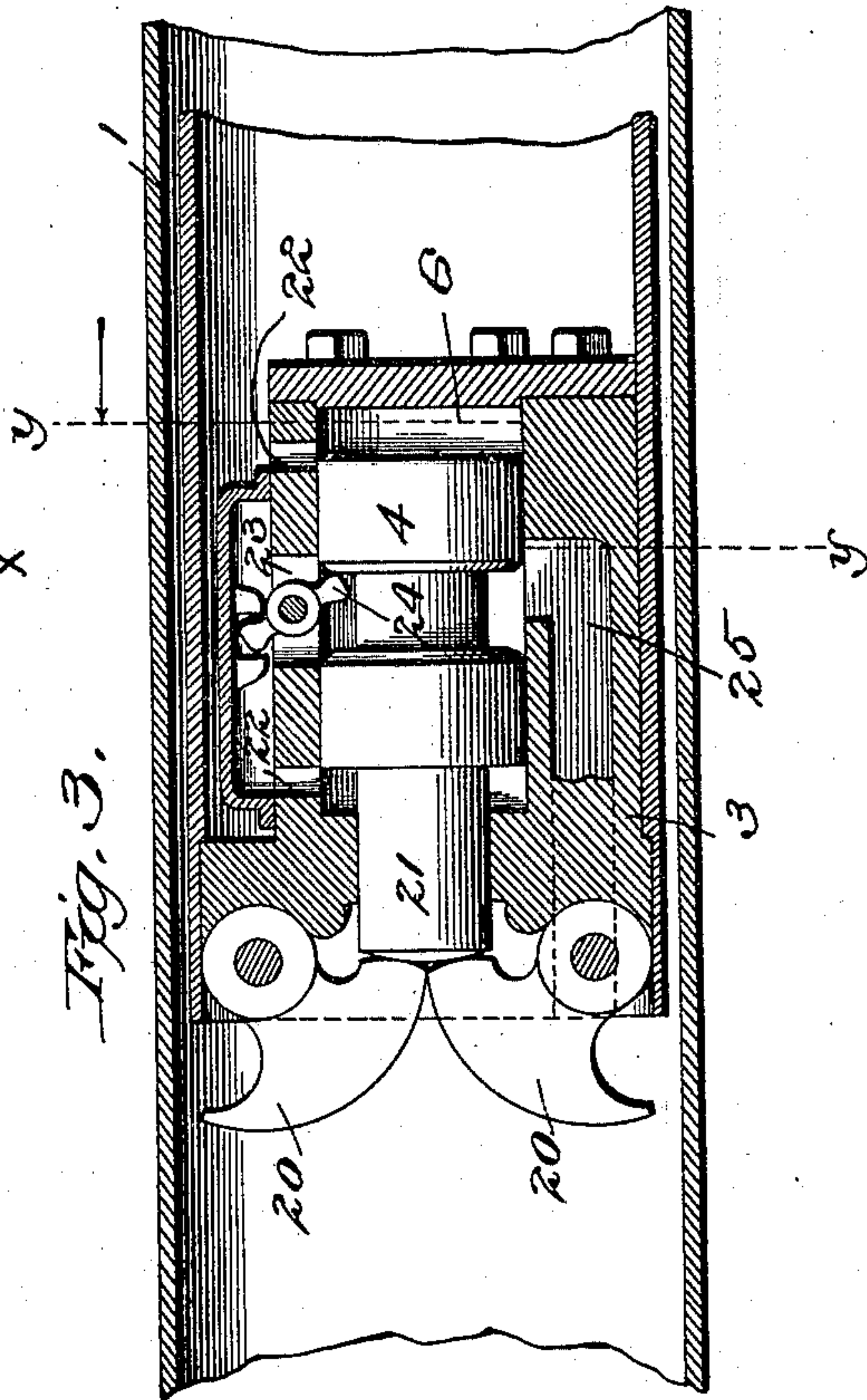
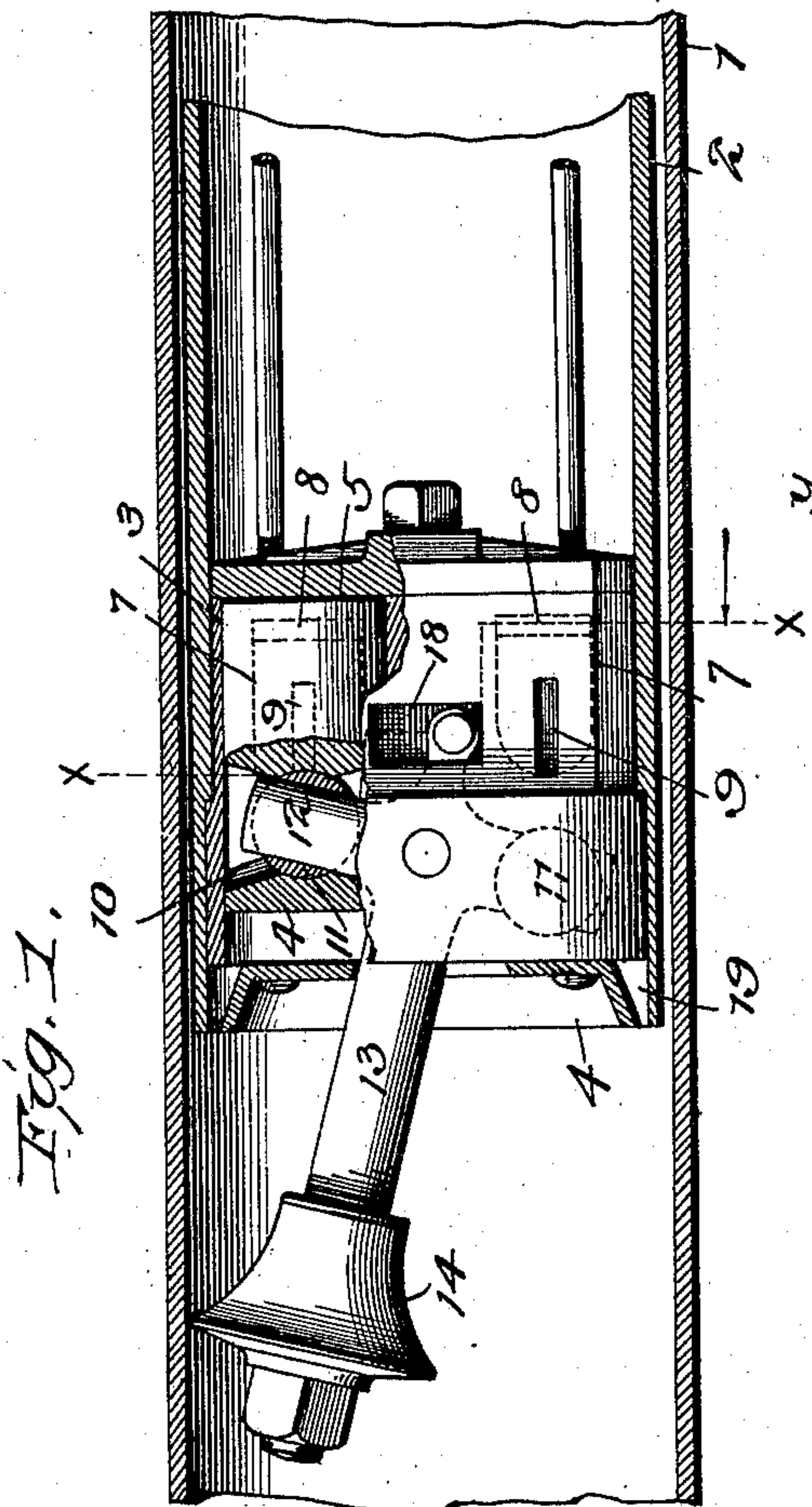
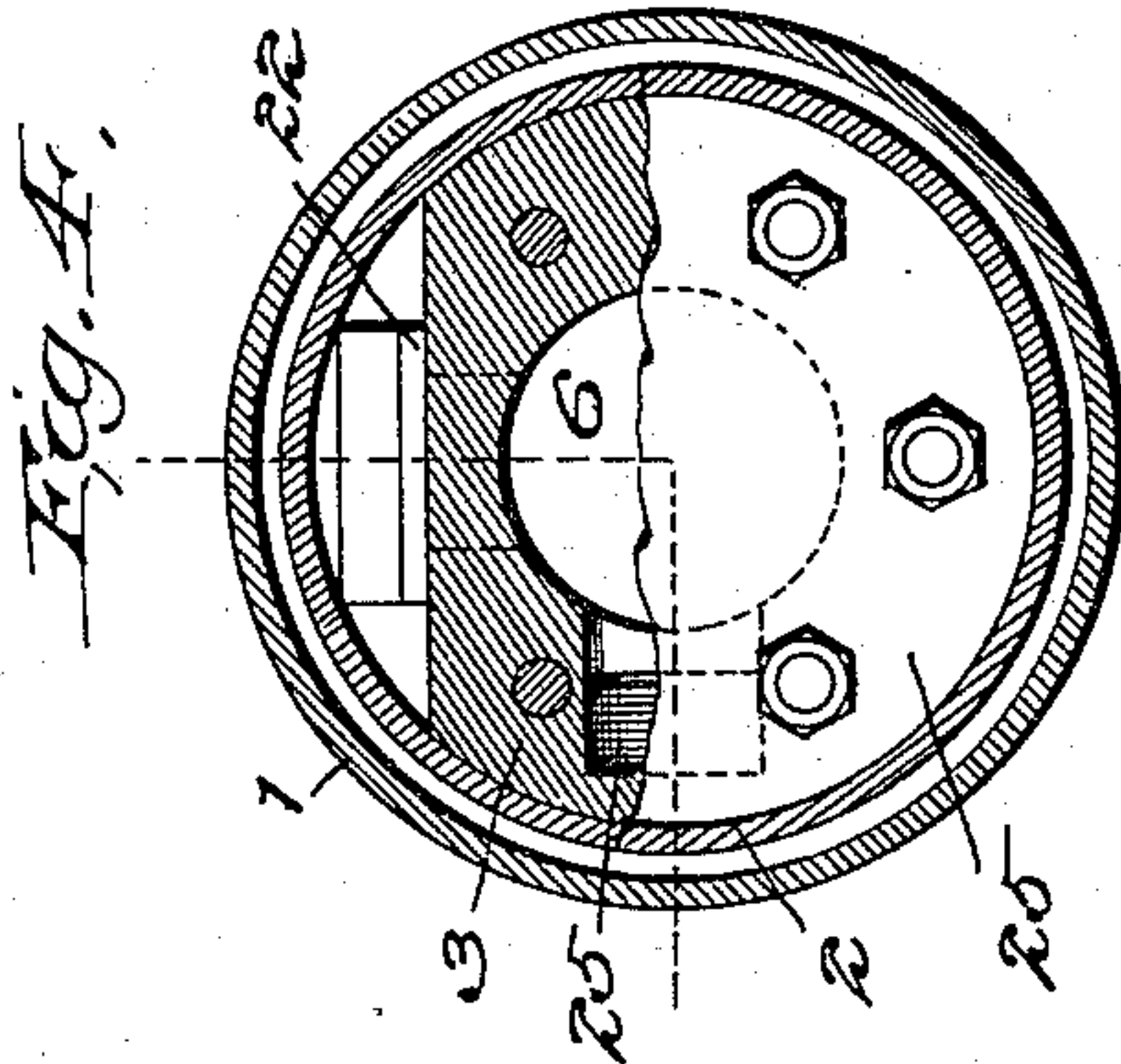
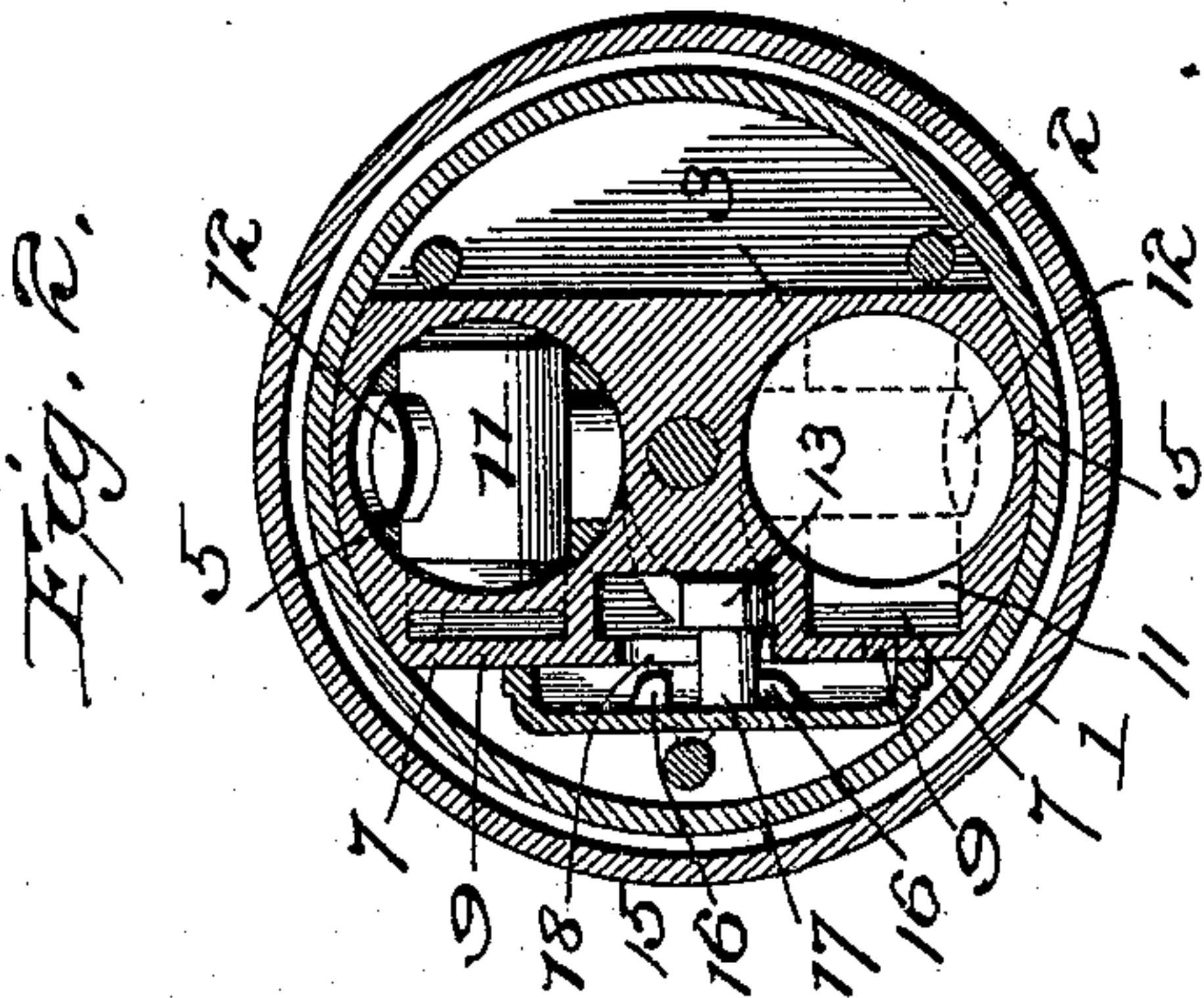


(No Model.)

C. S. DEAN.
WATER TUBE CLEANER.

No. 580,776.

Patented Apr. 13, 1897.



Witnesses
Albert Spiden.

Inventor
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UNITED STATES PATENT OFFICE.

CYRUS S. DEAN, OF FORT ERIE, CANADA, ASSIGNOR TO WILLIAM B. PIERCE,
OF BUFFALO, NEW YORK.

WATER-TUBE CLEANER.

SPECIFICATION forming part of Letters Patent No. 580,776, dated April 13, 1897.

Application filed November 13, 1896. Serial No. 611,950. (No model.)

To all whom it may concern:

Be it known that I, CYRUS S. DEAN, a subject of the Queen of Great Britain, residing at Fort Erie, in the county of Welland and Province of Ontario, Canada, have invented certain new and useful Improvements in Water-Tube Cleaners, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to machines or tools for cleaning the water-tubes of steam or other boilers of incrustation, scale, and other foreign matter accumulating thereon, and is designed as an improvement on the cleaner for which
15 on or about September 9, 1896, I filed an application in the United States Patent Office for Letters Patent, Serial No. 605,238.

The improvement relates more particularly to mechanism for operating the cutter or
20 scale-loosening device and in the special construction and combination of the parts, which hereinafter will be more fully described and illustrated and finally set forth in the subjoined claims.

25 In the drawings, Figure 1 is a detail view of a cleaner constructed in accordance with this invention, parts being broken away and the water-tube and shell being shown in section. Fig. 2 is a section on the line X X of
30 Fig. 1, looking in the direction of the arrow. Fig. 3 is a detail view showing the scale-loosening device or cutter in duplicate and a single piston. Fig. 4 is a detail section about on the line Y Y of Fig. 3, looking to the
35 left, as indicated by the arrow.

Corresponding and like parts are designated in the following description and in the views of the accompanying drawings by the same reference-characters.

40 The water-tube 1 is an element of a steam or other boiler of the tubular type, and is illustrated to show the application of the invention. The shell 2 is adapted to be connected at one end with a hose or other pipe
45 leading from the steam-generator in the ordinary manner, so as to supply a motive medium to the shell for operating the scale-loosening device, and the opposite end of the shell is provided with a chambered head 3, within
50 which is mounted one or more pistons 4. As shown in Figs. 1 and 2, the head is formed

with parallel chambers 5, each being supplied with a piston, and, as shown in Figs. 3 and 4, the head has a single chamber 6, in which reciprocates a piston 4. A port 7 extends parallel with each chamber 5, and communicates therewith at its rear end by a transverse port 8, and has a longitudinal port 9, extending through a side of the head to receive the steam or other motive medium for
55 positively driving the piston. Each piston 4 fits snugly within its chamber 5 and has a recess 10, in which is fitted a rocking bearing 11, the latter being apertured to receive an arm 12 of a vibrating lever 13, fulcrumed to
60 the head 3. This lever 13 is provided at its outer end with a scale-loosening device or cutter 14, which may be of any desired form, according to the nature of the work to be performed.

70 The side of the head through which the port 9 extends is flattened and forms a seat for a slide-valve 15, which latter controls the admission and the exhausting of the steam from the chamber. This slide-valve has inner lugs 16, between which operates a pin 17,
75 projecting laterally from an extension of the lever 13, a slot 18 being formed in the valve-seat for the pin 17 to operate in and providing an escape for the spent or exhaust steam.

80 The steam or motive medium for vibrating the scale-loosening device is admitted into the shell 2 in the usual way and, passing through a port 9, enters a chamber 5 and drives the piston therein forwardly. At the
85 same time the other piston is moved to the rear or to a starting position by reason of the arm 12 engaging therewith, the air in the chamber in the rear of the piston escaping through the port 8 and into the slide-valve by
90 way of the ports 7 and 9, thence into the slot 18, and out through the head either by way of the opening in which the lever 13 vibrates or out through a nozzle 19. After the piston
95 has been impelled to the limit of its forward stroke the scale-loosening device will have struck the side of the tube 1 and rebounded sufficiently to shift the slide-valve, so as to close the port 9 previously opened and open
100 the port previously closed, thereby admitting the steam in the rear of the second piston, when the operation thus described will be

repeated. There is a limited play between the pin 17 and the lugs 16 to admit of a rebound of the cutter or scale-loosening device prior to shifting the valve.

5 As shown in Fig. 3, the scale-loosening device 20 is duplicated and is pivoted to the head 3 near the side thereof, and the inner end of each is adapted to be struck by an extension 21 of piston 4, whereby both cutters
10 are operated simultaneously. Ports 22 and 23 communicate with the interior of the chamber 6, the port 22 being at the ends thereof and the port 23 intermediate of the ends, and a tappet 24 is located in the port 23 and has its
15 ends engaging with the piston and slide-valve, whereby the latter is positively actuated by means of the piston, the latter being grooved intermediate of its ends to receive the inner ends of the tappet 24 and provide a passage
20 for the escape of the exhaust-steam. A duct 25 is formed in a side of the head and communicates with the space formed by the annular groove of the piston. There is a limited play between the piston and tappet, and
25 the piston alternately closes the port 22 and is moved so as to uncover the port by the rebound of the scale-loosening mechanism and by the cushion formed at the end of the chamber, thereby permitting the steam to enter
30 in the rear of the piston the instant the valve is shifted, so that the piston may be driven positively to the limit of its stroke in the opposite direction. Inasmuch as the work is performed at the forward stroke of the piston,
35 the steam acts on the full area of the piston at its rear end and only on a portion of the front end because of the extension 21.

A detailed description of the operation, in view of the foregoing, is not deemed necessary, as the same is obvious.

A tube-cleaner comprising a chambered head, a piston, a scale-loosener, a slide-valve, and an intermediate connection between the slide-valve and piston related in the manner
45 set forth, whereby a limited movement between the piston and valve is had and whereby the valve and piston mutually cooperate to control the admission and exhausting of the motive medium, is not claimed herein
50 broadly, as it forms the basis of an application filed by me September 9, 1896, Serial No. 605,238. A piston having a rocking bearing and an arm carrying a scale-loosener and

working loosely through the rocking bearing is claimed by me in an application for a like
55 invention filed of even date herewith, Serial No. 611,949.

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

1. In a tube-cleaner, the combination of a
60 longitudinally-chambered head, a piston mounted to reciprocate longitudinally of the said head, a scale-loosener pivoted to the head and adapted to operate in a direction about
65 at right angles to the movement of the piston and actuated thereby, a slide-valve at one side of the head, and actuating mechanism for the movable parts, substantially as shown and described.

2. In a tube-cleaner, the combination of a head having parallel chambers, pistons located in the chambers, a scale-loosening device having positive connection with each piston, and a slide-valve operated by means
75 of the scale-loosener for controlling the admission and exhausting of the steam from the chambers, substantially as specified.

3. In a tube-cleaner, the combination of a head having parallel chambers, a scale-loosening device pivotally supported intermediate of the chambers and having oppositely-extending arms, pistons located in the chambers and having the said arms engaging therewith, and a slide-valve for controlling the
85 admission and exhausting of the motive medium from the said chambers, substantially as and for the purpose specified.

4. A tube-cleaner comprising a head having parallel chambers, pistons located in the
90 chambers, a slide-valve for controlling the admission and the exhausting of the motive medium from the chambers, and a scale-loosening device pivotally connected with the head intermediate of the chambers, and having
95 oppositely-extending arms to engage with the pistons and a rear extension provided with a lateral projection engaging with the said slide-valve, substantially in the manner set forth for the purpose specified.

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

CYRUS S. DEAN.

Witnesses:

ALEXANDER H. BELL,
ELLIS HUGHES.