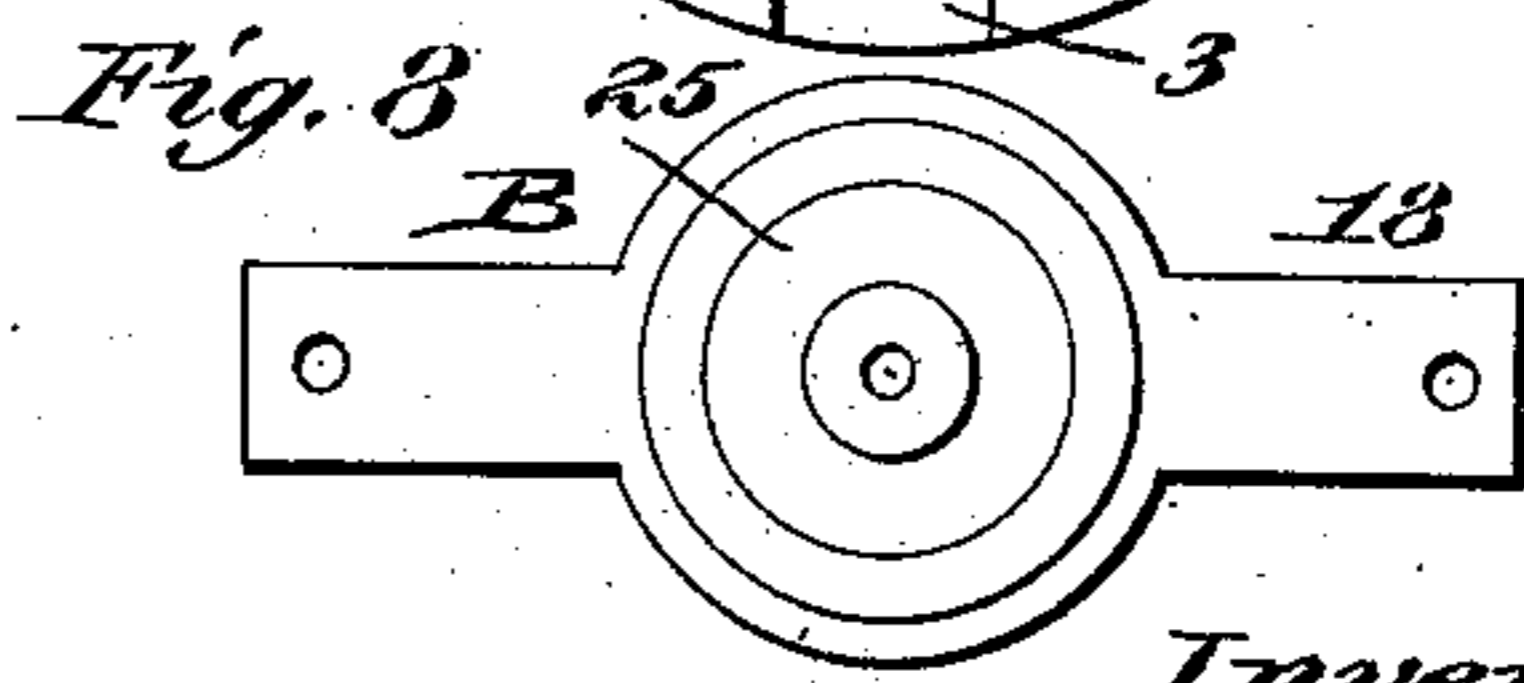
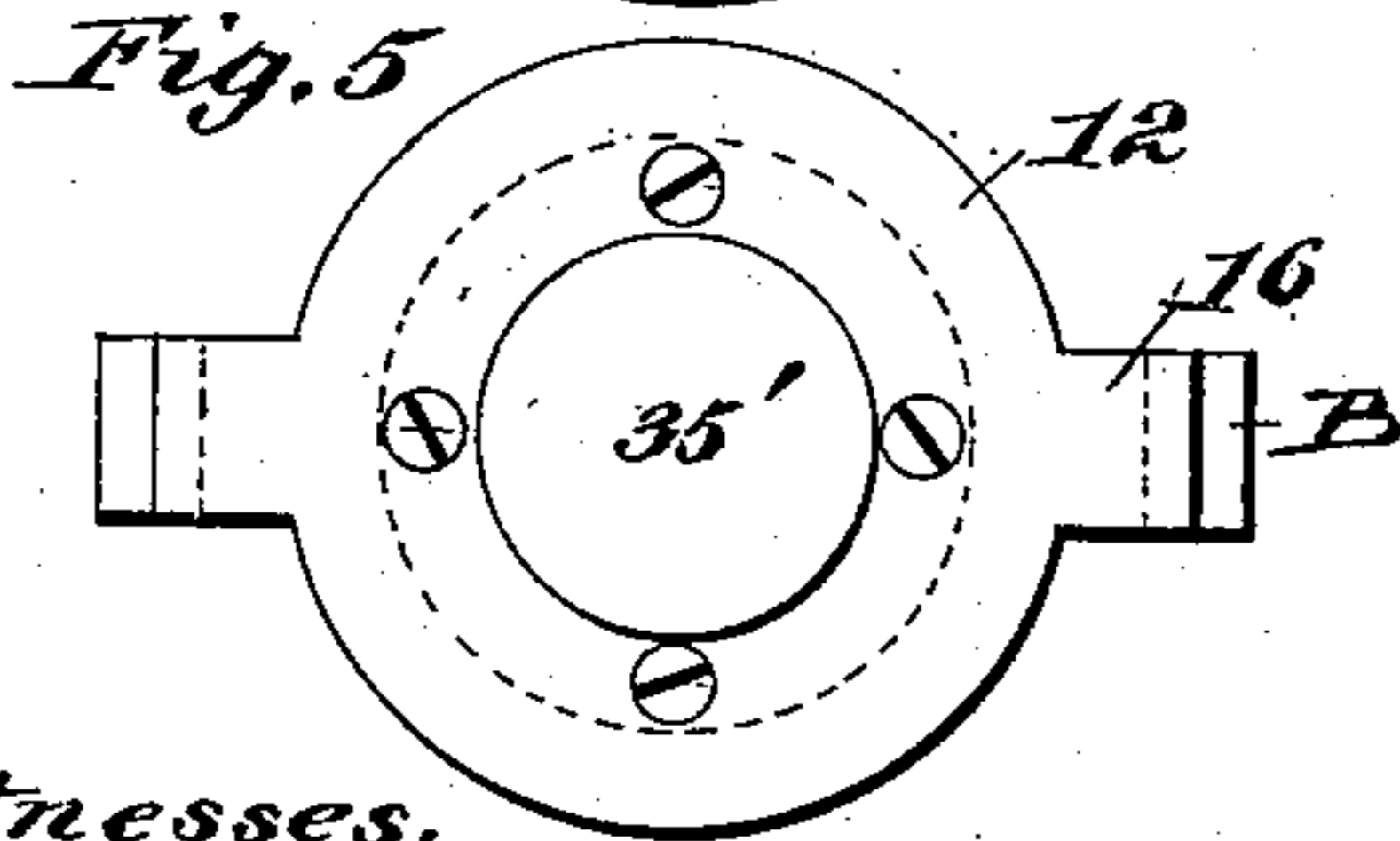
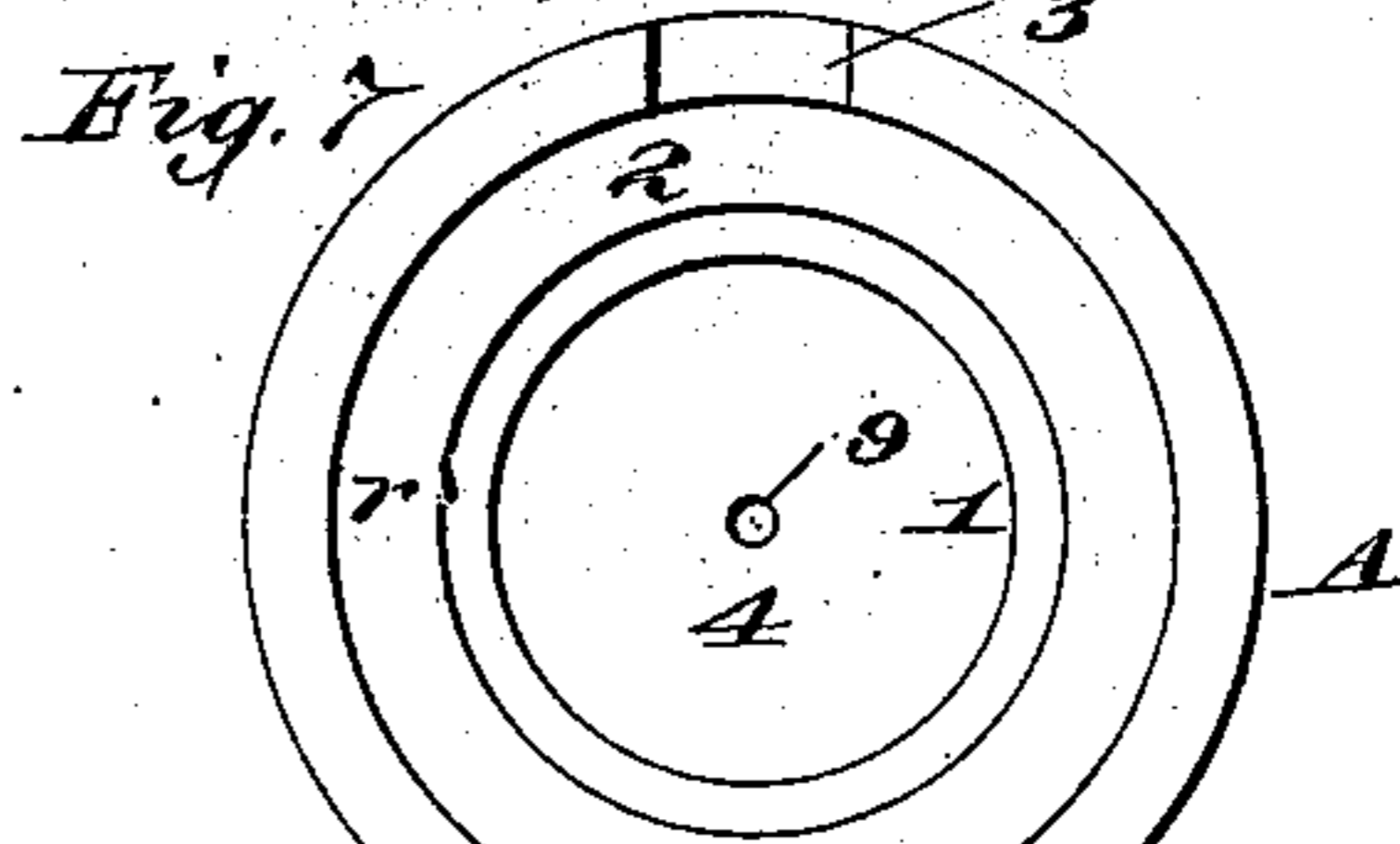
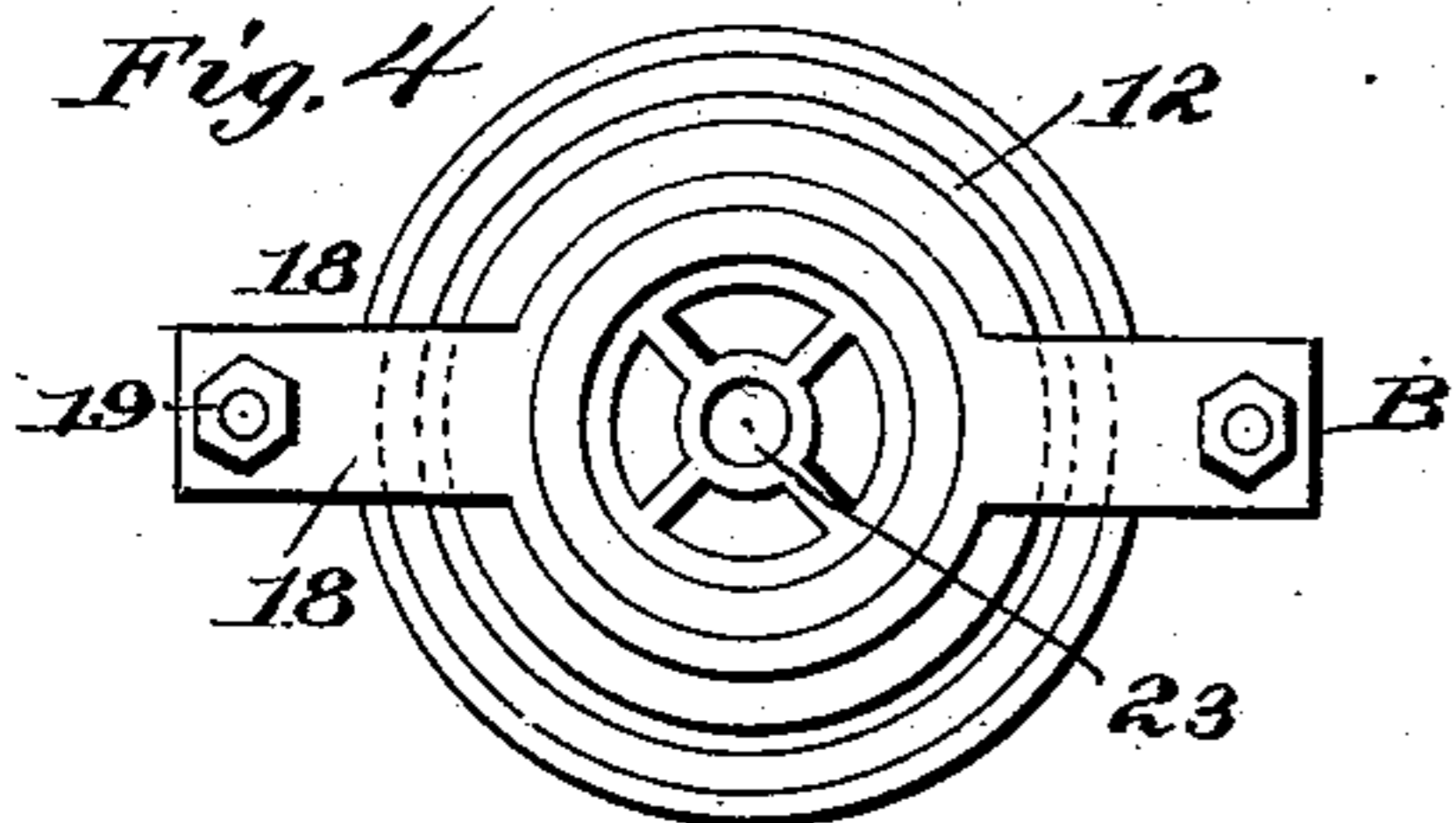
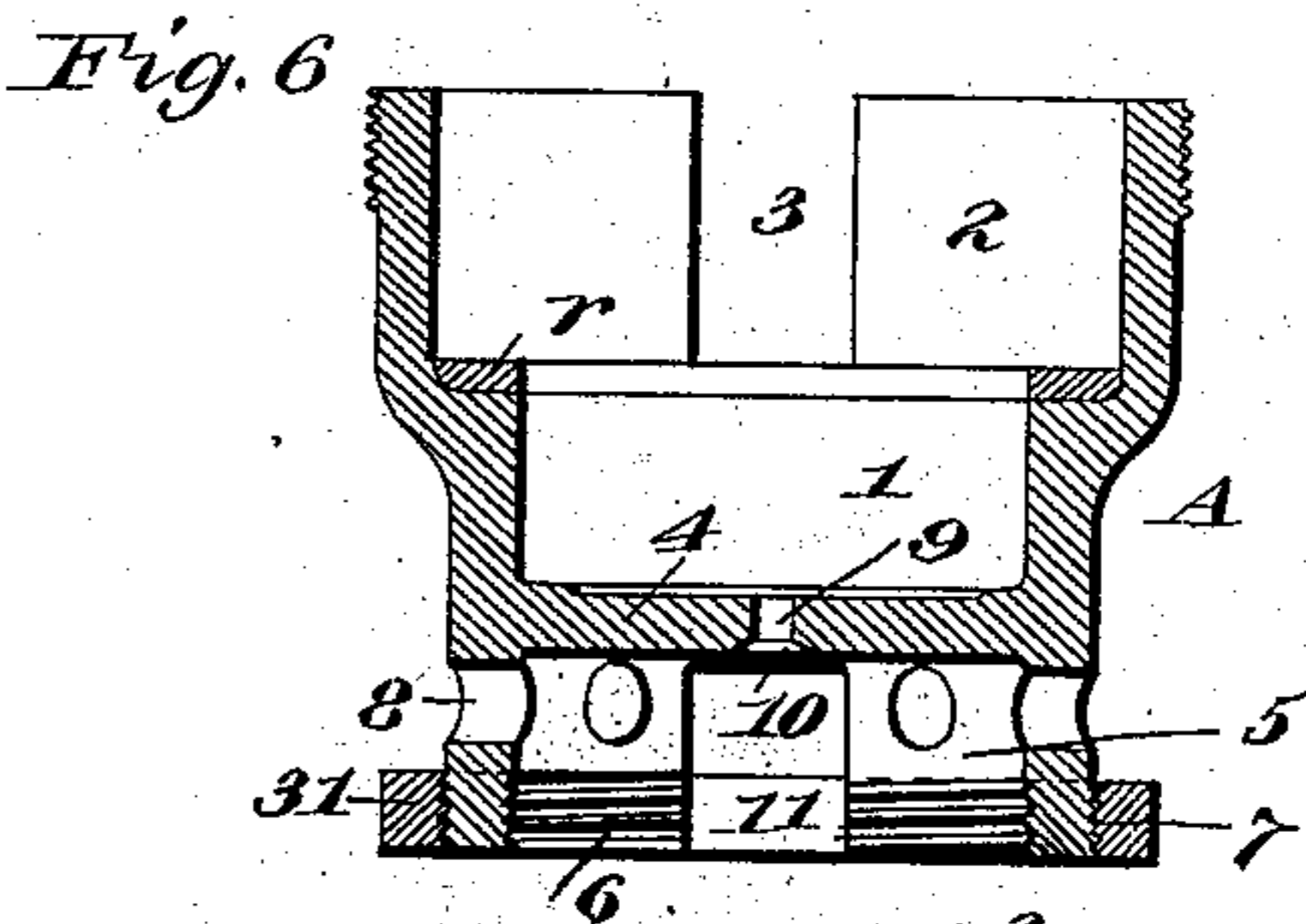
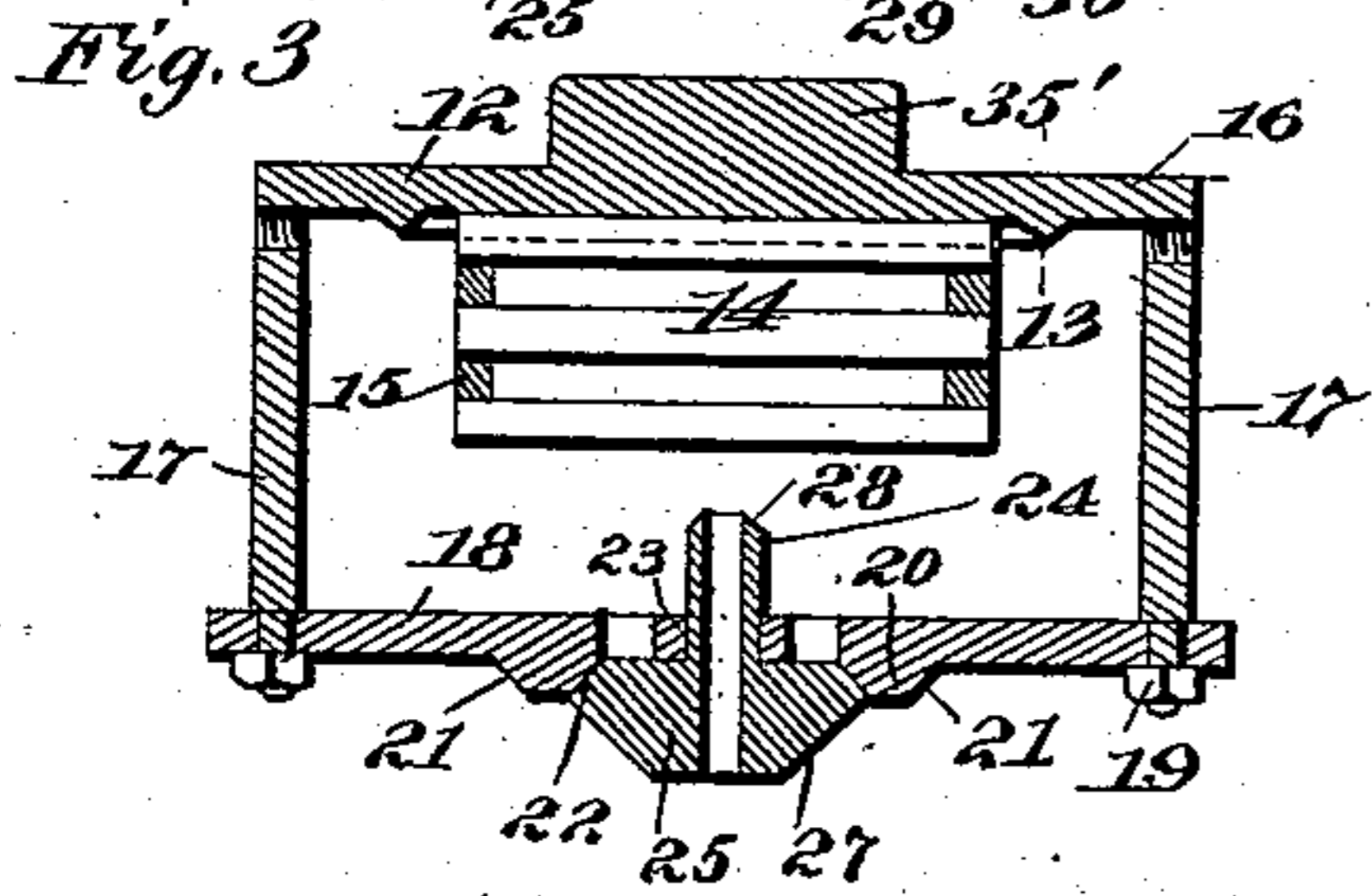
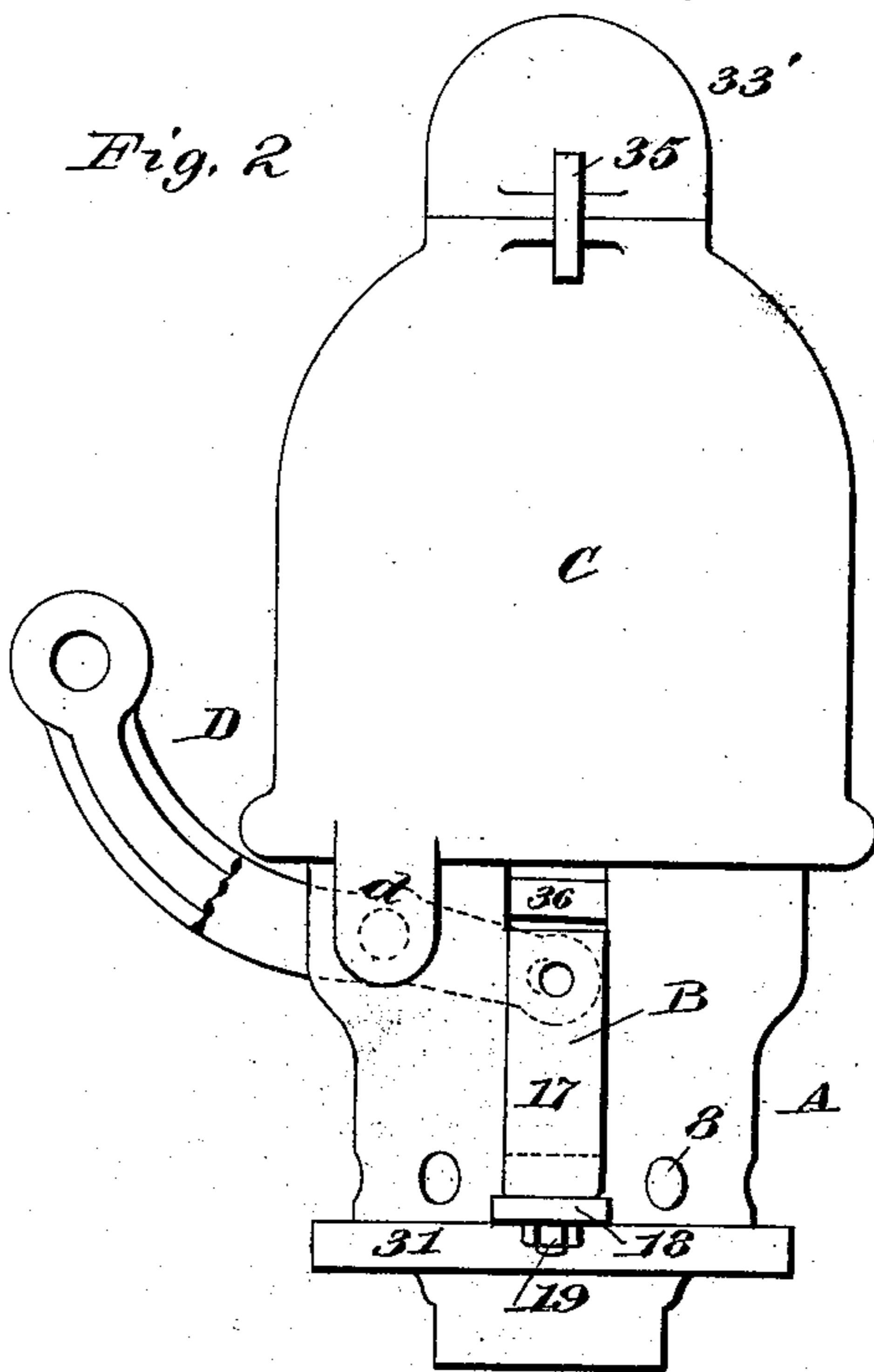
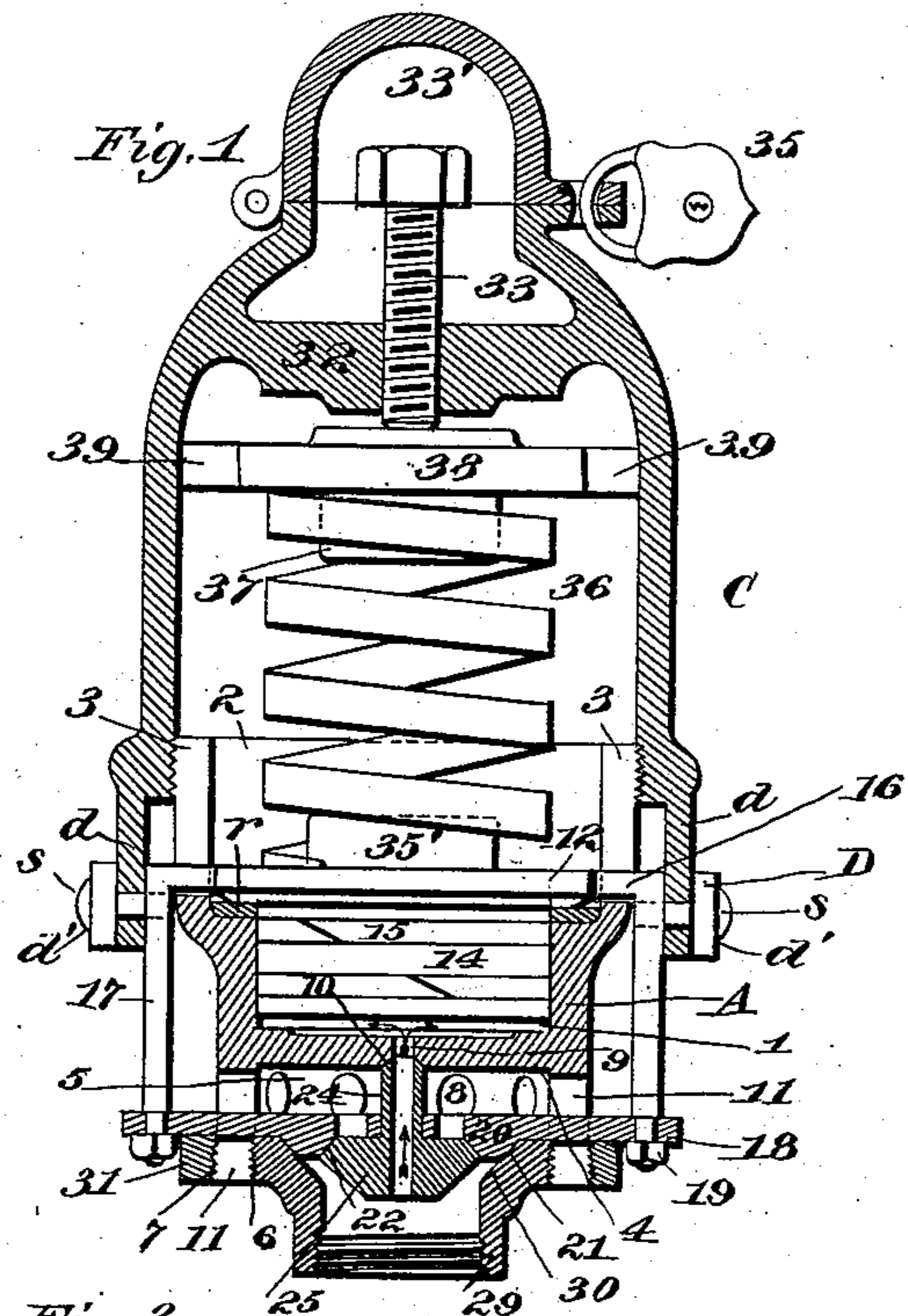


(No Model.)

C. H. CAMERON.  
SAFETY VALVE.

No. 506,624.

Patented Oct. 10, 1893.



*Witnesses,*

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# UNITED STATES PATENT OFFICE.

CHARLES HOYLE CAMERON, OF RUSK, TEXAS.

## SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 506,624, dated October 10, 1893.

Application filed July 10, 1893. Serial No. 480,049. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES HOYLE CAMERON, a citizen of the United States, residing at Rusk, in the county of Cherokee and State of Texas, have invented certain new and useful Improvements in Safety-Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in safety-valves for boilers.

The invention will first be described in connection with the accompanying drawings, and then particularly pointed out in the claims.

In the drawings—Figure 1 is a vertical section, partly in elevation, of a valve embodying my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a vertical section, partly in elevation, showing the valves and the piston. Fig. 4 is a bottom plan view and Fig. 5 is a top plan view of the same. Fig. 6 is a vertical section through the center of the valve-chamber. Fig. 7 is a top plan view of the same. Fig. 8 is a detail plan view.

Referring to the drawings, A is a valve-chamber having a steam-cylinder 1, above which is a guide-cylinder 2, provided with guide-slots 3, one at each side. The bottom of the steam-cylinder is formed by a diaphragm 4, below which is a cylindrical socket 5, threaded at its lower end both inside and out, as at 6 and 7, for a purpose hereinafter described; above the threaded portion are transverse steam-outlets 8, and through the center of the diaphragm is formed a steam-opening 9, having a conical valve-seat 10 at its lower end.

At the bottom of the guide-cylinder 2 a ring 7, preferably of copper, is located, and the cylindrical socket 5 has a pair of diametrically opposite guide-slots 11.

B is a valve-frame consisting of an upper valve 12 whose lower edge is V-shaped, as at 13, a piston 14, having the usual piston-rings 15, being attached to the under side of the upper valve. Projecting outward from the upper valve 12, are arms 16, which are bent downward to form vertical bars 17 and have their lower ends threaded and passed through a transverse spider 18, being secured below the spider by nuts 19. The spider carries a

lower annular valve 20 beveled on its interior and exterior faces, as at 21 and 22. The center of the spider 18 has a central opening 23, which forms a guide for the stem 24 of an auxiliary valve 25 which has an upper beveled surface 26 and a lower beveled surface 27, the upper end of the stem being also beveled at 28 to fit the valve-seat 10 in the diaphragm 4.

In assembling this device, the valve-frame is taken apart by removing nuts 19 and withdrawing the spider 18 from the arms 17. The upper portion of the valve-frame is inserted into the valve-chamber, the piston 14 entering and fitting tightly within the steam-cylinder, while the valve 12 enters the guide-cylinder 2, the V-shaped portion 13 resting on the ring 7, while the arms 16 project outward through the slots 3. The lower valve and its spider are then put in place in the lower socket 5, the spider 18 projecting through the slots 11 and being then secured to the vertical arms 17 by means of the nuts 19. The auxiliary valve 25 is then put in place, its stem passing through the central opening 23, and its upper end entering the conical valve-seat 10 in diaphragm 4. To hold the auxiliary valve in place, a reducer 29 is screwed into the lower threaded end 1 of the socket 5, the upper interior surface 30 of the reducer, being beveled to form a valve-seat for the beveled face 27 of the auxiliary valve. Around the outside of the lower outer end 6 of the valve-chamber is screwed a ring 31 for the purpose of strengthening the joint. The inner surface of the reducer is threaded at its lower end to receive the steam pipe from the boiler.

On top of the valve-chamber is screwed a dome C having a central diaphragm or partition 32 through which is threaded a screw 33. The upper end of the dome is provided with a cap 33' preferably hinged to the dome at 34, and arranged to be locked by a pad-lock 35, as will be fully understood from the drawings.

The top of the upper valve 12 is provided with a boss 35' which enters the lower end of a helical spring 36 whose upper end is held by a boss 37 projecting downward from a follower 38, having guide arms 39 which move against the interior of the dome. The screw

33 rests against the top of the follower and serves to adjust the tension of the spring, and thereby regulates the pressure at which the valve will operate. The steam from the boiler normally holds the auxiliary valve into contact with the diaphragm 4, thus allowing the steam to pass through the central opening of the stem and bear against the under side of the piston; as soon as the pressure on the piston exceeds the tension of the spring, the piston is forced upward, raising the upper valve and the lower annular valve, permitting the steam to escape through the transverse openings 8, until the pressure is sufficiently reduced to allow the spring to force the piston back again. The object of having the upper valve and its V-shaped face 13 which bears on the ring,  $r$ , is simply to prevent the escape of steam, if at any time the piston rings should become loose and allow the steam to pass them. For the purpose of raising the valve by hand when desired I provide a forked lever D which is pivoted to the exterior of the dome at  $d$ , and has its inner ends attached at  $d'$  to the arms 16, by screws S.

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

1. In a safety valve, the combination with a valve chamber having at its base a socket and provided with a valve seat and having a steam outlet and at its upper part a guide chamber, of a valve arranged in said socket, said valve chamber being provided with a steam inlet tube passing through said valve and opening below the same, a piston mounted in said guide chamber, a spring arranged to bear on said piston, and means for communicating the movement of said piston to said valve in the socket of the valve chamber, substantially as described and for the purpose set forth.

2. In a safety valve, the combination with a valve chamber having at its base a socket and at its upper part a guide chamber, said socket and guide chamber being each provided with a valve seat, of valves adapted to engage the respective valve seats, said valve chamber being provided with a steam inlet tube passing through the valve in the socket

and opening below the same, a piston mounted in said guide chamber and connected to said valve therein, a spring arranged to bear on said piston, and means for communicating the movement of said piston to said valve in the socket, substantially as described and for the purpose set forth.

3. In a safety valve, the combination with a valve chamber having at its base a socket and at its upper part a guide chamber, said socket and guide chamber being each provided with a valve seat and with guide slots, of valves adapted to engage the respective valve seats and having lateral arms projecting through the slots in said guide chamber and socket, said arms being connected at their outer ends, said valve chamber being provided with a steam inlet tube passing through the valve in the socket and opening below the same, a piston mounted in said guide chamber and connected to said valve therein, and a spring arranged to bear on said piston, substantially as described and for the purpose set forth.

4. In a safety-valve, a valve-chamber having a steam cylinder and a guide-cylinder above the steam cylinder, a piston fitting in the steam-cylinder, an upper valve in the guide-cylinder and attached to the piston, an escape-valve attached to the upper valve and a spring bearing on the upper valve, substantially as described.

5. In a safety-valve, a valve-chamber, having a steam-cylinder and a guide-cylinder larger than the steam-cylinder and above it, a soft metal ring fitting on the shoulder formed by the guide and steam-cylinders, a piston working in the steam-cylinder, a valve fitting in the guide-cylinder and provided with an annular hardened V-shaped bearing surface, said valve being attached to the piston, and a spring bearing on the valve and holding the V-shaped surface normally into contact with the ring, substantially as described.

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

CHAS. HOYLE CAMERON.

Witnesses:

S. B. BARRON,

W. H. HENDERSON.