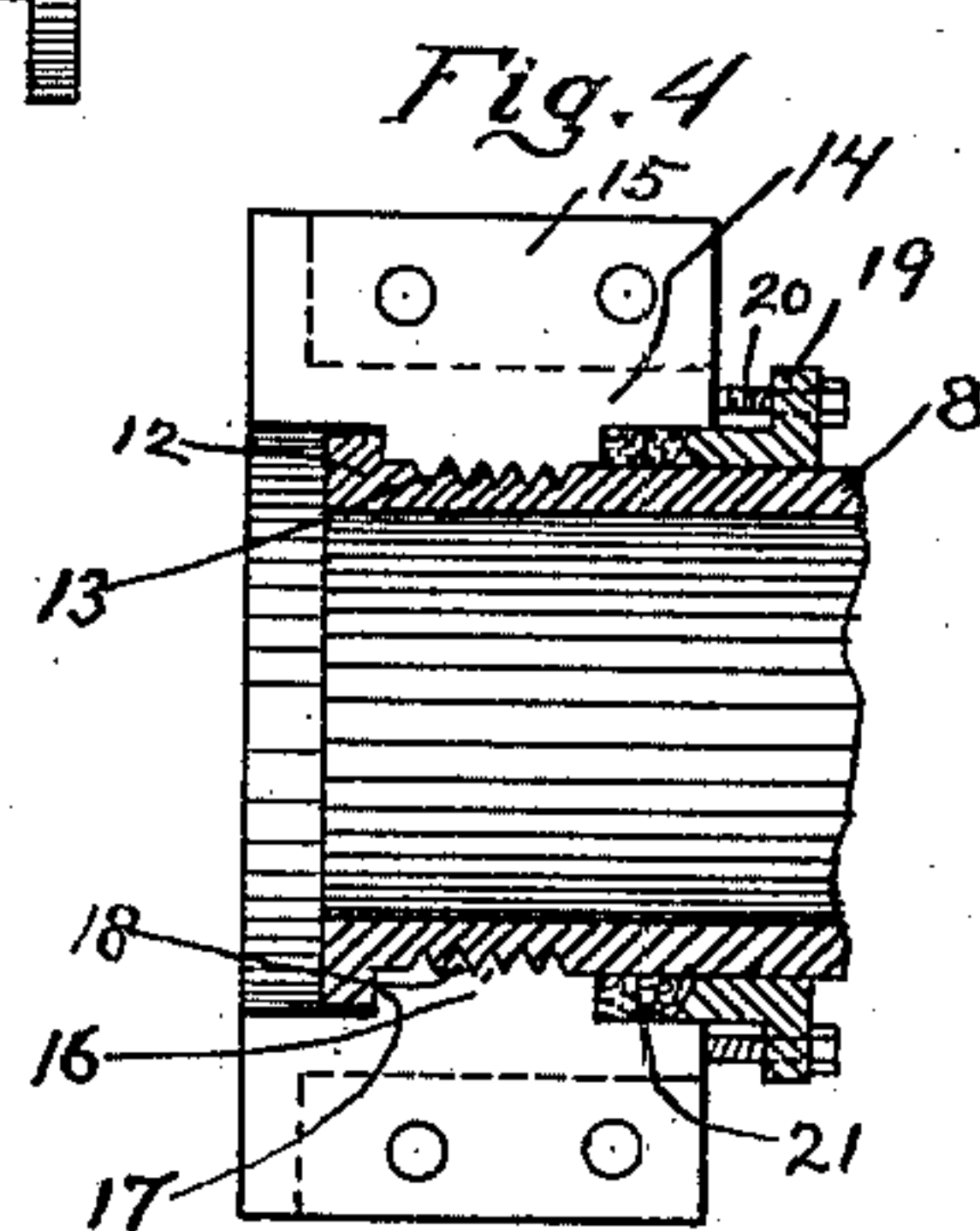
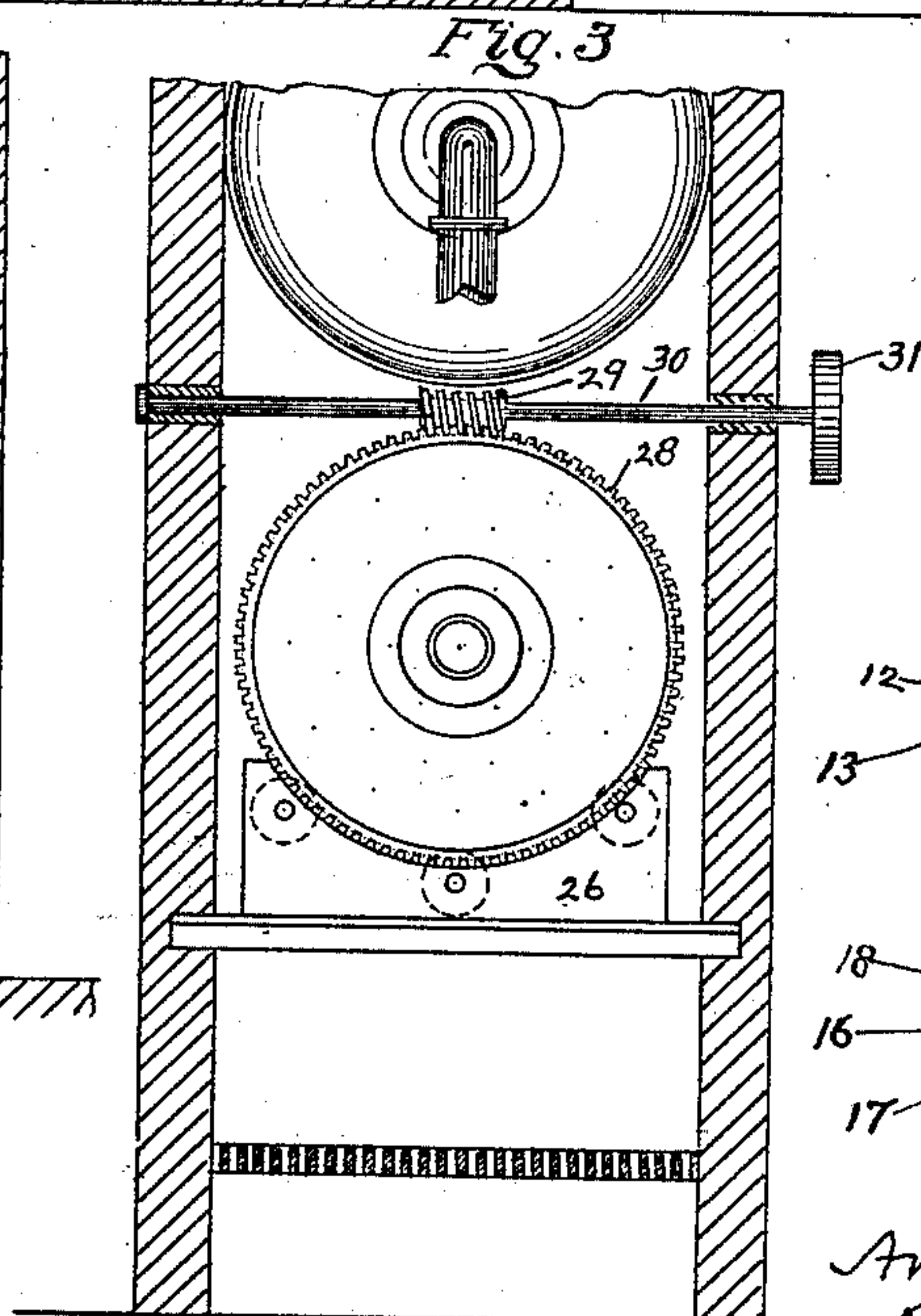
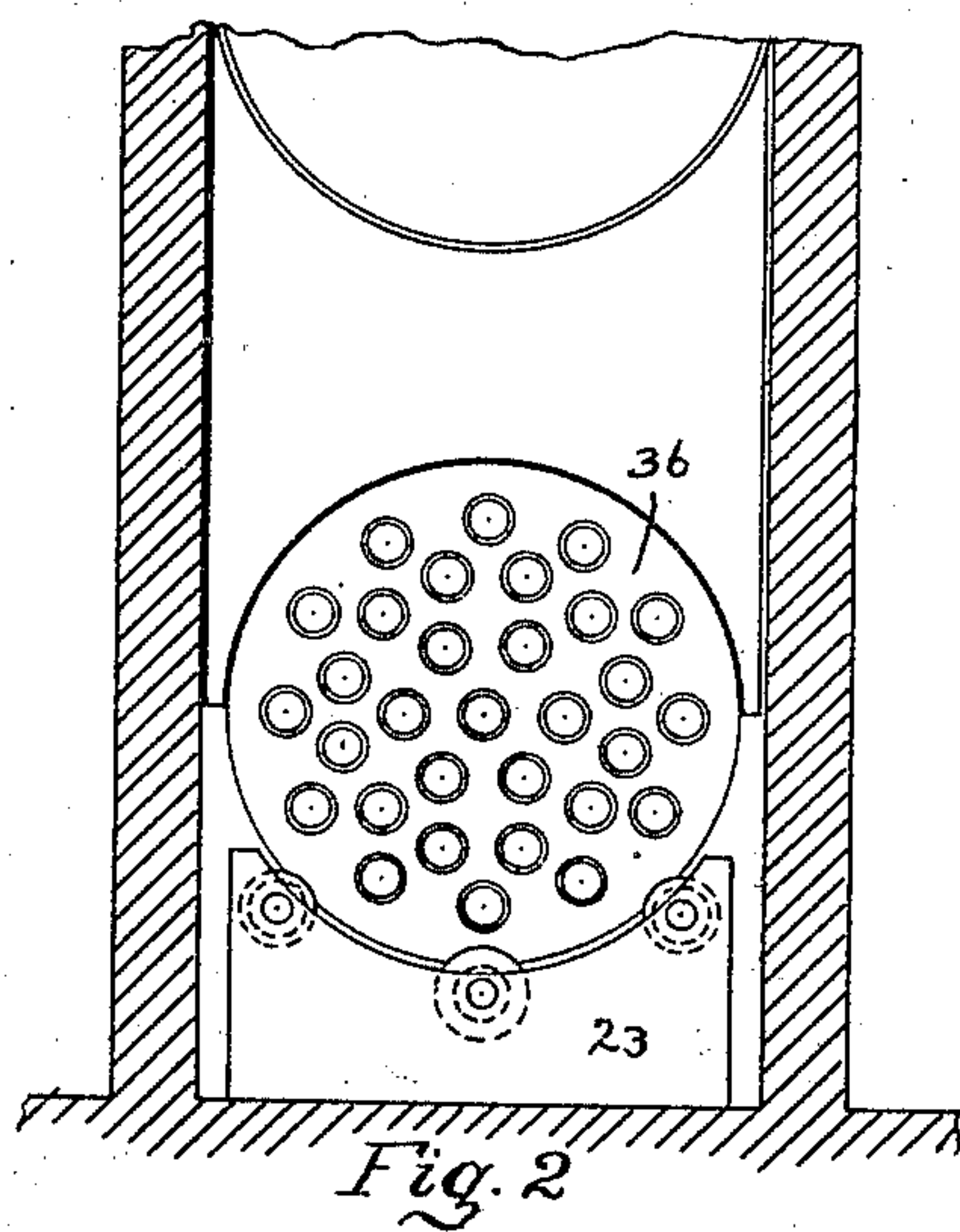
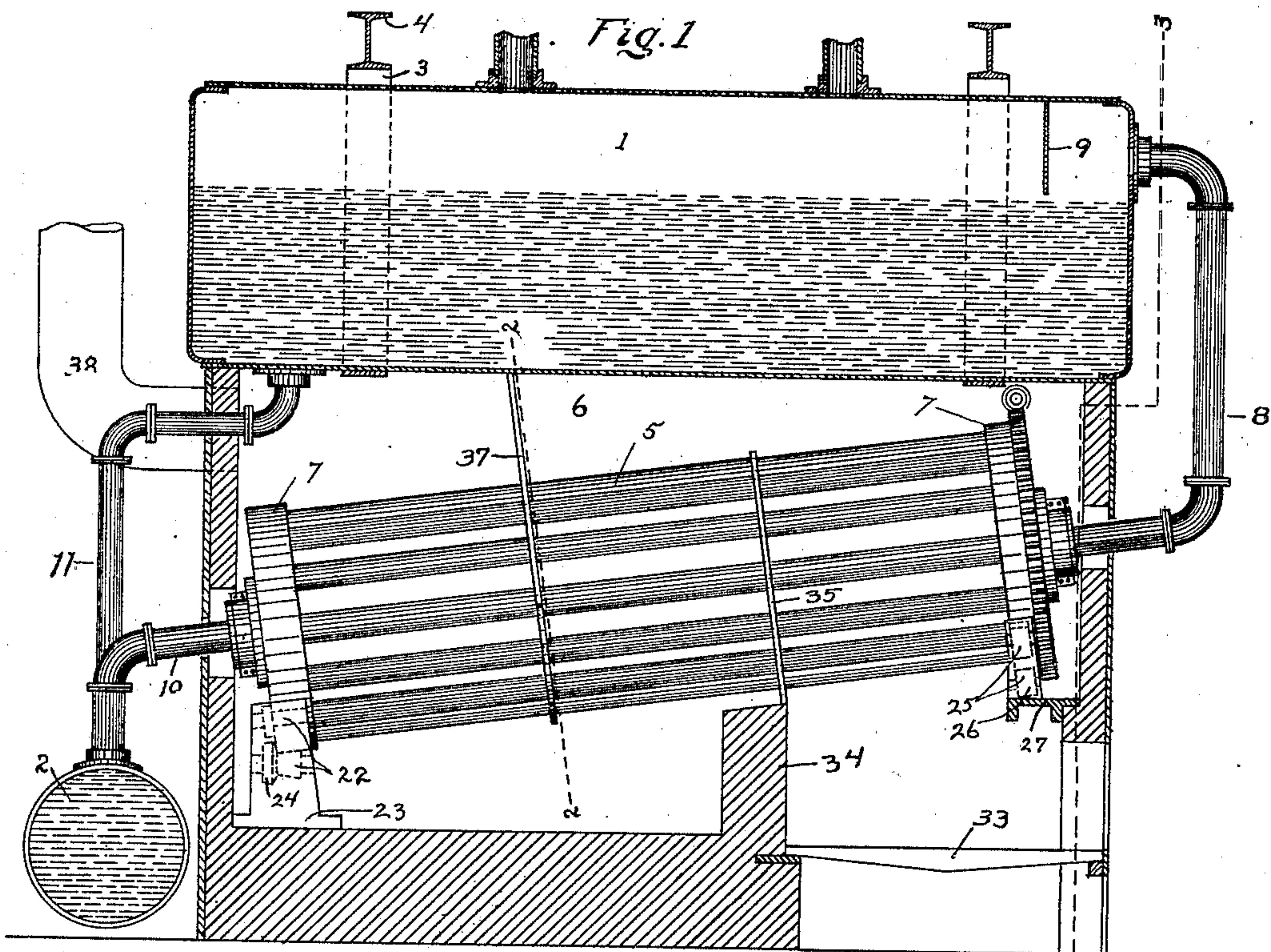


No. 696,566.

Patented Apr. 1, 1902.

A. S. HUGHES.
ROTARY WATER TUBE.
(Application filed May 11, 1901.)

(No Model.)



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UNITED STATES PATENT OFFICE.

ARTHUR S. HUGHES, OF MANSFIELD, OHIO.

ROTARY WATER-TUBE.

SPECIFICATION forming part of Letters Patent No. 696,566, dated April 1, 1902.

Application filed May 11, 1901. Serial No. 59,749. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR S. HUGHES, a resident of Mansfield, in the county of Richland and State of Ohio, have invented a new and useful Improvement in Rotary Water-Tube Boilers; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to water-tube boilers; and its object is to preserve the life of the water-tubes by so constructing the boiler that different portions of the water-tubes are brought into direct contact with the flame and heat from the furnace.

To these ends it comprises, generally stated, a cluster of water-tubes connected at their ends to manifolds provided with suitable water connections, the said cluster of tubes and manifolds being supported so that they can rotate, and means for rotating the same.

In the accompanying drawings, Figure 1 is a longitudinal vertical section through my improved boiler. Fig. 2 is a transverse section on the line 2 2, Fig. 1. Fig. 3 is a front view of the boiler, the front wall of the furnace being removed; and Fig. 4 is a detail sectional view of the joint connecting the water-tubes and manifolds.

My invention is illustrated in connection with a water-tube boiler having a longitudinal elevated steam and water drum 1 and a horizontal mud-drum 2, although it is not limited to this particular type of boiler, but is equally applicable to a boiler having vertical water-tubes, vertical steam and water drum, or any other arrangement of these parts. The steam and water drum 1 is supported in suitable bands 3, connected to the transverse beams 4, and said drum is located above the cluster of water-tubes 5, as shown. These water-tubes 5 are located in the furnace-chamber 6 and are arranged so as to form a substantially circular cluster, and they have their ends united to suitable circular manifolds 7, the front manifold being connected by the pipe 8 to the front end of the steam and water drum, entering above the level of the water therein and projecting the steam against the depending baffle-plate 9, while the rear manifold is connected by the pipe 10 to the horizontal mud-drum 2, which drum is connected by a pipe 11 to the rear

end of the steam and water drum 1, as shown. The pipes 8 and 10 are connected to their respective manifolds by a joint, which will permit rotation of the manifold and water tubes 5. This joint is shown in detail in Fig. 4, wherein the pipe 8 is shown as provided with an end flange 12 and with a series of annular grooves 13. Secured to the manifold 7 is the other member of the joint, the same comprising a sleeve 14, formed in two sections, provided with flanges 15, united by bolts, as shown. The sections of the sleeve 14 fit over the pipe 8 and are provided with the inwardly projecting portions 16, which form an annular shoulder 17, bearing against the annular flange 12 on the pipe 8, and said projections 16 are further provided with a series of annular projections 18, which take into the annular grooves 13 in the pipe 8. A suitable annular follower 19 is connected to the sleeve 14 by the bolts 20, said follower entering the space between the sleeve 14 and the pipe 8 and serving to compress the packing 21 therein. By this construction joints between the manifolds and pipes 8 and 10 are provided which are steam and water tight and which will permit the rotation of the manifolds on said pipes. These joints are preferably made from non-corrosive metal, so that they may permit of rotation with the least possible friction.

The rear manifold 7 rests upon suitable rollers 22, mounted in the support 23, said rollers being provided with enlarged portions or flanges 24, against which the end of the manifold abuts in order to prevent the cluster of tubes and manifolds moving endwise in case the tubes are inclined, as shown; but if said tubes are horizontal the flanges 24 on the rollers 22 are not necessary. The front manifold 7 is supported upon a similar arrangement of rollers 25, mounted in a bearing 26, supported on the transverse channel-beam 27.

The cluster of water-tubes and manifolds may be rotated by any suitable mechanism, that illustrated being a large worm-gear 28, secured to the front manifold 7 and engaged by a worm 29 on the shaft 30, extending transversely across the furnace-chamber, said shaft being provided outside of the furnace-chamber with a pulley 31 or other suitable means for receiving a belt or other means for

rotating said shaft and, through the worm 29 and gear 28, the manifolds and cluster of water-tubes.

Below the front or elevated end of the cluster of tubes is the furnace-grate 33, and just back of the same is the bridge-wall 34. Projecting upward from the bridge-wall is a baffle-wall 35, which extends up as high as the cluster of tubes 5 and is formed to fit around the circular cluster of tubes. Between the various tubes 5 in line with the baffle-wall 35 is a suitable plate 36, which plate is circular in form and provided with holes through which the tubes 5 project, so that said plate 36 forms, in effect, a rotating section of the baffle-wall 35. Extending downwardly into the furnace-chamber to the rear of the baffle-wall 35 is another baffle-wall 37, and in line therewith is another circular plate 36, through which the tubes 5 pass, and which plate forms a rotating section of the baffle-wall 37. By this means the flame and heat are caused to pass upwardly through the front end of the cluster of water-tubes, downwardly through the middle portion thereof, and again upwardly through the rear portion thereof and out at the flue 38.

In the use of my boiler water is supplied to the steam and water drum 1 in the usual way and passes down through the pipe 11 into the mud-drum 2 and from thence through the pipe 10 into the rear manifold 7, thence through the cluster of water-tubes 5 into the front manifold 7 and out through the pipe 8 back to the steam-space in the drum 1, the steam being drawn from said drum in the ordinary way. During the operation of the boiler the shaft 30 is slowly rotated and through the gearing shown imparts a slow rotary movement to the manifolds 7 and cluster of tubes 5, connecting the same, thereby bringing different portions of the tubes 5 into direct contact with the current of heat and flame from the furnace 33, so that the flame does not constantly strike against the same portions of said tubes 5, as in the old form of boiler constructions, thereby quickly burning the same up.

While I have shown the steam and water drum 1 located longitudinally of the furnace and above the cluster of water-tubes 5, it will be understood that said drum may be placed transversely of the boiler, if desired, that it need not be above the water-tubes nor horizontal, but may be placed to one side of the water-tubes and may be vertical, and two or more clusters of tubes 5 may be used with each steam and water drum. Furthermore, I do not wish my invention limited to the inclined arrangement of water-tubes shown, as they may be either vertical or horizontal, if desired, nor to the precise manner of mounting the said cluster of tubes so as to rotate,

nor to the precise mechanism illustrated for rotating the same.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a water-tube boiler, the combination of a cluster of water-tubes and manifolds to which the same are connected, supports on which the manifolds are rotatably mounted, and means for rotating the same.

2. In a water-tube boiler, the combination with a stationary steam and water drum and a stationary mud-drum, of a cluster of water-tubes and manifolds to which the same are connected, supports on which the same are rotatably mounted, means for rotating the same, and connections between the manifolds and steam and water drum and mud-drum respectively.

3. In a water-tube boiler, the combination of a cluster of water-tubes and manifolds to which the same are connected, of supports for the manifolds, rollers on said supports on which the manifolds rest, and means for rotating the manifolds and water-tubes.

4. In a water-tube boiler, the combination of a cluster of inclined water-tubes and manifolds to which the same are connected, of supports for the manifolds, rollers on said supports on which the manifolds rest, the rollers on the lower support being provided with flanges for engaging the end of the manifold, and means for rotating the manifolds and water-tubes.

5. In a water-tube boiler, the combination of a cluster of water-tubes and manifolds to which the same are connected, supports on which manifolds are rotatably mounted, a gear connected to one of the manifolds, and a worm engaging said gear for rotating the same.

6. In a water-tube boiler, the combination with a furnace, of a cluster of water-tubes and manifolds to which the same are connected, supports on which the same are rotatably mounted, means for rotating the same, a baffle-wall projecting into the furnace-chamber and a division-plate in line with the baffle-wall and through which the tubes pass.

7. In a water-tube boiler, the combination of a cluster of water-tubes and manifolds to which the same are connected, supports on which the same are rotatably mounted, means for rotating the same, and steam and water connections to said manifolds the same comprising a pipe having annular grooves, and a sleeve having annular projections fitting into said grooves.

In testimony whereof I, the said ARTHUR S. HUGHES, have hereunto set my hand.

ARTHUR S. HUGHES.

Witnesses:

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ROBERT C. TOTTEN.