

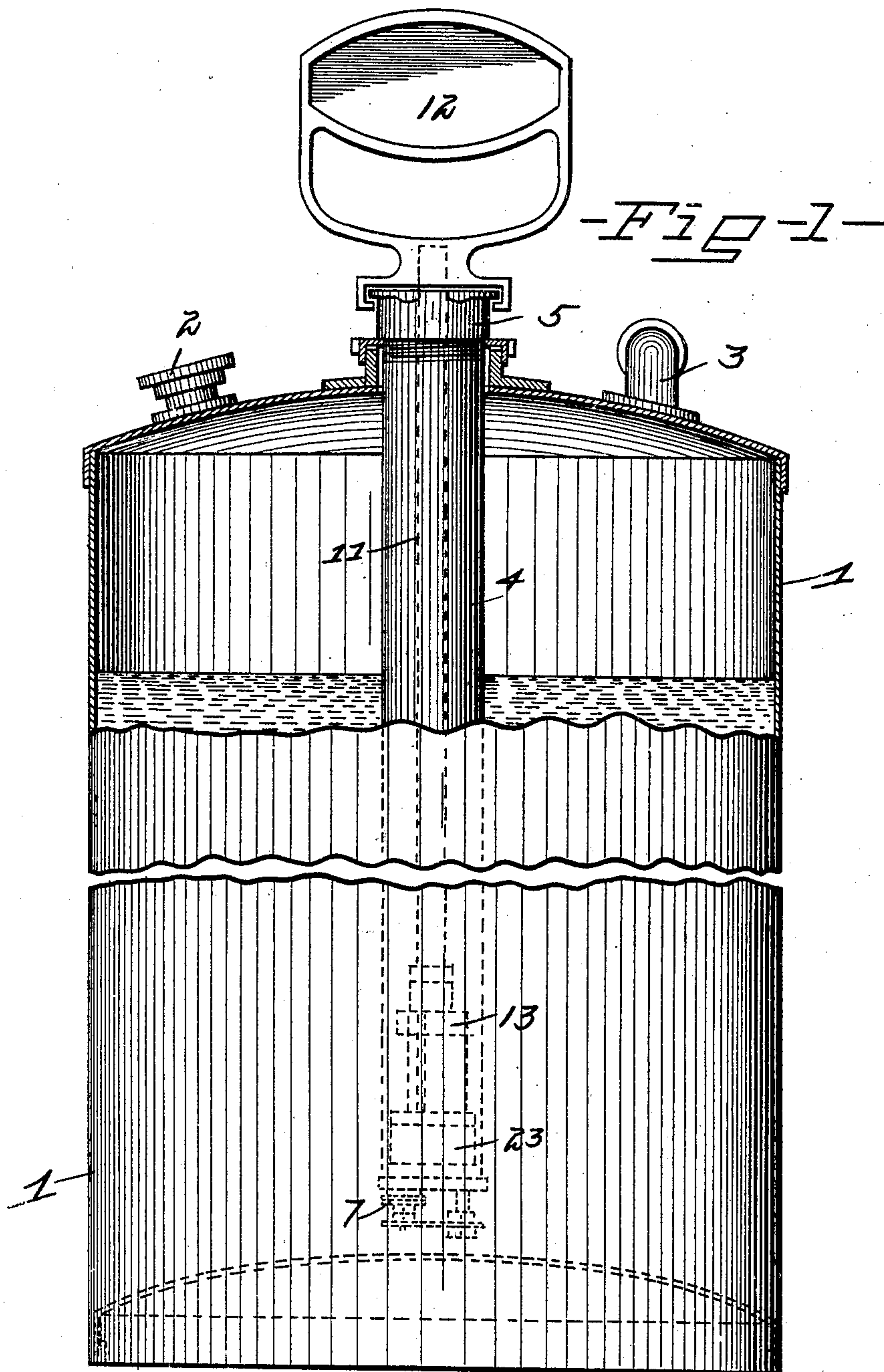
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PATENTED OCT. 2, 1906.

C. A. KOEPNICK.
RELIEF VALVE FOR AUTOMATIC SPRAYING MACHINES.

APPLICATION FILED FEB. 19, 1906.

2 SHEETS—SHEET 1.



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Fig-2.

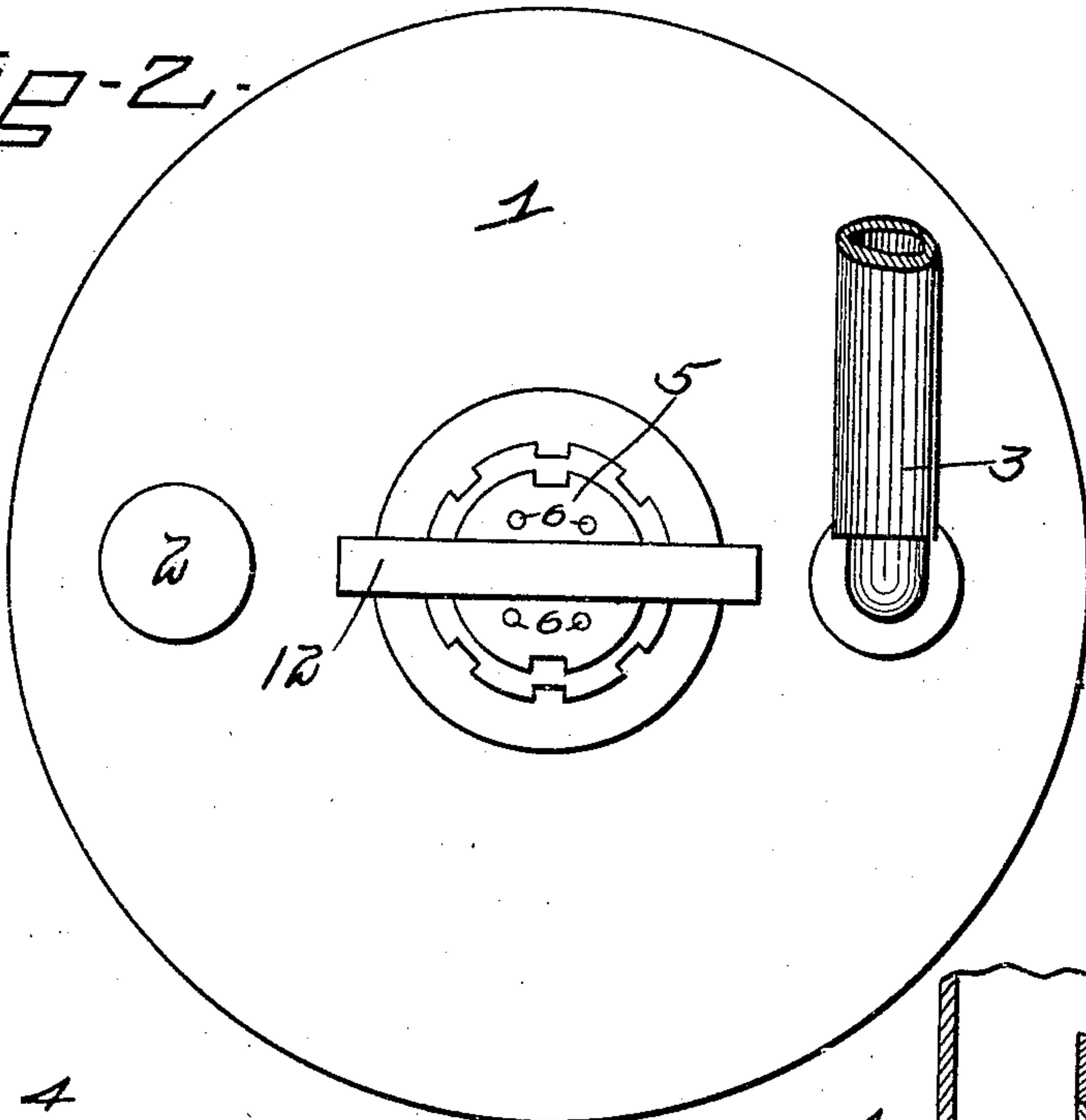


Fig-3.

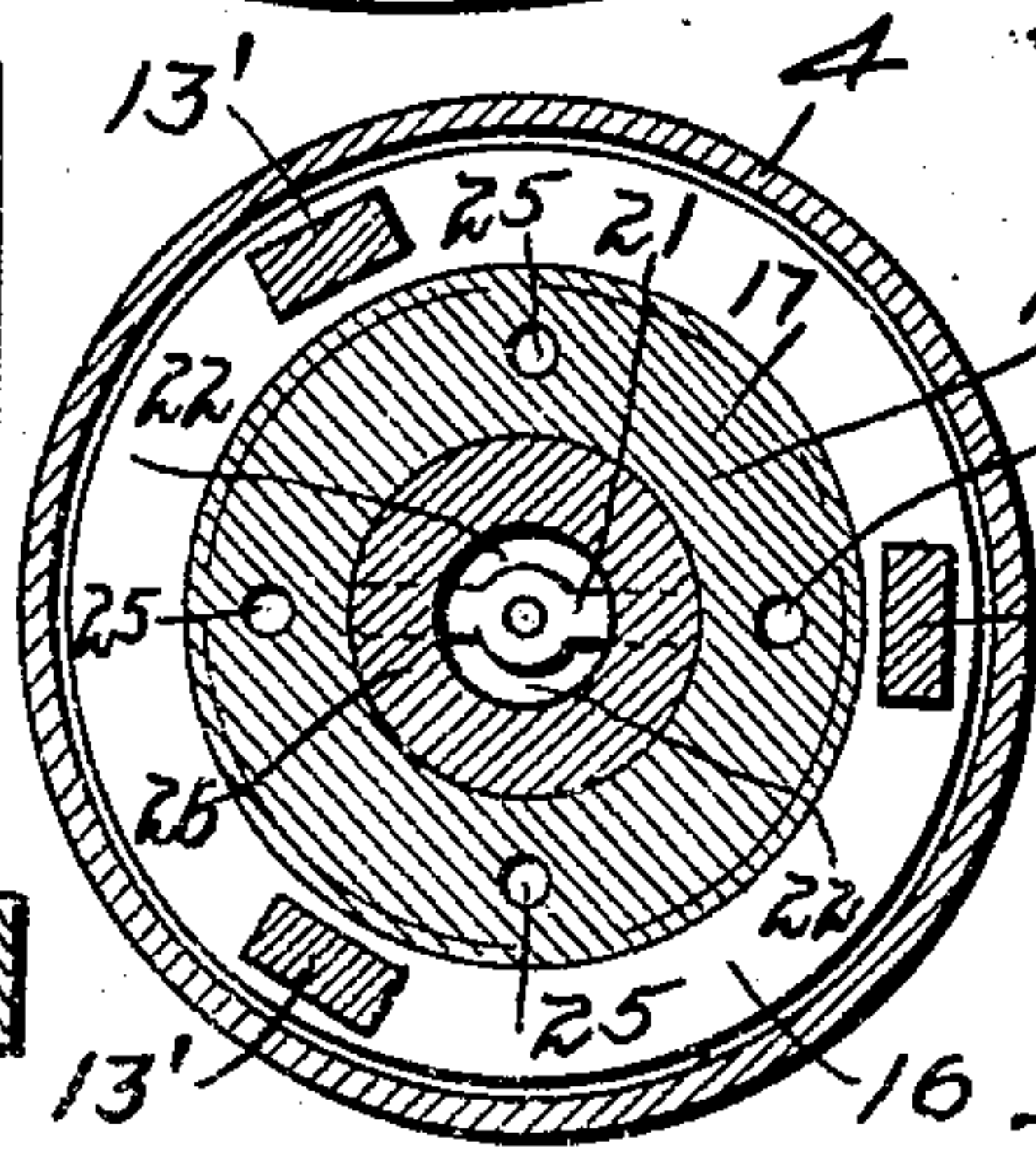
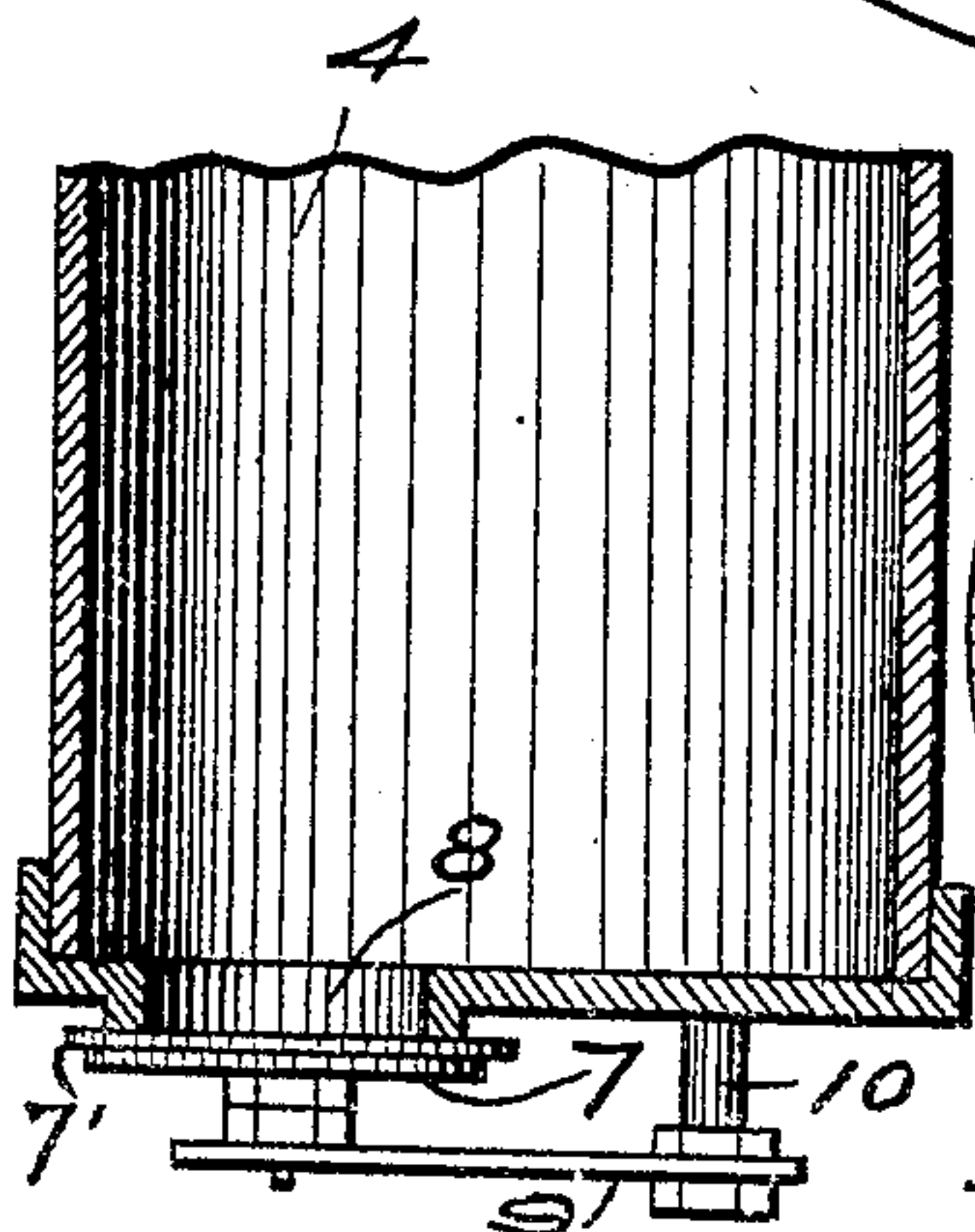
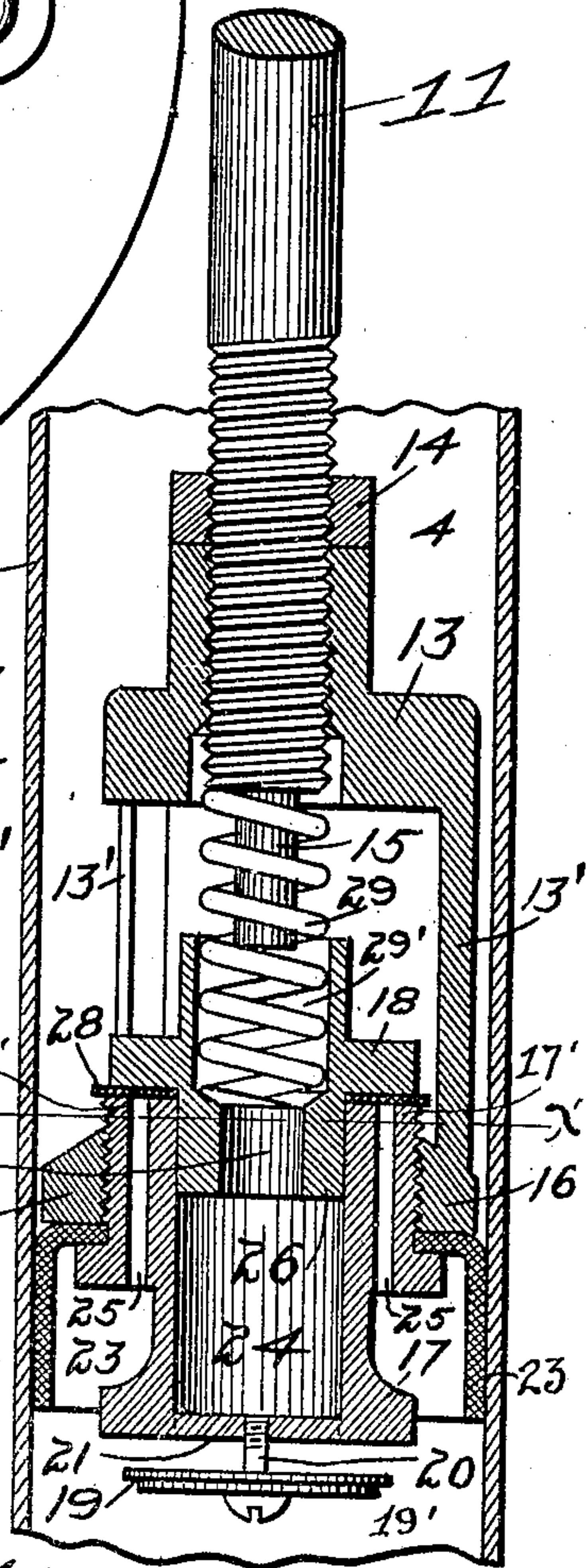


Fig-4.

Fig-5.

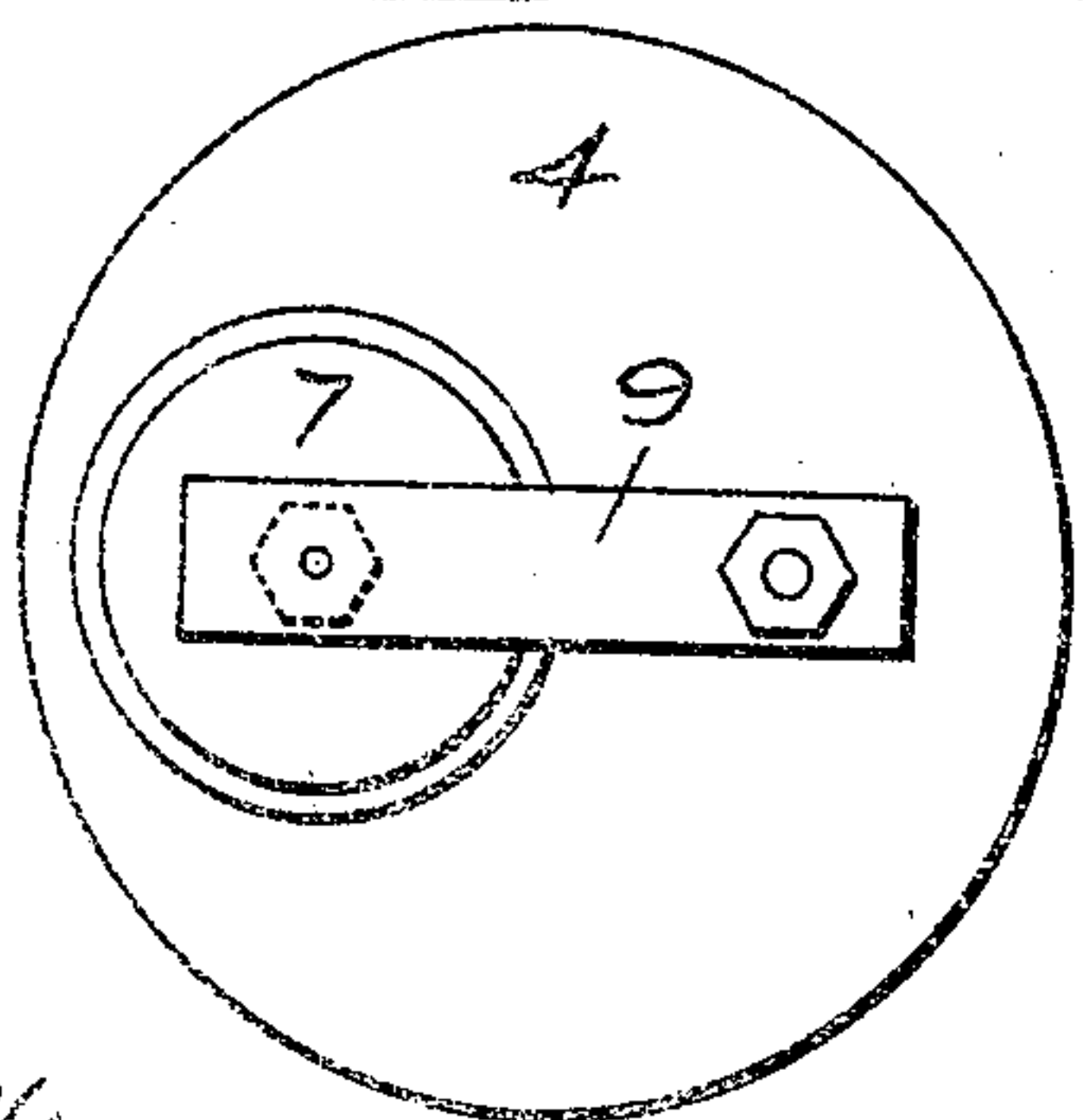


Fig-6.

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UNITED STATES PATENT OFFICE.

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RELIEF-VALVE FOR AUTOMATIC SPRAYING-MACHINES.

No. 832,261.

Specification of Letters Patent.

Patented Oct. 2, 1906.

Application filed February 19, 1906. Serial No. 301,733.

To all whom it may concern:

Be it known that I, CHARLES A. KOEPNICK, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Relief-Valves for Automatic Spraying-Machines; and I do 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, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in relief-valves for automatic spraying-machines.

The object and purpose of the improvements are to provide positive and efficient means for automatically relieving the pressure in the tank after such pressure has reached the desired point, whereby the effectiveness and durability of the machine are preserved. Owing to machines of this character being in the hands of unskilled persons in many instances, it is essential that means be provided for thus relieving the tank of an undue amount of pressure and that these means shall be both simplified and efficient in order that the liability of such means becoming themselves inoperative or defective is reduced to a minimum.

In the present invention relief-valve mechanism answering the above requirements is provided to the fullest extent, and the same will be hereinafter more fully described in connection with the accompanying drawings, which are now referred to.

Figure 1 illustrates a spraying machine or tank having my improvements applied thereto, the upper portion of the same being shown in section and a portion broken out to facilitate illustration. Fig. 2 is a top plan view of a spraying-machine. Fig. 3 is an enlarged sectional view through a portion of the plunger-cylinder and the relief-valve mechanism. Fig. 4 is a sectional view on the line $x-x$ of Fig. 3. Fig. 5 is a sectional view through the lower end of the plunger-cylinder. Fig. 6 is a plan view of the lower end of the plunger-cylinder.

In a detail description of the invention,

similar reference characters indicate corresponding parts.

1 designates a tank of suitable capacity in which the spraying liquid is introduced through inlet 2 and from which it is forced through outlet 3 under pressure to the spraying-nozzle. (Not shown.) Projected centrally into said tank and properly supported in the head thereof is an air-cylinder, said air-cylinder extending into the tank within suitable proximity to the bottom thereof. The top or exposed end of this air-cylinder is fitted with a screw-threaded cap 5, which has a suitable number of apertures 6, through which air is taken to the cylinder until the requisite pressure within the tank is obtained and through which the air is emitted from said cylinder after the requisite pressure has been obtained. The bottom of this air-cylinder is provided with a pressure-valve 7, having a packing-disk 7' and normally closing an opening 8, said valve being thus controlled by an arm or plate 9, which is suitably mounted at one end upon a stud 10 and has sufficient resiliency to permit of the valve unclosing the opening under a sufficient pressure within the cylinder. This pressure of air is produced by mechanism consisting of a plunger 11, which has upon its exposed end a hand-grip 12, by means of which it is operated. The lower end of said plunger is screw-threaded for a suitable length and supports by a screw-threaded attachment a cage 13, said cage being secured by a nut 14 upon the lower end of the plunger and above the cage. The threads upon the lower end of the plunger are of a sufficient length to permit of the necessary adjustments of the cage for purposes hereinafter stated. The extreme lower end of the plunger terminates in a portion 15 of less diameter and devoid of screw-threads. The lower end of the cage 13 terminates in a cylindrical interiorly-screw-threaded portion 16, which is joined to the upper portion of the cage by arms 13'. Screwed into the lower end of said cage is a bushing 17, which provides upper and lower valve-seats, respectively, for a relief-valve 18, and the suction-valve 19, having a packing-disk 19', by which the air is supplied to the tank 1 through the valve 7 in the lower end of the cylinder 4. The suction-valve 19 is united to the lower end of the plug or bushing 17 by means of a

screw 20, which penetrates an opening in a bridge 21, which crosses the opening in the lower end of said bushing or plug and provides openings 22 on either side of said bridge, through which the air escapes or passes into the cylinder 4 when the plunger is moving upwardly.

23 is a packing-cup constructed of leather or other suitable material and united to the plug or bushing 17 by the screw-threaded portion 16 of the cage and serving to provide the proper packing between the parts carried upon the plunger and the cylinder 4. The plug or bushing 17 has a large central bore 24, into the upper portion of which the valve 18 projects and which provides an air-chamber below said valve 18, also an annular extended portion 17', which is provided with a suitable number of air-ports 25, which extend through the entire upper portion of the bushing or plug and in that portion which is screwed to the cage portion 16.

The relief-valve 18 has a portion 26, which projects into the bore 24 of the bushing or plug 17 and communicates with the chamber below through a bore 27 of less diameter than the bore 24. An annularly-extended portion of this relief-valve or bushing 18 projects radially to a sufficient extent to cover the ports 25, which may be termed "relief-ports," and between the said ports 25 and the relief-valve 18 there is interposed a packing ring or gland 28, constructed of leather or other suitable material and serving as a valve with the relief-valve 18 to normally close the ports 25. The relief-valve 18 is maintained seated upon the bushing or plug 17 by means of a spring 29, one end of which is projected into a recess 29' in the top of said relief-valve and the other end of which surrounds the reduced portion 15 of the plunger and engages a shoulder formed by a screw-threaded portion of said plunger. The requisite tension of this spring is obtained by adjusting the screw-threaded connection between the cage 13 and the plunger and applying the lock-nut 14. The tension of this spring should coincide with the limit of air-pressure that is necessary within the tank 1—for example, say, a pressure of fifty pounds to the square inch—and when a greater pressure is obtained by the continued operation of the plunger the effect of this excessive pressure is to elevate the valve 18, and thus permit the air to blow off or escape through the relief-ports 25 and thence upwardly through the openings 6 in the head or cap 5 of the cylinder 4. Of course it will be understood that the pressure within the tank may be regulated in accordance with the size or capacity of the tank and the tension of the spring 29 regulated in accordance with the limit of such pressure.

As the device is shown in Fig. 3 the plunger is ascending or is stationary and the

emission-valve 19 in a position for the air to pass into the cylinder 4. The relief-valve 18 closes the ports 25 and remains in such position until the excessive point of pressure is reached.

Having described my invention, I claim—

1. In a relief-valve for automatic spraying-machines, the combination with a cylinder, a tank within which said cylinder is arranged, of a plunger within said cylinder, a cage adjustably supported upon said plunger, a valve-plug mounted within the lower extremity of said cage, and having an enlarged central bore, and a plurality of outer parallel relief-ports, said central bore having a suction-valve controlling it; a safety-valve projected into the bore of said valve-plug and having a bore communicating with the central bore of said valve-plug, said safety-valve having an annularly and laterally extended portion which controls the relief-ports in said valve-plug, a packing-ring interposed between said annularly and laterally extended portion and said relief-ports, and a spring engaging said relief-valve and interposed therebetween and the lower end of the plunger-rod.

2. In a relief-valve for automatic spraying-machines, the combination with a plunger-rod, of an admission-valve comprising an outer lower valve-plug and an inner upper valve-plug projected into said outer valve-plug and communicating therewith, said outer valve-plug having a suction-disk inclosing its outlet, and a series of parallel relief-ports, the upper valve-plug having an annularly and laterally extended portion which controls the outlet through said relief-ports, and a spring interposed between said upper valve-plug and the plunger-rod for regulating the normal contact between the upper and lower valve-plugs.

3. In a valve mechanism for automatic spraying-machines, the combination with a plunger-rod, of a cage having an adjustable connection therewith, a lower valve-plug connected to the lower extremity of said cage, a packing-gland secured between the lower extremity of said cage, and an annularly-projected portion of said lower valve-plug, a suction-disk secured to the lower extremity of said lower valve-plug and controlling the outlet thereof, said lower valve-plug having an annular offset extending from the central portion of said plug and terminating at the upper extremity of the plug and in which there are arranged a series of relief-ports, an upper valve-plug seated upon and projected within the upper end of said lower valve-plug and having a central communication therewith, said upper valve-plug having an annularly and laterally extended portion which normally covers said relief-ports, a suitable packing-gland interposed between the outlet ends of said relief-ports and the

said annularly and laterally extended portion of said upper valve-plug, said upper valve-plug having an upwardly-extended portion communicating with the bore or passage therein, a coil tension-spring seated in said upwardly-extended portion and having its upper end in contact with the plunger-rod, whereby the tension of said spring may be varied to regulate the desired contact between the upper and lower valve-plugs.

4. In a relief-valve for automatic spraying-machines, a plunger-rod having its lower end screw-threaded a portion of its length, and terminating in a smooth extended portion of less diameter, a cage having a connection with said screw-threaded portion, an outer valve-plug connected to the lower end of said cage, said outer valve-plug having a central bore extending throughout its length, and a series of outer parallel relief-ports extending approximately one-half the length of said outer valve-plug, and terminating at the upper end of said valve-plug, a bridge-piece spanning the lower terminal of said central bore, a suction-disk loosely united to said bridge-piece, an inner valve-plug projected

into the upper end of the central bore of said outer valve-plug, the portion of said inner valve-plug so projected having a bore of less diameter which communicates with the central bore of the outer valve-plug, a laterally-extended portion on said inner valve-plug which closes the relief-ports of the outer valve-plug, a packing-gland interposed between said relief-ports and said laterally-extended portion, whereby said relief-ports are closed during the normal operations of the plunger, and a regulating-spring inclosed between said inner valve-plug and the plunger-rod, by means of which the tension upon said inner valve-plug to maintain it in proper contact with the outer valve-plug during the normal operations of the machine, is obtained in accordance with the desired maximum pressure within the tank.

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

CHARLES A. KOEPNICK.

Witnesses:

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MATTHEW SIEBLER.