

No. 828,522.

PATENTED AUG. 14, 1906.

T. H. SMITH.
AIR COMPRESSOR.

APPLICATION FILED MAY 27, 1905.

2 SHEETS—SHEET 1.

Fig. I.

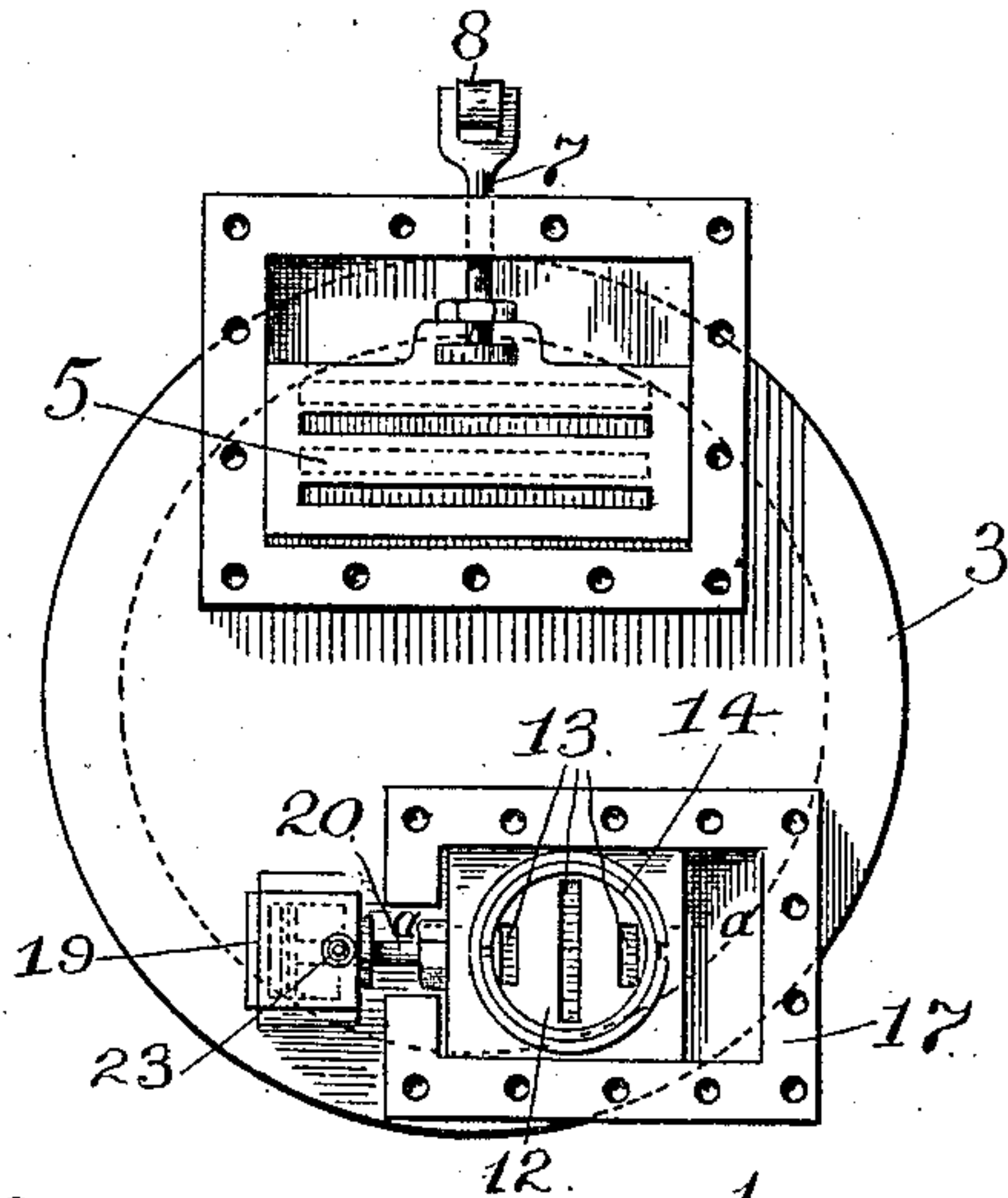


Fig. II.

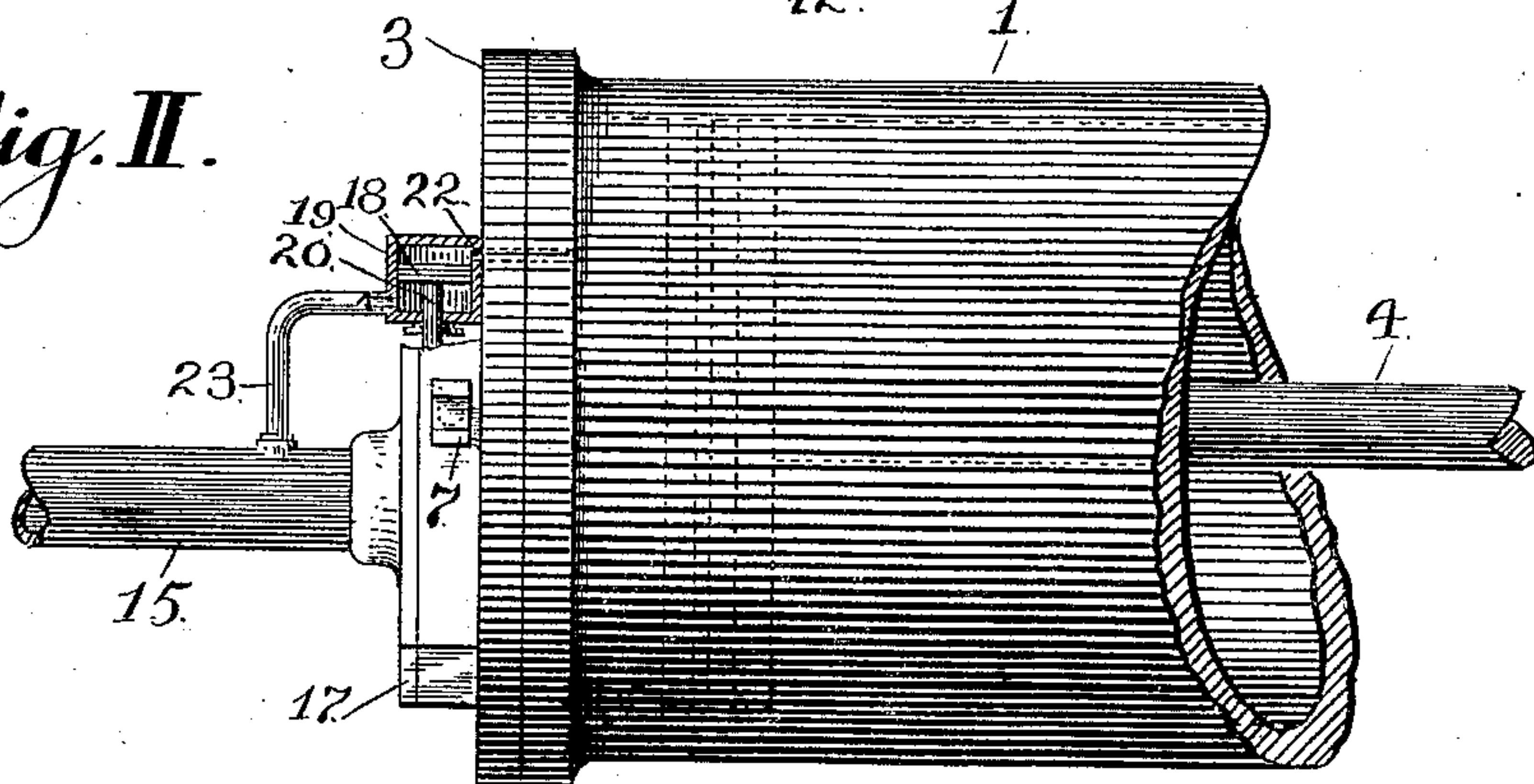
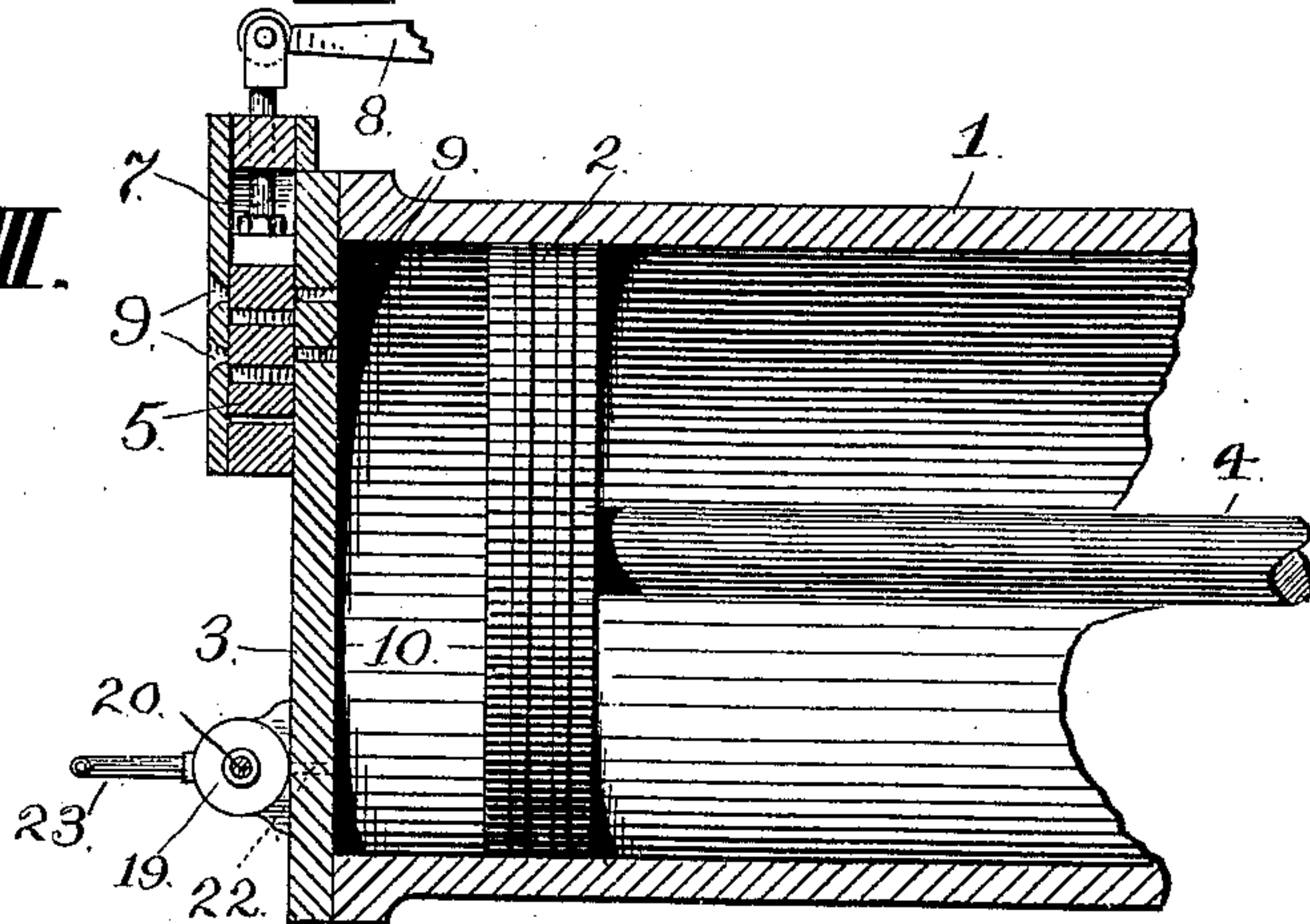


Fig. III.



Witnesses:

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Elmer Wickes.

Inventor:

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2 SHEETS—SHEET 2.

Fig. IV.

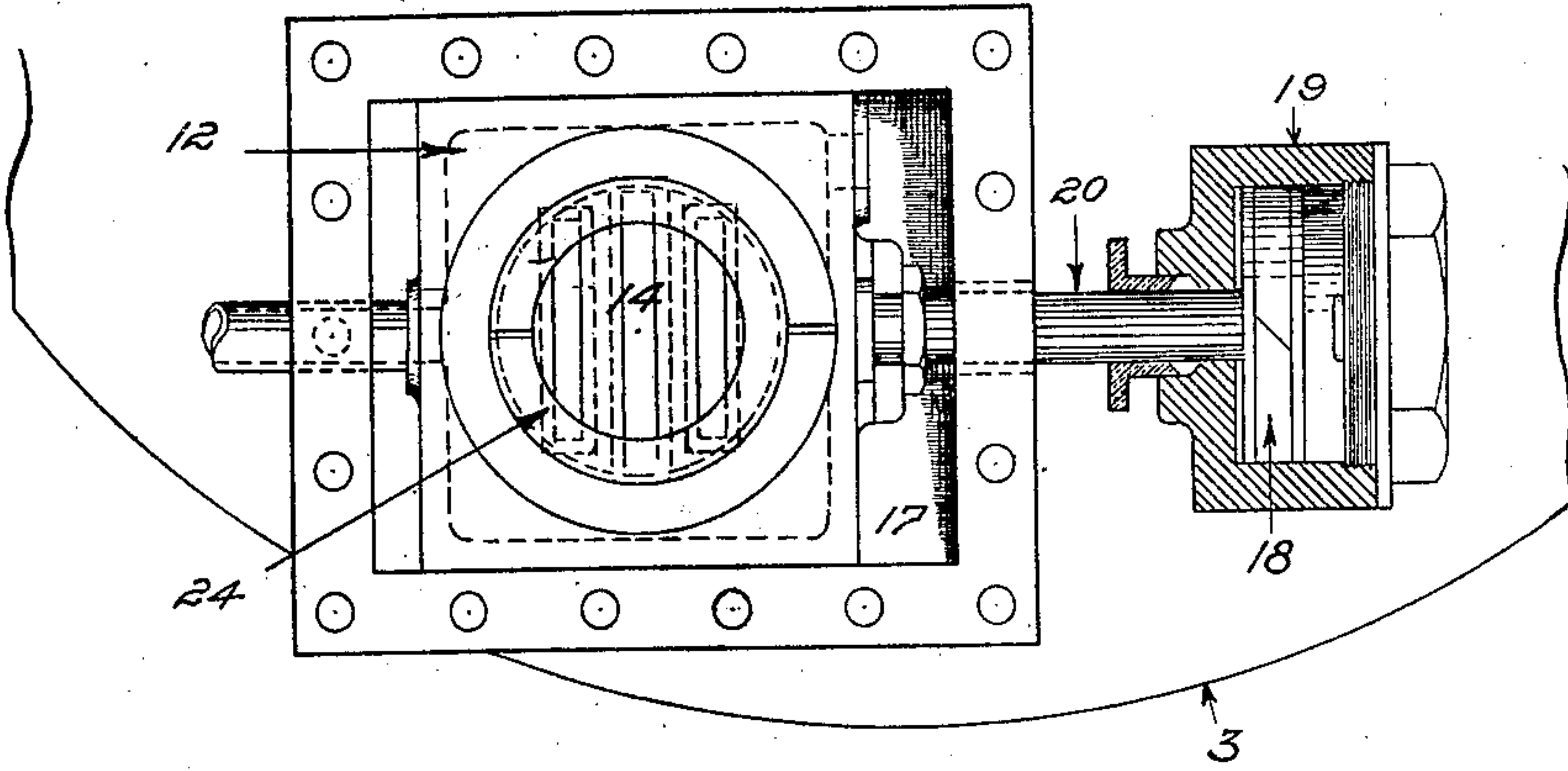
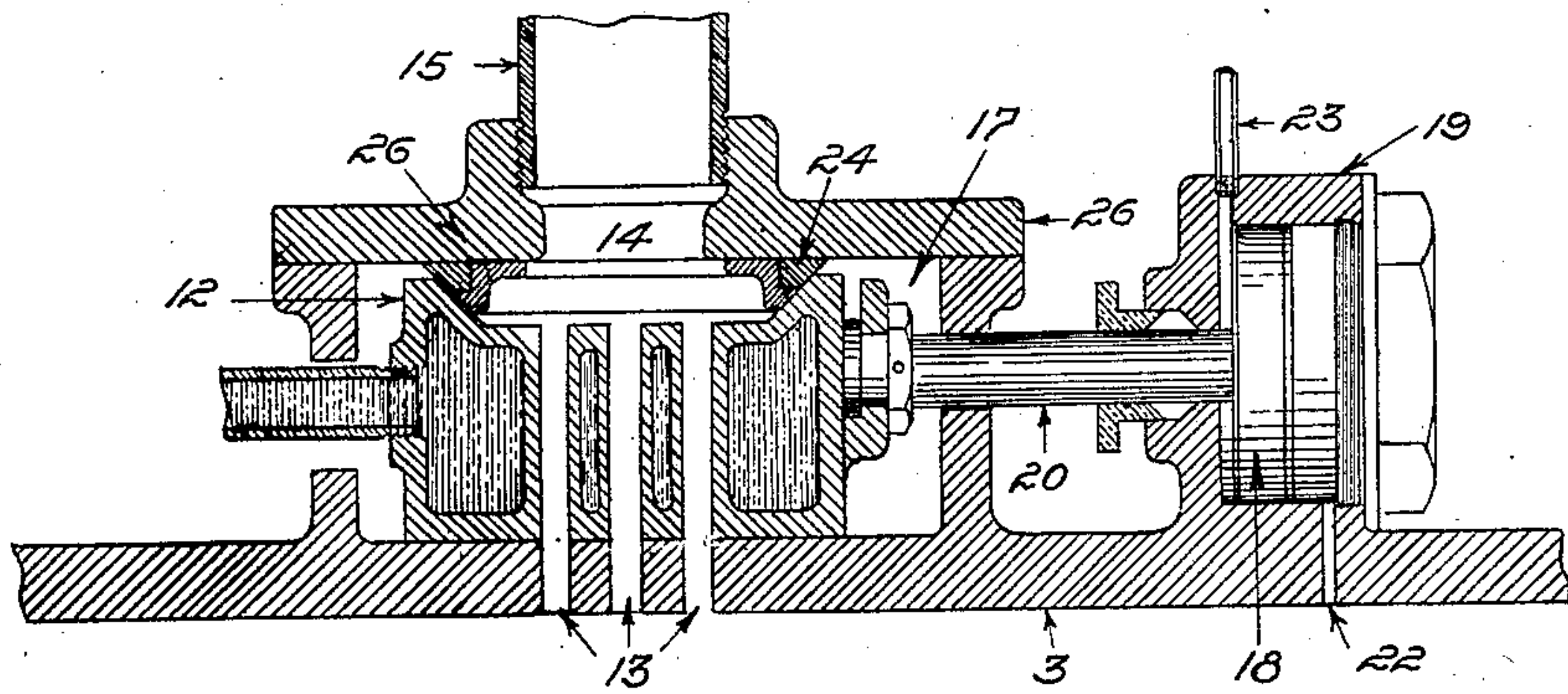


Fig. V.



Witnesses:
Elmer Wickes
[Signature]

Inventor:
Theodore H. Smith
By his Attorneys J. Richards & Co.

UNITED STATES PATENT OFFICE.

THEODORE H. SMITH, OF SAN FRANCISCO, CALIFORNIA.

AIR-COMPRESSOR.

No. 828,522.

Specification of Letters Patent.

Patented Aug. 14, 1906.

Application filed May 27, 1905. Serial No. 262,623.

To all whom it may concern:

Be it known that I, THEODORE H. SMITH, a citizen of the United States of America, residing at San Francisco, county of San Francisco, and State of California, have invented certain new and useful Improvements in Air-Compressors; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to an improvement in the manner of operating the eduction-valves of air-compressing engines, as herein-after described, and illustrated by drawings that form a part of this specification.

My improvement consists in an actuating-piston operated by air-pressure that automatically opens and closes the eduction passage or passages from the air-compressing cylinder and in devices to this end.

The object of my invention is to secure an easy, prompt, and noiseless movement of valves of air-compressing engines contingent on pressure within the compressing-cylinder, the reduction of clearance-space, endurance of wear, and simplicity of parts.

To these ends I employ devices as illustrated in the drawings.

Figure I is an end view of an air-compressing engine fitted with my improvements. Fig. II is a plan view of the device shown in Fig. I, the valve-moving piston being in section, the induction-valve being omitted. Fig. III is a partial longitudinal section through the air-compressing cylinder and induction-valve, showing also the end of the eduction-valve-moving piston-rod, the view being taken to correspond with Fig. I and at an angle of forty-five degrees from Fig. II. Fig. IV is an enlarged front view of the eduction-valve and its accessories with a portion of the cylinder-cover, the valve-actuating piston being on the right instead of on the left, as in Fig. I. Fig. V is a central longitudinal section through the device shown in Fig. IV.

The construction of sliding valves lends itself particularly to the narrow plane available for valve-space at the ends of air-compressing engines, where clearance causes more or less loss in any case. It also enables balancing by counter-pressure and has other advantages.

Referring to the drawings, 1 is a broken

section of the cylinder of an air-compressing engine, 2 the piston thereof, and 3 the back cylinder-cover, which is the same as at the other end of the cylinder except as to a packing-gland for the piston-rod 4.

5 is the induction slide-valve of the gridiron type operated by a stem 7 and lever 8 or other suitable mechanism that will raise this valve and open the ports 9 when the piston begins to move back from the head 3 and causes a partial vacuum in the chamber 10. 12 is the eduction-valve to which my invention especially relates. This valve is also of the sliding gridiron type, having three ports of unequal length to bring them all within the balancing-ring 24 and chamber 14 opposite to the end of the discharge-pipe 15. These packing or balancing rings 24, contrary to the usual construction, are subject to pressure inside and bear against the cover 26 of the chamber 17, forming a seal over the end of the pipe 15 and dispensing with a packing-gland on the stem 20. The balancing-ring moves with the valve. This eduction-valve 12 is moved by a piston 18 in the short cylinder 19, a stem 20 connecting to the valve 12, as shown in the drawings. This piston 18 is moved forward, and the valve is opened by air admitted through a small port 22, that communicates directly with the chamber 10 or interior of the cylinder 1, as indicated in Figs. I and II and shown in Fig. V, and is moved in the other direction by static pressure of the air already compressed passing through the pipe 23 from the discharge-pipe 15; also in part by suction in the chamber 10. This valve 12 remains normally closed by reason of the air-pressure in the pipes 15 and 23 until the advancing piston 2 compresses the air in the cylinder 1 and chamber 10 to a pressure greater than that in the pipe 15. Then the piston 18 will move back and open the valve 12, permitting the compressed air to flow into the pipe 15. The piston 18, being operated by the difference between the pressures in the cylinder 1 and the discharge-pipe 15, is made with an area to suit such difference of pressures. It will be understood that this description of one end and one set of valves for an air-compressing engine is applicable alike to each end thereof or to double-acting machines. It will also be understood that any of the parts can be made cellular and cooled by circulating water.

Having thus described the nature and ob-

jects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an air-compressing engine, a sliding eduction-valve of the gridiron type, a pneumatic piston to move said valve, a chamber and balancing-ring at the rear of the valve and moving therewith, and an air-discharge pipe with which said chamber communicates, substantially as specified.
2. In an air-compressing engine, a compressing-cylinder, a sliding eduction-valve of the gridiron type, a piston to move the same, said piston communicating with the air-compressing cylinder, whereby it is operated in one direction, and with the air-discharge pipe, whereby it is operated in the other direction, a chamber at the rear of said valve, a balancing-ring in said chamber, sealing against escape of air outwardly from the valve and moving therewith, and an air-discharge pipe at the rear of said chamber, com-

municating with the same, substantially as specified.

3. In an air-compressing engine, a compressing-cylinder, an air-discharge pipe, a sliding eduction-valve of the gridiron type, a pneumatic piston to operate said valve, communicating with the air-compressing cylinder on one side and with the air-discharge pipe on the other side, a chamber between said eduction-valve and said air-discharge pipe, and a balancing-ring in said chamber, at the rear of said valve and moving therewith, substantially as specified.

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

THEODORE H. SMITH.

Witnesses:

N. E. W. SMITH,
ELMER WICKES.