

J. G. FRERICHS.  
TUBE CLEANING APPARATUS.  
APPLICATION FILED JAN. 29, 1909.

936,620.

Patented Oct. 12, 1909.  
2 SHEETS—SHEET 1.

Fig. 1.

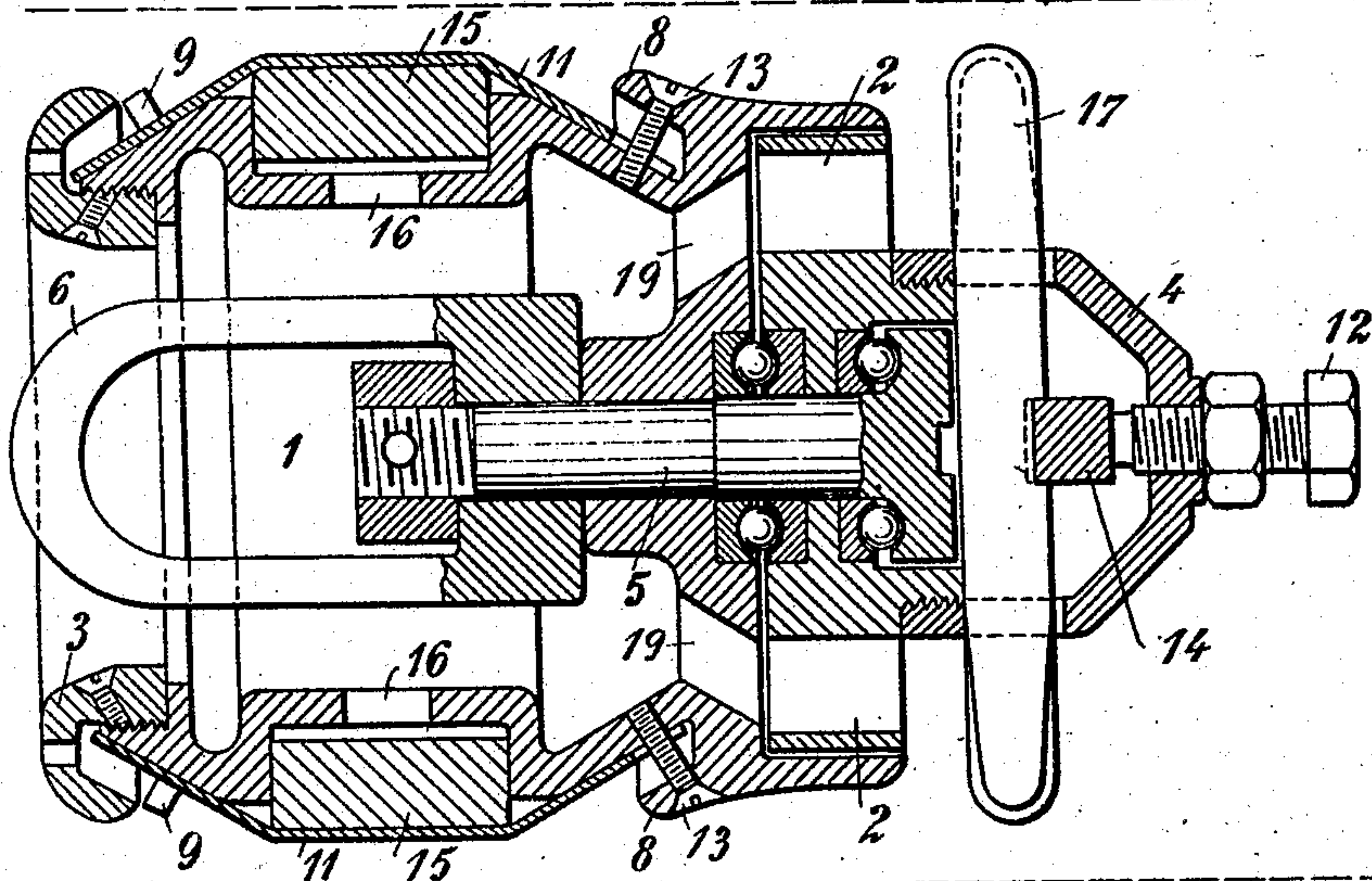
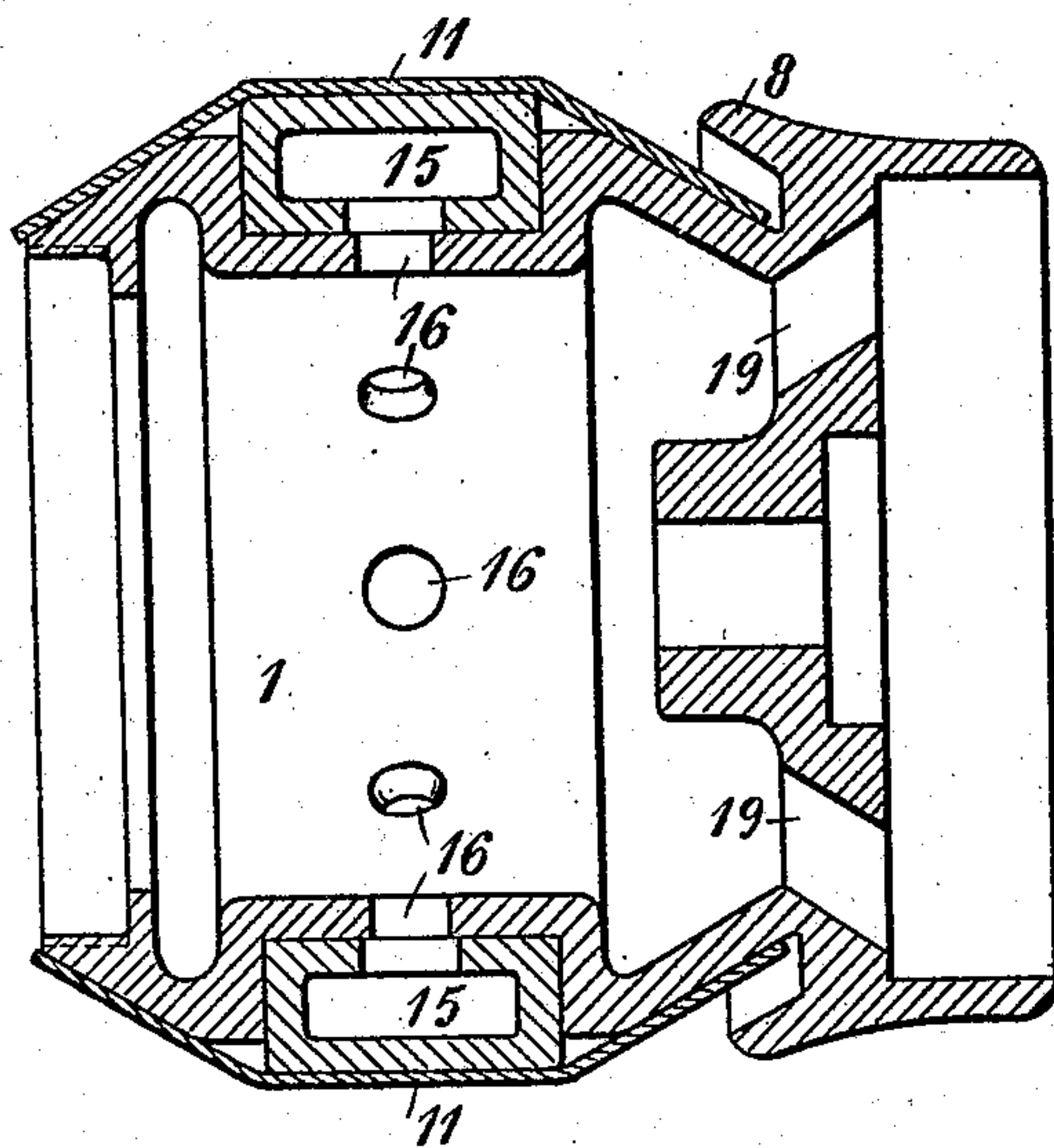


Fig. 2.



WITNESSES

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Fig. 3.

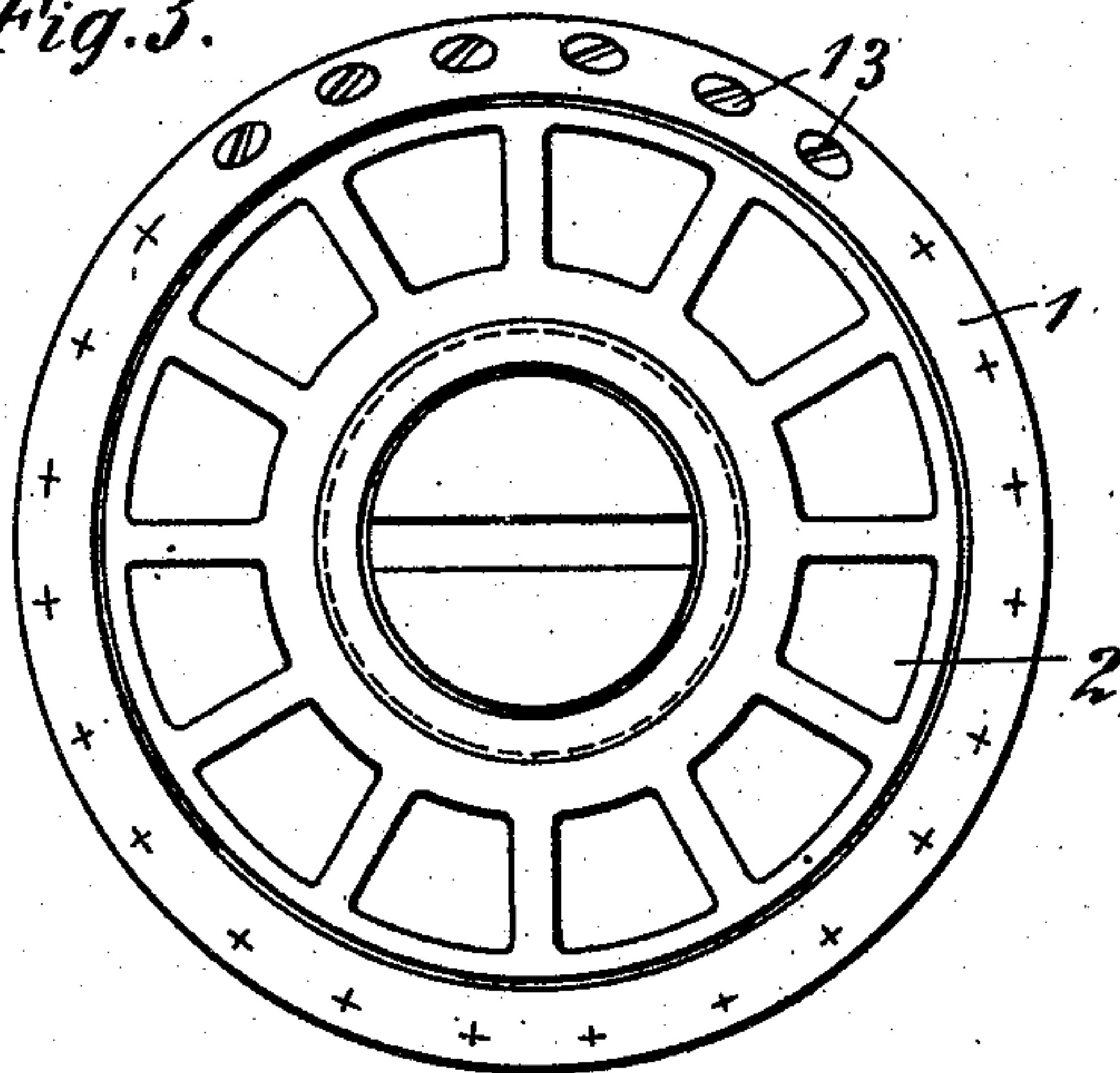


Fig. 4.

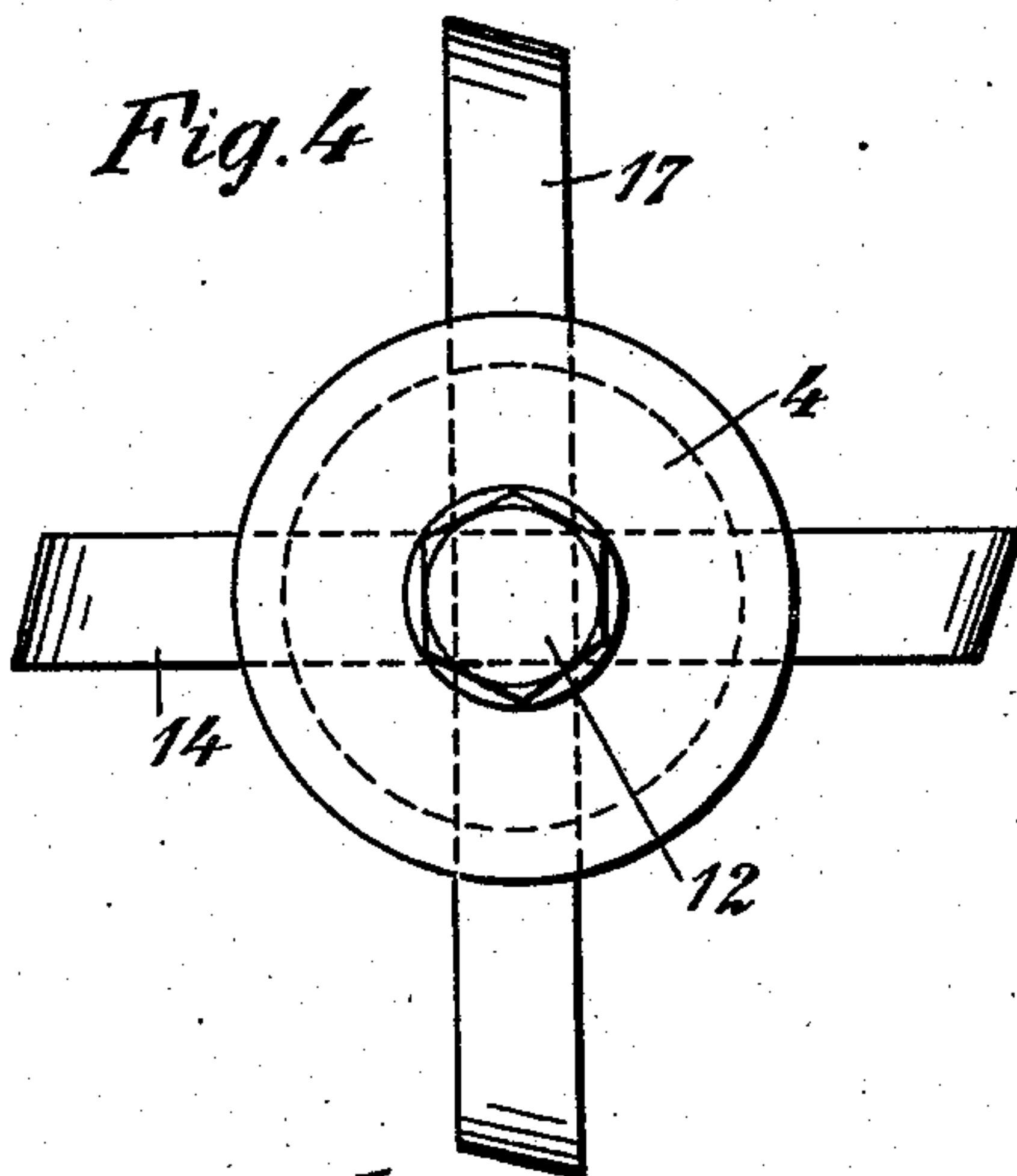
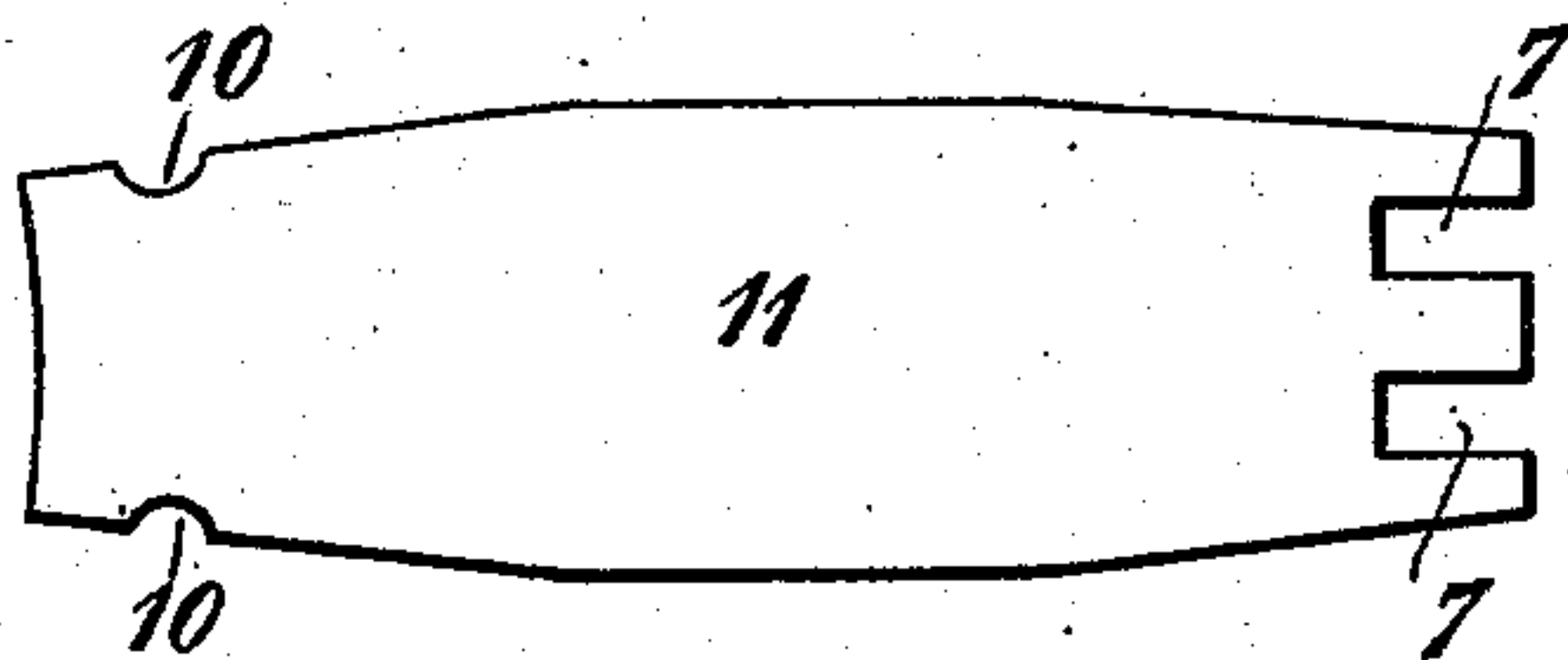


Fig. 5.



WITNESSES

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# UNITED STATES PATENT OFFICE.

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## TUBE-CLEANING APPARATUS.

936,620.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed January 29, 1909. Serial No. 475,067.

*To all whom it may concern:*

Be it known that I, JOHANN GUSTAV FRERICHS, an engineer, and a citizen of Bremen, and a resident of 33 Wedekindstrasse, in the city of Hanover, Kingdom of Prussia, and German Empire, have invented certain new and useful Improvements in Tube-Cleaning Apparatus, of which the following is a specification.

This invention relates to apparatus of the turbine-driven type for cleaning out tubes, pipes, ducts (hereinafter included in the term "tube") by fluid under pressure, and is designed to provide a cheap and efficient apparatus of the character described. Also to provide efficient means for making a fluid tight joint with the walls of the tube.

The improved fluid tight joint is designed to be capable of adapting itself readily and with certainty to the sides of a tube varying up to 12 per cent. or more in diameter. The improved joint is also so constructed that it will be protected from injury in ordinary working and also in the case of the sudden occurrence of contractions and enlargements of the tube, and while being withdrawn from the tube.

The improved apparatus combines the aforesaid advantages with very great simplicity of construction of the said joint so that it can be put together and taken apart easily and quickly, while any damaged parts can be replaced readily and conveniently.

The improved apparatus is compact and it is capable of passing around sharp corners and bends which could not be cleaned by means of apparatus as constructed hitherto.

One form of the tube-cleaning apparatus constructed according to this invention is illustrated by way of example in the accompanying drawings in which:—

Figure 1 is a central longitudinal section of one form of my improved apparatus; Fig. 2 is a similar view of a modified form of casing; Fig. 3 is a front view of the apparatus with the cutter head removed, Fig. 4 is a front view of the cutter head, and Fig. 5 is a detail plan view of one of the protecting plates.

1 is the casing of the turbine provided with a suitable jointing device, and 2 is the running wheel of the turbine provided with a cutter holder 4. The casing 1 comprises a

ring of turbine blades 19 and is fixed on a bolt 5. The running wheel 2 is rotatably mounted on the shaft 5 by means of ball bearings and is protected by an encircling forwardly projecting extension of the casing 1. This shaft is provided with a shackle 6 for the attachment of a wire rope or the like to the apparatus. The cutter holder 4 is screwed on the forward part of the running wheel 2 and secured therein by means of a screw 12, are the cutters 14 and 17.

The apparatus is preferably made of aluminium with the object of reducing the required power, and therefore also the consumption of driving fluid.

In the construction shown in Fig. 1, the casing 1, is provided, preferably on a rearwardly extending part thereof, with a peripheral ring 15 composed of a suitable elastic material. This ring may be solid as shown in Fig. 1, or hollow as shown in Fig. 2. Apertures 16 are provided in the periphery of the casing 1 below the ring 15. The driving fluid passes through these apertures under or into the ring which is thereby pressed against the sides of the tube with which the ring 15 makes a tight joint by reason of its elasticity. The ring 15 is protected against external injury by a casing composed of thick non-elastic plates 11 of metal or other suitable material capable of moving freely in a radial direction to an extent of 12 per cent. or more of the diameter of the tube.

In order to prevent the plates 11 from canting on one end they are guided at one end by means of studs 9 which are fixed in the periphery of the casing 1 and which engage slots 7 in the plates (see Fig. 5). The other ends of these plates are guided by screws 13, which extend through an annular flange 8, and slots 10 in the plates. The radial movement of the plates 11 is limited, by means of annular projecting flanges 3 and 8 which overhang the ends of the plates. The rear flange 3 is preferably in the form of a nut engaging a threaded portion in the casing. By this means of attachment, the jointing parts can be taken apart, put together, and changed, rapidly and conveniently by simply screwing the nut 3 off and on as required.

The cleaning of a tube by means of the improved apparatus is effected as follows:—A



portion of the driving fluid entering the casing 1, passes through the apertures 16 under or into the elastic ring 15 and presses the latter together with the radially guided plates 11 outward until these bear fluid-tight joint will be made by this means in a tube having fluctuations of its diameter amounting to 12 per cent. and upward. By reason of the mobility of the plates 11 the joint will adjust itself to uneven surfaces in one and the same cross section and also to oval and the like shapes of cross section. The other portion of the driving fluid enters the turbine, drives the running wheel 2, and thereby causes the cutter holder 4 to rotate and by means of its cutters to knock and cut away all deposits, sediments, and accumulations from the wall of the tube.

The plates 11 are arranged preferably so as to leave between them spaces through which a portion of the driving fluid passes out in jets that unite with the revolving jets issuing from the turbine to clean and smooth the sides of the tube, thus dispensing with the use of a brush.

It is to be understood that the hereinbefore described fluid-tight joint is not confined to the apparatus as described and shown but can be applied usefully and conveniently to tube cleaning apparatus of every type and construction.

What I claim and desire to secure by Letters Patent of the United States is:—

1. A rotary fluid actuated tube cleaner having a casing, an annular groove on the periphery of the casing, apertures in the bottom of the groove, an elastic ring in said groove, and means to supply pressure to said apertures to expand said ring; substantially as described.

2. A rotary fluid actuated tube cleaner

having a casing, an annular groove on the periphery of the casing, apertures in the bottom of the groove, an elastic ring in said groove, protecting plates for the ring adjustably mounted on the casing, and means to supply pressure to said apertures to expand said ring; substantially as described.

3. A rotary fluid actuated tube cleaner having a casing, an annular groove on the periphery of the casing, apertures in the bottom of the groove, an elastic ring in said groove, projections on the periphery of the casing, slotted protecting plates adjustably mounted on said pins, and means to supply pressure to said apertures to expand said ring; substantially as described.

4. A rotary fluid actuated tube cleaner having a casing, an annular groove on the periphery of the casing, apertures in the bottom of the groove, an elastic ring in said groove, protecting plates for the ring, adjustably mounted on the periphery of the casing, means for limiting the outward movement of the plates, and means to supply pressure to said apertures to expand said ring; substantially as described.

5. A rotary fluid actuated tube cleaner having a casing, an annular groove on the periphery of the casing, apertures in the bottom of the groove, an elastic ring in said groove, radially adjustable protecting plates for the ring mounted on the periphery of the casing, an annular flange on the casing for limiting the radial movement of the plates, and means to supply pressure to said apertures to expand said ring; substantially as described.

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Witnesses:

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