

No. 702,939.

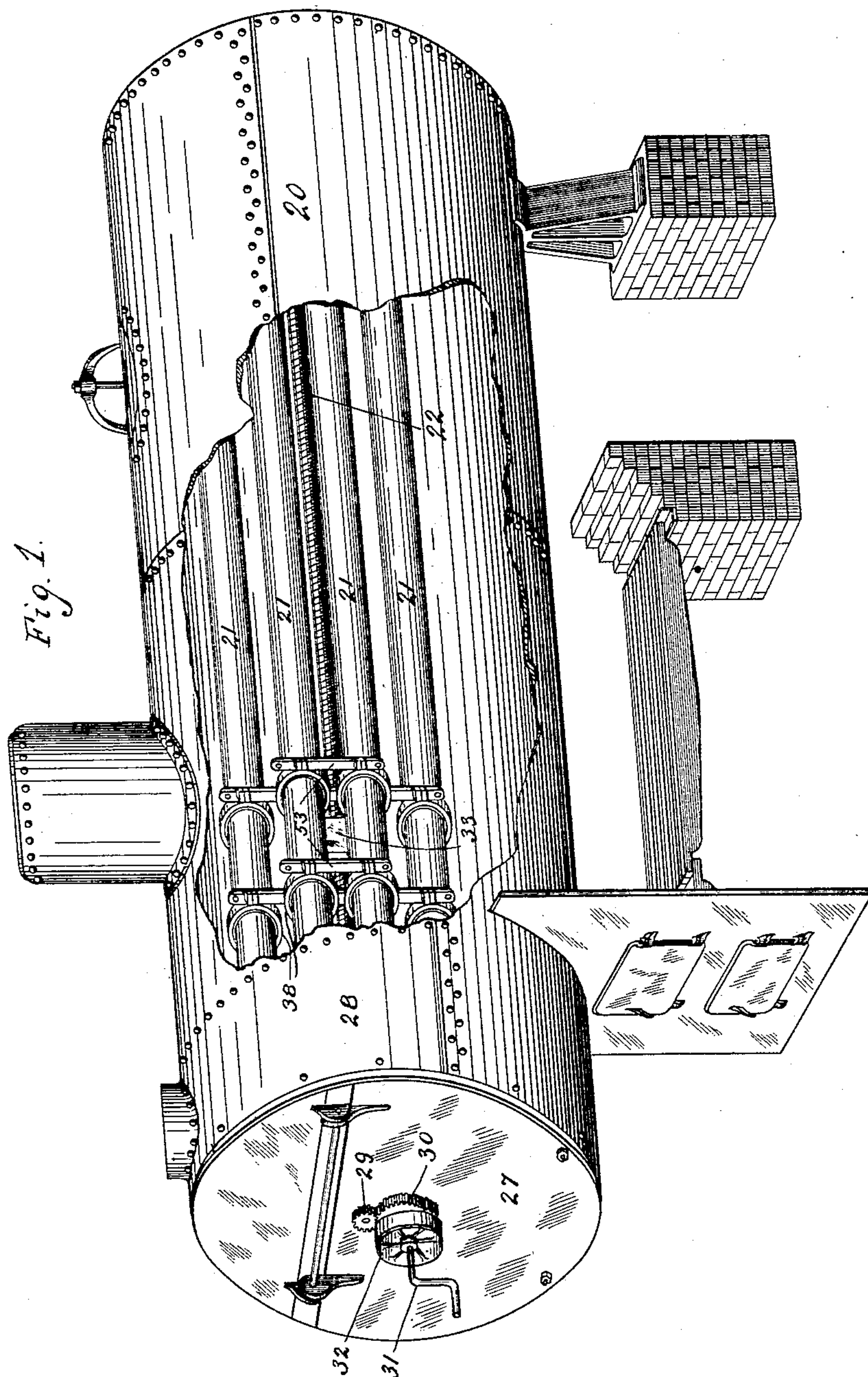
Patented June 24, 1902.

P. F. GIBBONS.
MECHANICAL BOILER CLEANER.

(Application filed Dec. 2, 1901.)

(No Model.)

5 Sheets—Sheet 1.



Witnesses.

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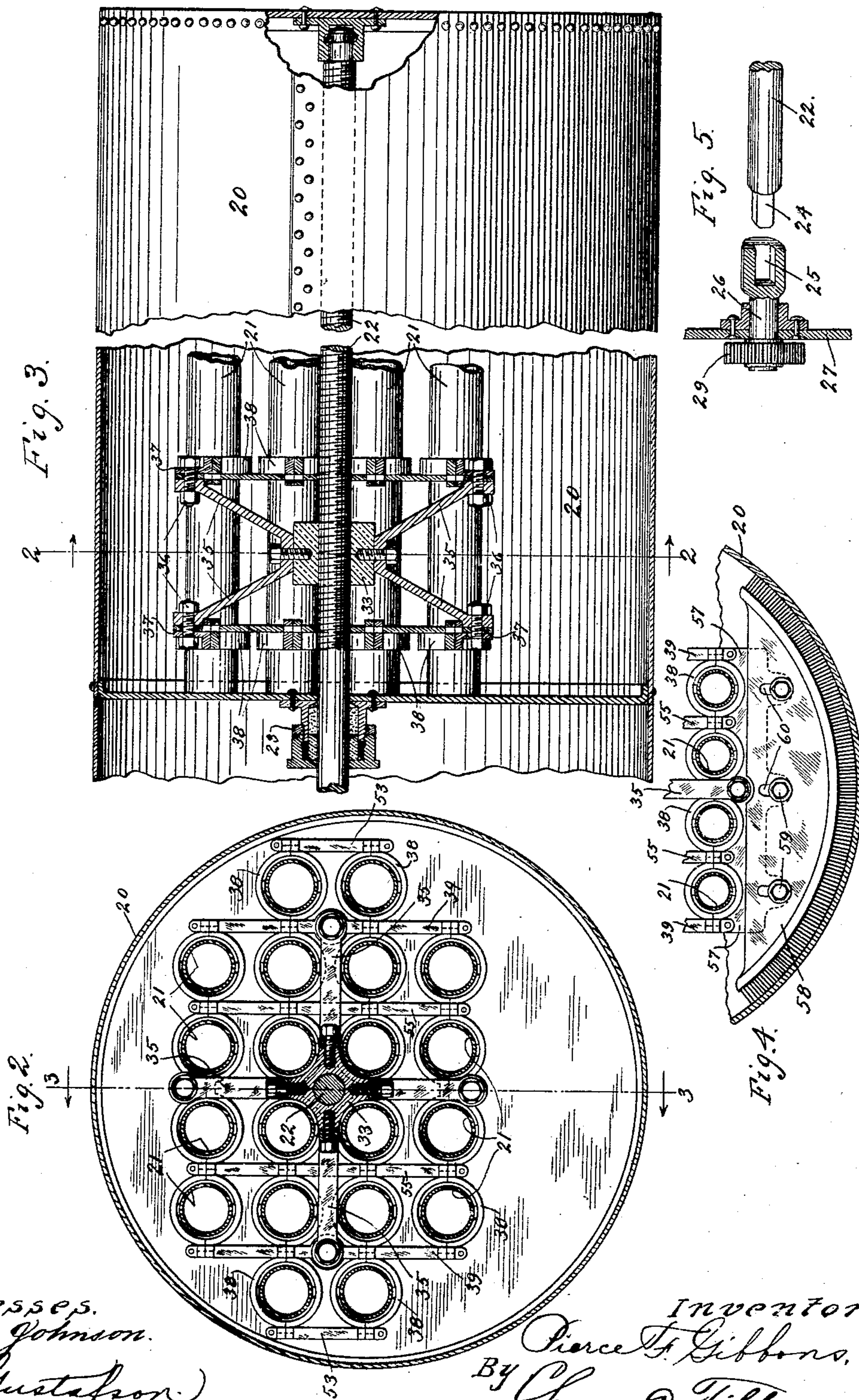
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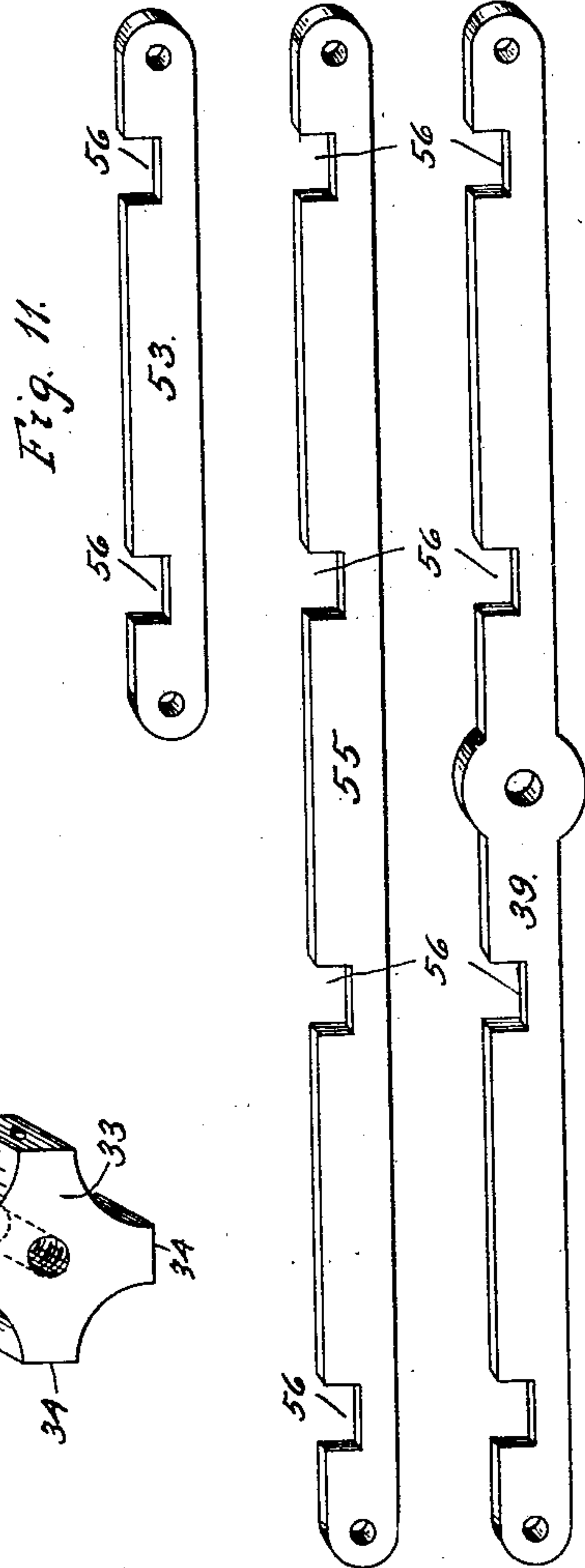
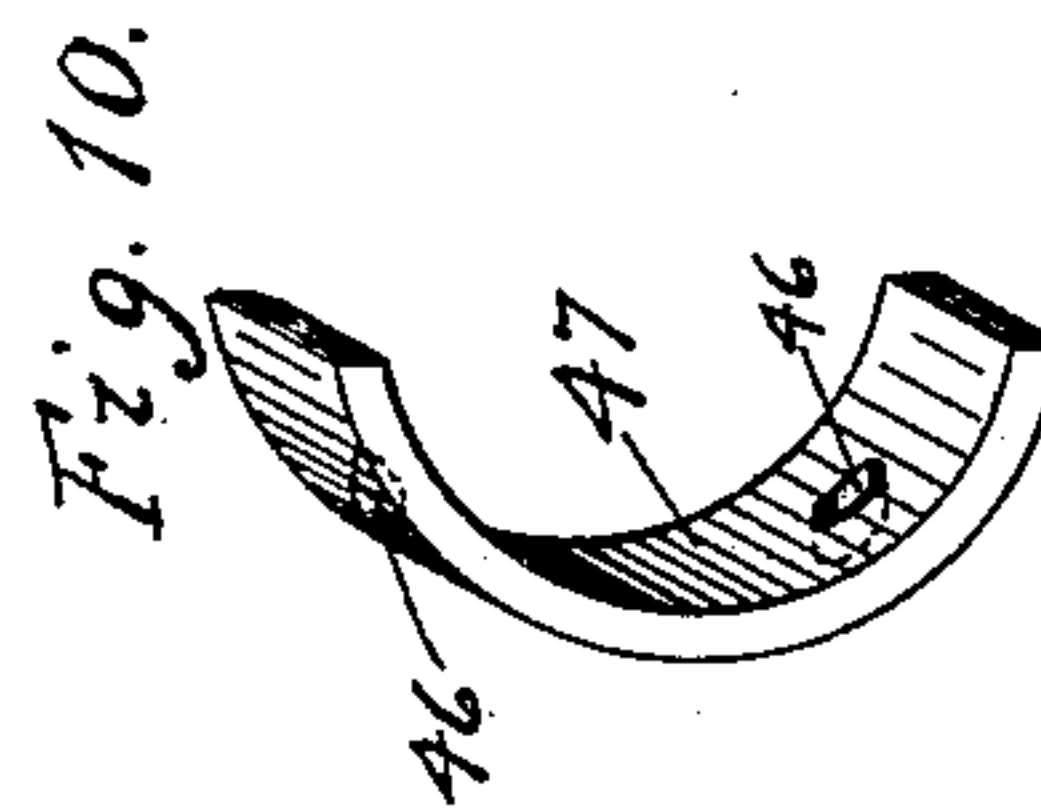
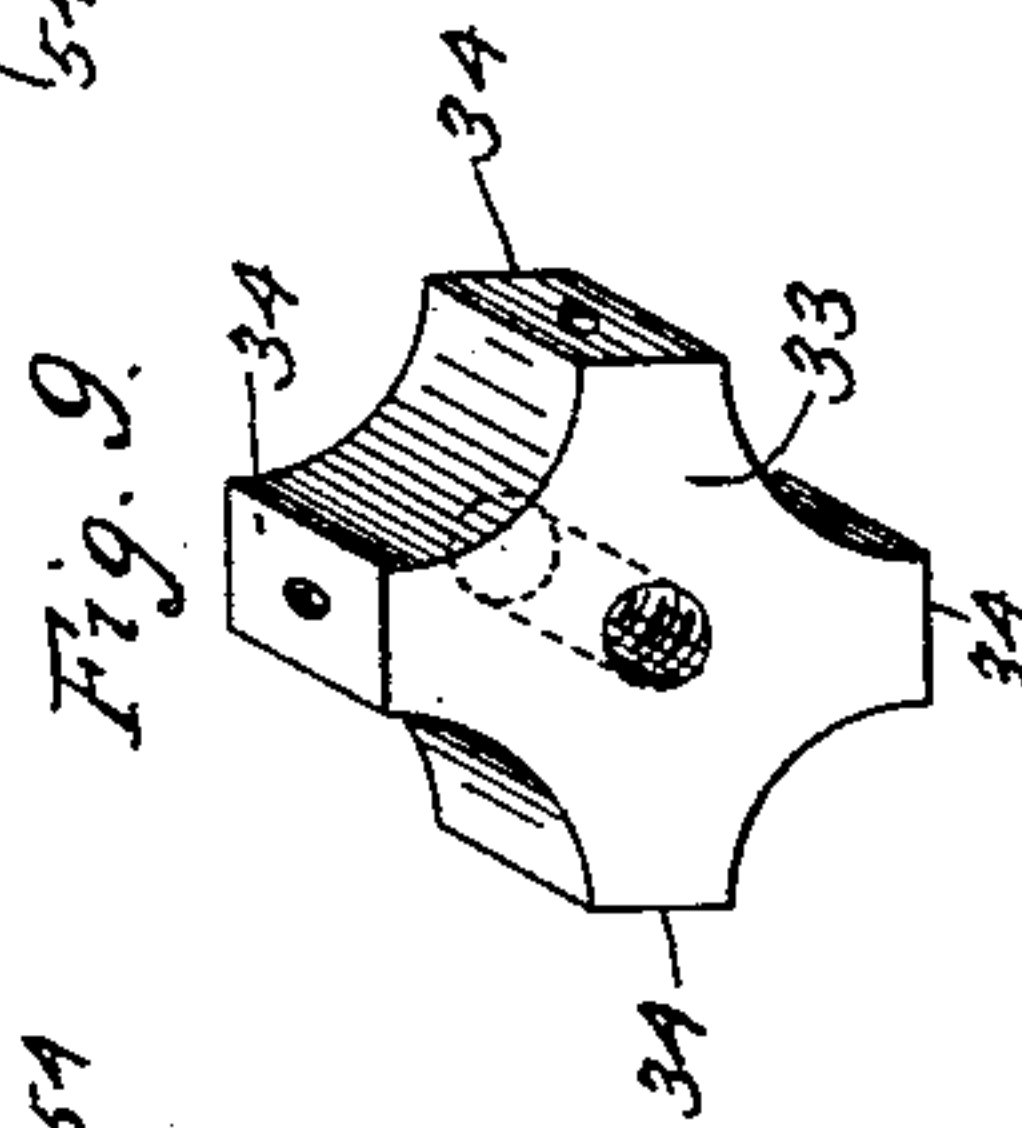
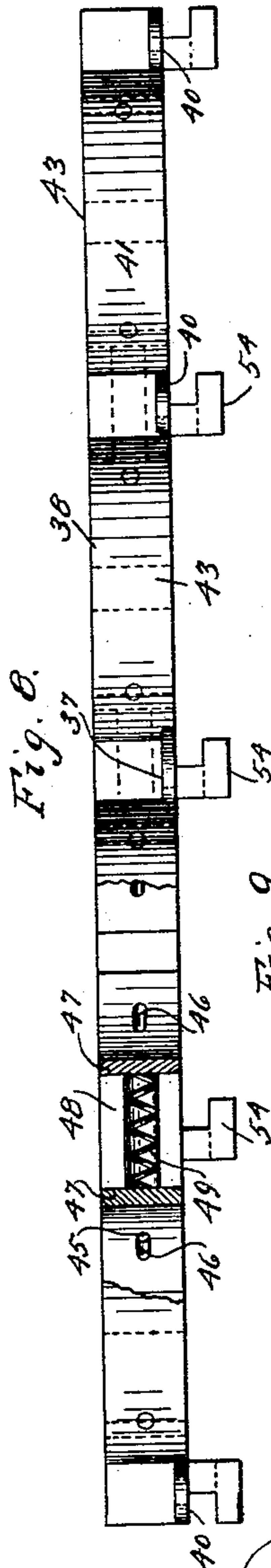
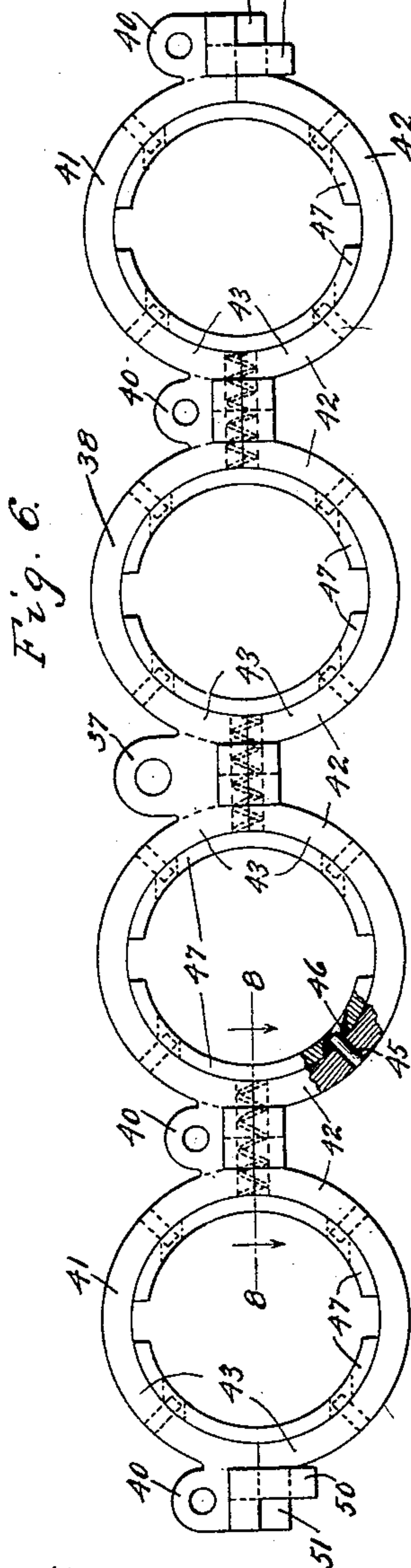
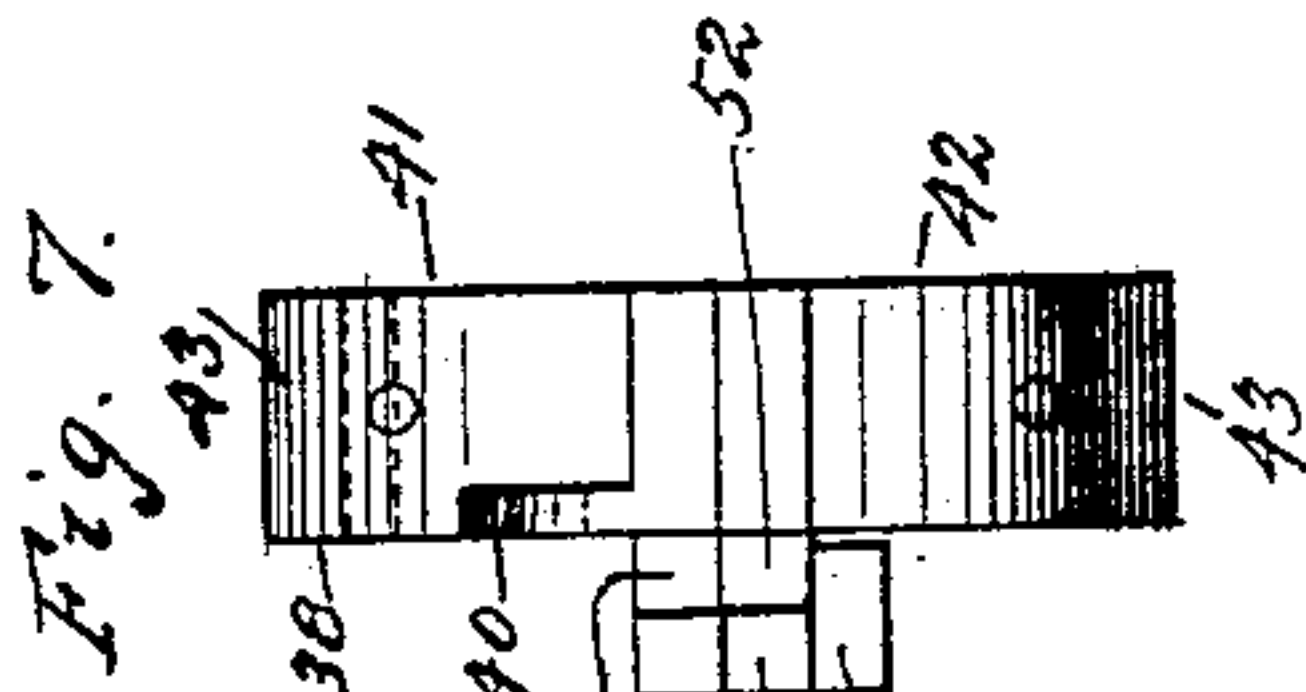
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5 Sheets—Sheet 3.



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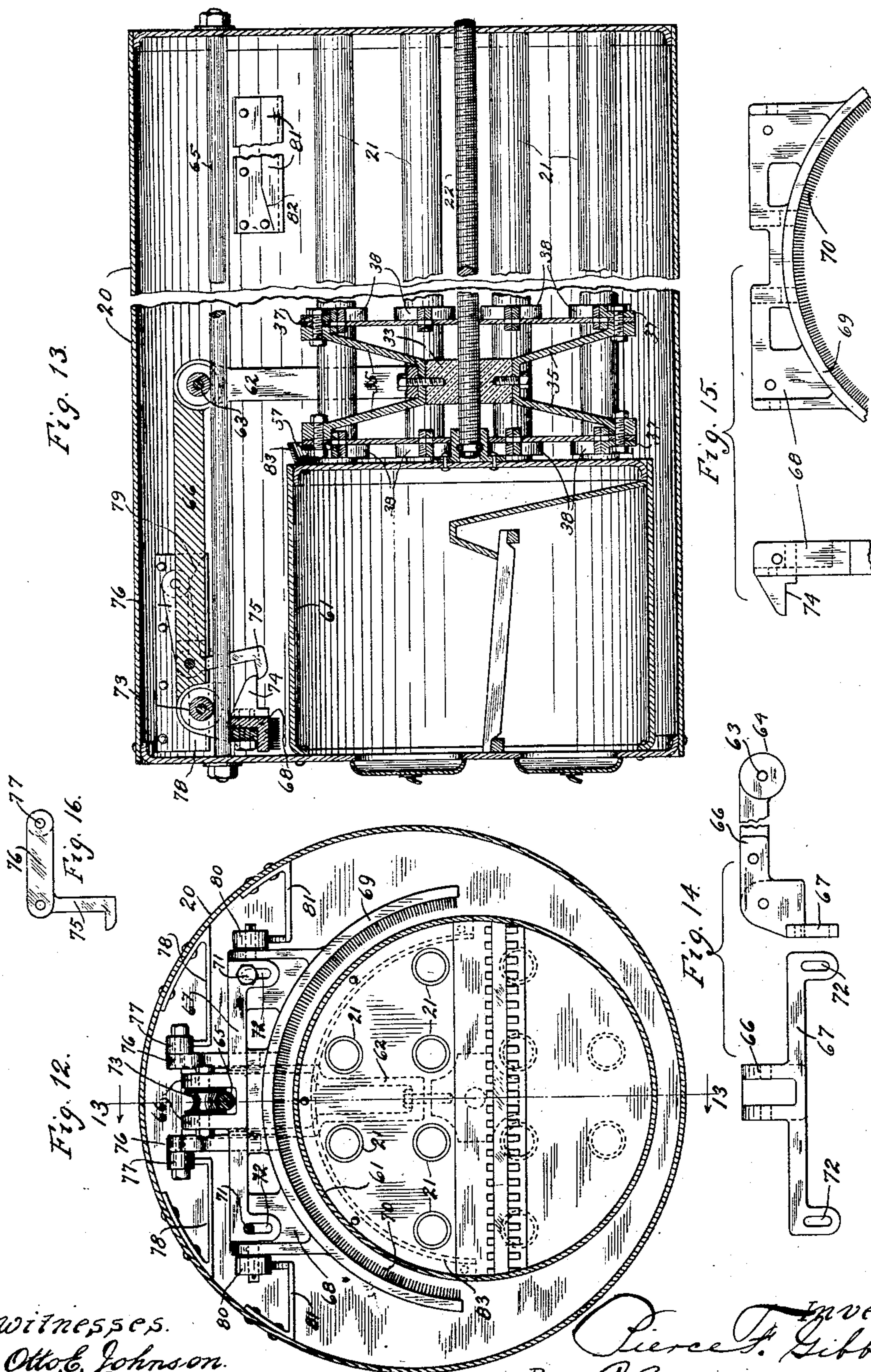
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(No Model.)

5 Sheets—Sheet 4.



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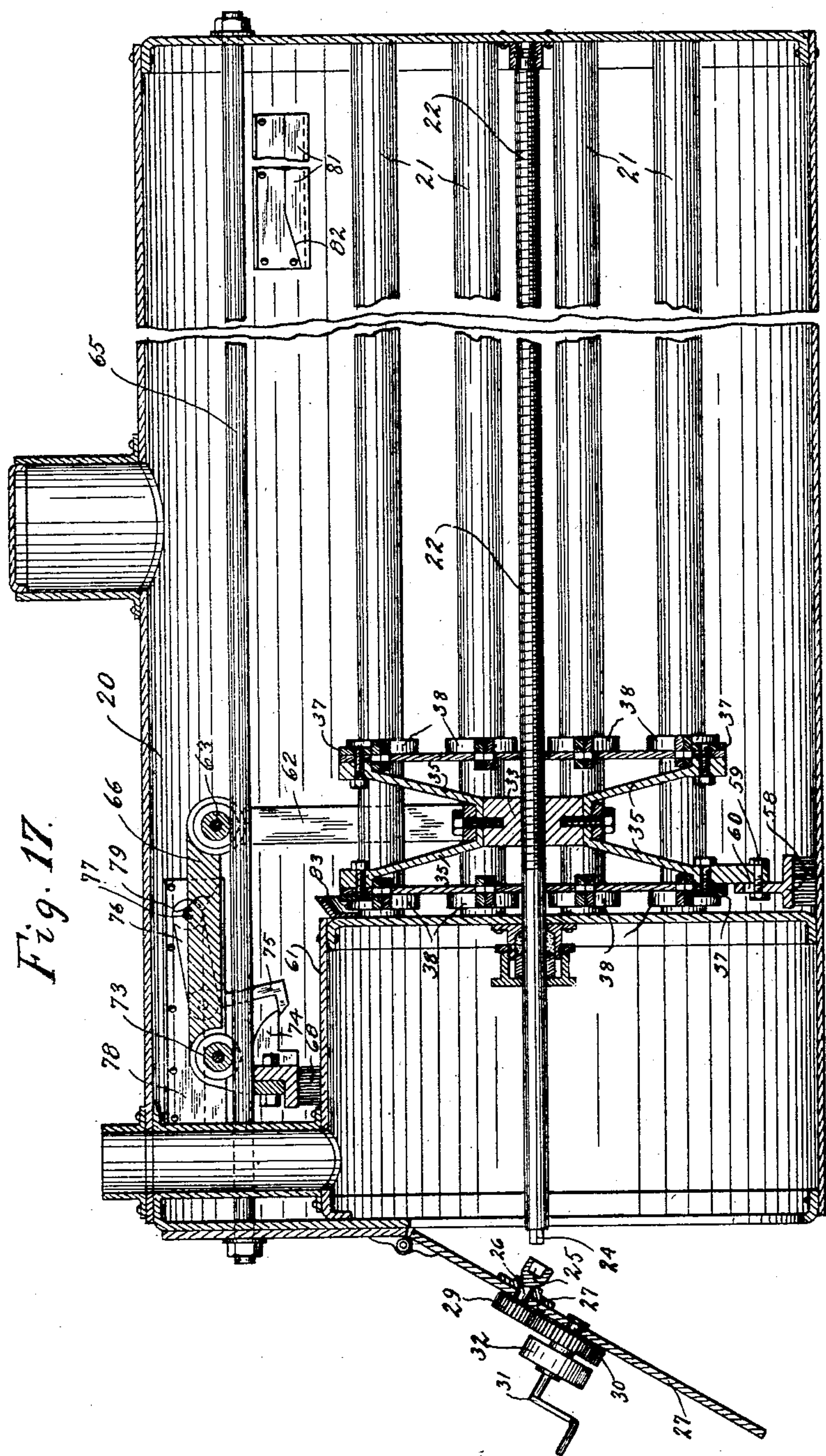
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(No Model.)

5 Sheets—Sheet 5.



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UNITED STATES PATENT OFFICE.

PIERCE F. GIBBONS, OF CHICAGO, ILLINOIS, ASSIGNOR OF TWO-THIRDS TO
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MECHANICAL BOILER-CLEANER.

SPECIFICATION forming part of Letters Patent No. 702,939, dated June 24, 1902.

Application filed December 2, 1901. Serial No. 84,399. (No model.)

To all whom it may concern:

Be it known that I, PIERCE F. GIBBONS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Mechanical Boiler-Cleaners, of which the following is a specification.

This invention relates to improvements in mechanical boiler-cleaners, and while it is more especially intended to be used on boilers of the tubular and horizontal type, yet it is applicable to boilers without tubes; and it consists in certain peculiarities of the construction, novel arrangement, and operation of the various parts thereof, as will be hereinafter more fully set forth and specifically claimed.

The principal object of my invention is to provide a simple and efficient cleaner for boilers which may be readily placed in position after the boiler has been constructed or may be applied thereto when the boiler is being made and which by reason of the peculiar construction and operation of its parts will clean and keep clean or will remove from the boiler-tubes and inner surface of the parts of the boiler and keep them free of any scales or incrustations that might form thereon, thus enabling the boiler to receive the full effect of the heat from the fuel, thereby economizing in the quantity thereof used.

Another object of the invention is to so construct the cleaner that it may be operated by hand or by any suitable power and in such a manner that it will travel back and forth within the boiler, so as to clean the tubes and inner surfaces of the parts of the boiler while the same is in use.

Other objects and advantages of the invention will be disclosed in the subjoined description and explanation.

In order to enable others skilled in the art to which my invention pertains to make and use the same, I will now proceed to describe it, referring to the accompanying drawings, in which—

Figure 1 is a perspective view of a stationary boiler of the tubular type, showing my invention applied thereto and the parts in position ready for operation. Fig. 2 is a cross-sectional view taken on line 2 2 of Fig. 3

looking in the direction indicated by the arrows. Fig. 3 is a longitudinal view, partly in section and partly in elevation, taken on line 3 3 of Fig. 2 looking in the direction indicated by the arrow and showing the boiler shortened for the convenience of illustration. Fig. 4 is a cross-sectional view of the lower portion of the boiler, showing the part of the cleaner used for cleaning said portion. Fig. 5 is a detail view of a portion of the operating-shaft of the cleaner and a portion of the door of the smoke-chamber of the boiler, showing a gear for driving said shaft. Fig. 6 is a view in front elevation of some of the cleaners or ringed scrapers for the tubes of the boiler. Fig. 7 is an end view thereof. Fig. 8 is a plan view, with a part in section, taken on line 8 8 of Fig. 6. Fig. 9 is a perspective detached view of the nut or carrier for the tube-cleaners or ringed scrapers. Fig. 10 is a similar view of a part of one of said cleaners. Fig. 11 represents perspective views of the connecting-bars for the tube-cleaners or ringed scrapers. Fig. 12 is an end view of a marine boiler or of a boiler of a different type from that shown in Figs. 1 to 3, inclusive, with the front removed and illustrating the brush or cleaner for the crown-sheet thereof. Fig. 13 is a longitudinal sectional view taken on line 13 13 of Fig. 12 looking in the direction indicated by the arrows, showing the boiler shortened for the convenience of illustration. Fig. 14 represents a front and side view of the hanger for the cleaner or brush used for cleaning the crown-sheet. Fig. 15 represents an end and front view of the brush or cleaner for the crown-sheet. Fig. 16 is a detached view, in side elevation, of a bell-crank lever employed for raising and lowering the crown-sheet cleaner or brush; and Fig. 17 is a shortened longitudinal sectional view of a boiler, showing the cleaners for the tubes, crown-sheet, and bottom in position and illustrating the door to the front of the boiler, which carries the detachable means for driving the main shaft, partly open.

Like numerals refer to like parts throughout the different views of the drawings.

The numeral 20 represents a boiler of the ordinary construction; but which in the present instance I have shown as being of the

tubular type and having tubes 21, to clean which is a part of the object of my invention. Journaled in the ends of the boiler is a screw-threaded shaft 22, which may be provided at its end extending through the head or end of the boiler with a stuffing-box 23 to prevent leakage of steam or water. The outwardly-projecting portion of the shaft 22 is preferably formed with a squared end 24 to fit in a similarly-shaped socket 25 on the inner end of a shaft 26, which is journaled in the door 27 of the smoke-chamber 28 of the boiler and has mounted on its outer portion a pinion 29 to mesh with a gear 30, mounted on a crank-shaft 31, journaled on the door 27, as is clearly shown in Fig. 1 of the drawings.

The shaft 22 may be driven by hand by means of the crank-shaft 31 and gears 29 and 30, or power may be applied by means of a belt (not shown) on a pulley 32, mounted on the shaft of the gear 30, and said belt may be equipped so as to cause the shaft 22 to reverse its movement when the cleaners have reached the ends of the boiler. As shown in the drawings, the shaft 22 is located in the midst of the group of tubes 21 and has mounted thereon a traveler or traveling nut 33, which is provided with a screw-threaded opening for the reception and operation of the said shaft. This nut or traveler is preferably of the form shown in Fig. 9 of the drawings—that is, it is provided with four extensions 34 and curved recesses between said extensions in order to allow them to project between the tubes adjacent to the shaft 22, as is clearly shown in Fig. 2 of the drawings. Bolted to each of the extensions 34 of the traveler 33 is a bifurcated bracket 35, which extends outwardly between the tubes. The vertical brackets 35 are secured by means of bolts 36 to lugs 37 on the upper and lower sets of the frames 38 of the ringed scrapers or cleaners, and the horizontal brackets 35 are secured at their outer ends by means of bolts to the central portion of the connecting-bars 39, which extend vertically between the tubes, as shown in Fig. 2 of the drawings. The frames 38 of the ringed scrapers are all made substantially alike, except those located on the upper and lower tubes are provided with apertured lugs 40, while on the intervening frames 38 said lugs are omitted except at their ends. Each of the frames 38 consists of two pieces 41 and 42, having a series of semicircular portions 43, provided with inwardly-extending pins 45 to fit into elongated openings 46 in the segmental or curved pieces 47, which are located on the inner surfaces of the portions 43 and preferably so as to break the joints thereof. On their adjacent surfaces the pieces 41 and 42, composing the frames 38, are formed between the semicircular portions 43 with recesses 48 to receive spiral springs 49, the ends of which rest against the segments or curved pieces 47 and tend to press them toward each other and against the

tubes 21, which they surround. Each of the ends of the pieces 41 is provided with an outwardly-open recess 44 and with a downwardly and inwardly extending hook 50 or projecting portion, on which a lug 51 on each of the ends of the pieces 42 rests, which lug is also provided with outwardly-open recesses 52 to receive the vertical tie or connecting bars 39 and 53, which tie-rods are provided at their ends with openings to receive bolts, by means of which they are secured to the lugs 40 at the ends of the frames. Each of the pieces 41 and 42 is provided on one of its sides between the semicircular portions 43 with recessed lugs 54 to engage the connecting or tie rods 39 and 53 and 55, each of which is provided with recesses 56 to receive said lugs, thus firmly locking the portions of the frames together and also connecting all of the frames.

The above-described construction affords a device for cleaning and keeping clean the tubes of the boiler, for it will readily be understood that by rotating the shaft 22 by any suitable means first in one direction and then the other the traveler 33 will be caused to advance and retract and carry with it the cleaners or scrapers for the tubes, which will remove any substances that might cling thereto.

To clean the lower portion of the boiler, the lower frame 38 of the tube-cleaners may be provided with an extension 57, (see Fig. 4,) to which may be adjustably secured a brush-body 58 by means of bolts 59, passing through slots 60 in said body, which is provided on its lower surface with steel or wire bristles. This brush or cleaner for the lower portion of the boiler may be lowered when the bristles become worn by loosening the bolts 59, as is apparent.

In Figs. 12 and 13 of the drawings I have shown my apparatus applied to a marine boiler or one of a different type from that shown in Figs. 1 to 3, inclusive, and above described, and in order to clean the crown-sheet 61 thereof I secure to the traveler 33 a bifurcated standard 62, which extends upwardly between the tubes and has journaled on its upper end a shaft 63, on which is mounted a sheave or grooved roller 64, which travels on a rod 65, extending from one end to the other of the boiler. Secured at one of its ends to the shaft 63 is the hanger-bar 66, which carries at its other end the transverse hanger 67 for the body 68 of the brush 69 or cleaner for the crown-sheet. This body is provided with wire or other bristles 70 on its lower surface and is movably secured to the hanger 67 by means of bolts 71, which are located in suitable openings in the said body and in slots 72 in the hanger near its ends. The front portion of the bar 66 has journaled therein a grooved roller 73, which also travels on the rod 65 and, with the roller 64, provides a carriage for the crown-sheet cleaner or brush. The body 68 has rearward projections 74, with which the lower arms 75 of the bell-

crank levers 76 are adapted to engage, so as to raise the said body when it is being retracted. These levers are fulcrumed on the sides of the bar 66 near its front end, and each has on its upper arm a roller 77, which travel on rails 78, secured longitudinally on the upper inner surface of the front of the boiler, and which rails have their rear ends downwardly-inclined, as at 79. (See Fig. 13 of the drawings.) Journaled on each of the ends of the brush or cleaner body 68 is a roller 80, which are adapted to travel on rails 81, secured to the upper inner surface of the rear of the boiler, and which rails have their front ends downwardly inclined.

In using the construction shown in Figs. 12 and 13 and just above described it is apparent that the shaft 22 may or should extend through the rear end of the boiler instead of its front end, as before, and may be turned first in one direction and then the other by any suitable means, in which operation the traveler 33 will be caused to advance and retract and carry with it the cleaners for the tubes as well as the cleaner for the crown-sheet. As the mechanism approaches the rear end of the boiler the rollers 80 on the body 68 will strike the inclined portions 82 of the rails 81 and raise said body, when the arms 75 of the levers 76 will engage the projections 74 on the body and hold it in the raised position until the front end of the boiler is reached, when the rollers on the levers 76 will impinge the inclined parts 79 of the rails 78, thus raising the upper arms of said levers and at the same time disengaging the lower arms or hooks 75 thereof from the projections 74 on the body 68 and allowing it to drop, so that the brush 70 will rest on the crown-sheet. In the rearward progress of the mechanism the brush or cleaner 70 will remove any substance from the crown-sheet 61 to the trough 83, located at the rear of the crown-sheet or fire-box, by means of which it will be conveyed over the tubes to the bottom of the boiler, from whence it may be removed through suitable openings. (Not shown.)

It will be understood that a cleaner for the bottom of the boiler like that shown in Fig. 4 may be used in connection with the tube and crown-sheet cleaner, or any one of the cleaners may be employed separately, without departing from the spirit of my invention.

While I have shown the frames 38 of the tube cleaners or scrapers as being connected together by means of the recessed bars and prefer to use them for the reason they afford a convenient means for connecting them without bolts between the inner tubes, (which bolts would be difficult to insert or reach,) yet I do not desire to be limited to the use of said bars, as I may employ other means for uniting said frames. Neither do I desire to be limited to the construction of the frames 38 nor to the means shown and described of uniting the parts thereof, for it will be understood that in practice I may employ other

constructions for said parts as well as for other parts of the apparatus.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a tubular boiler having a smoke-chamber and door thereto, of a screw-threaded shaft longitudinally journaled therein and having one of its ends extending into said chamber, a screw-threaded traveler mounted on said shaft, cleaners for the tubes of the boiler and for the crown-sheet thereof connected to the traveler and carried thereby, a shaft journaled in the door of the smoke-chamber and having means on its inner end to detachably engage the first-named shaft, and means connected with the outer portion of the door-shaft to rotate the same, substantially as described.

2. The combination with a tubular boiler having a smoke-chamber and door thereto, of a screw-threaded shaft longitudinally journaled therein and having one of its ends extending into said chamber, a traveler mounted on said shaft, cleaners for the tubes, for the crown-sheet and for the bottom of the boiler connected to the traveler and carried thereby, a shaft journaled in the door of the smoke-chamber and having means on its inner end to detachably engage the first-named shaft, and means connected with the outer portion of the door-shaft to rotate the same, substantially as described.

3. The combination with a rotatable shaft longitudinally journaled in the boiler, of a traveler mounted thereon, a series of bifurcated brackets secured to the traveler and extending vertically and horizontally therefrom between the tubes of the boiler and providing a front set of prongs and a rear set of prongs, a series of ringed frames located on the tubes and connected together in sets and thus secured to the sets of prongs of said brackets, each of said frames consisting of two pieces joined together and having a number of semicircular portions to form rings, and provided with recesses in their adjacent surfaces, inwardly-extending pins on each of the semicircular portions, segmental pieces located in said rings and provided with openings for the pins and springs located in said recesses to press the segments inwardly, substantially as described.

4. The combination with a rotatable shaft longitudinally journaled in the boiler, of a traveler mounted thereon, a series of bifurcated brackets secured to the traveler and extending therefrom between the tubes of the boiler, a series of ringed frames located on the tubes and connected together and secured to the said brackets, each of said frames consisting of two pieces joined together and having a number of semicircular portions to form rings and provided with recesses in their adjacent surfaces, inwardly-extending pins on each of the semicircular portions, segmental pieces located in said rings and provided with open-

ings for the pins, and springs located in said recesses to press the segments inwardly, substantially as described.

5 5. A cleaner for the tubes of a boiler comprising a frame consisting of two pieces joined together and having a number of semicircular portions to form rings and provided with recesses in their adjacent surfaces, inwardly-extending pins on each of the semicircular
10 portions, segmental pieces located in said rings and provided with openings for the pins, and springs located in said recesses to press the segments inwardly, substantially as described.

15 6. The combination with a rotatable shaft journaled in the boiler, of a traveler mounted thereon, an upright standard secured to the traveler and having on its upper end a roller, a rod located longitudinally in the upper portion of the boiler to support said roller, rails
20 secured to the inner upper portion of the front of the boiler and having their rear ends downwardly inclined, rails secured to the inner

upper portion of the rear of the boiler and having their front ends downwardly inclined, 25
a hanger beam or bar pivotally secured at one of its ends to the upright standard and provided at its other end with a transverse hanger having vertical slots in its ends, a roller journaled in the front end of the said beam or 30
bar and resting on the said rod, a cleaner-body for the crown-sheet movably secured in the slots of the hanger, rollers journaled on each end of the cleaner-body and adapted to travel on the rails at the rear end of the 35
boiler, a bell-crank lever fulcrumed on each side of the hanger-bar and having on its upper arm a roller to travel on the rails at the front end of the boiler and provided on its lower arm with means to engage the cleaner- 40
body to hold it in a raised position, substantially as described.

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