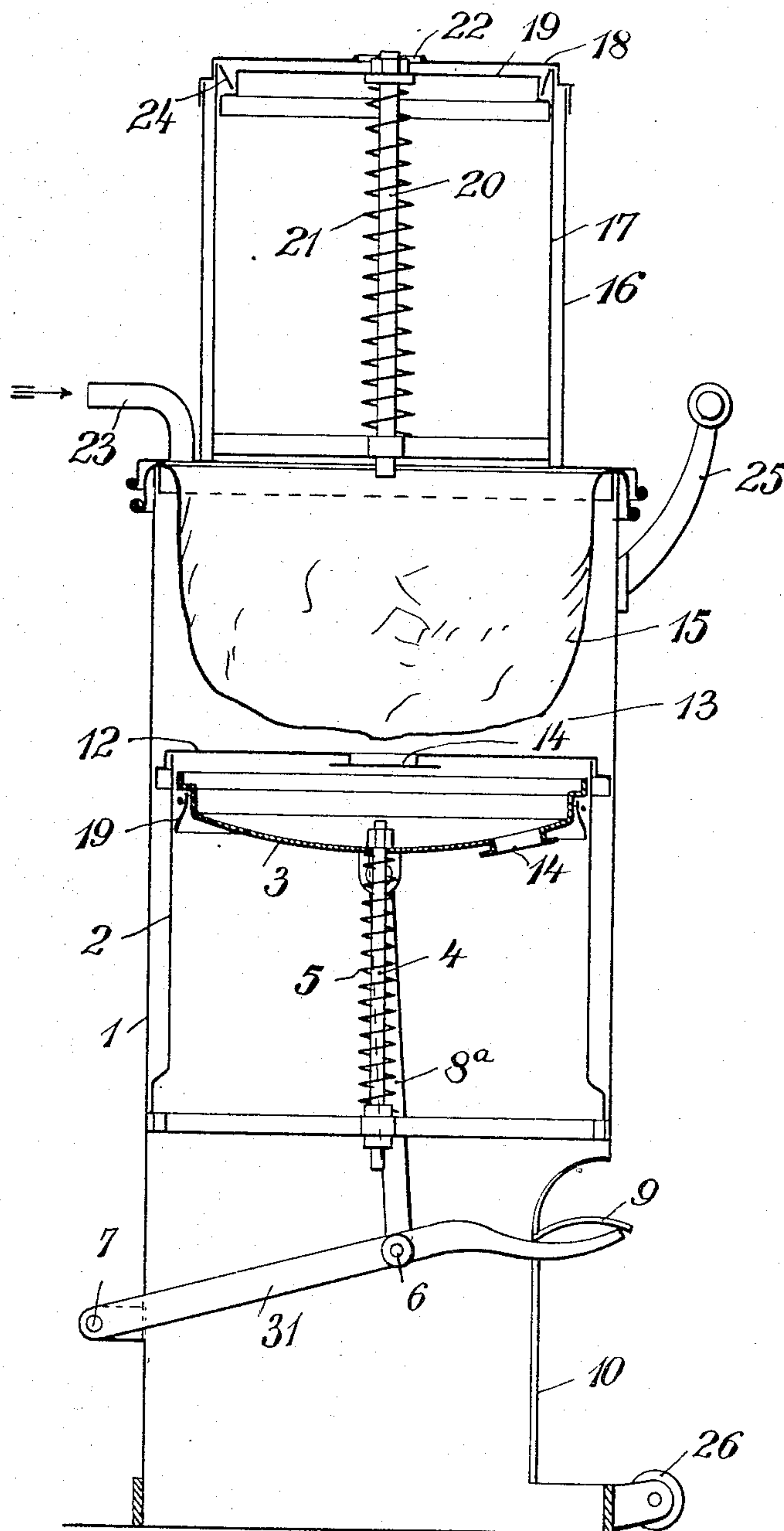


M. LEBENBERG.
 SUCTION APPARATUS.
 APPLICATION FILED FEB. 13, 1908.

943,426.

Patented Dec. 14, 1909.
 3 SHEETS—SHEET 1.

Fig. 1.



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Fig. 2.

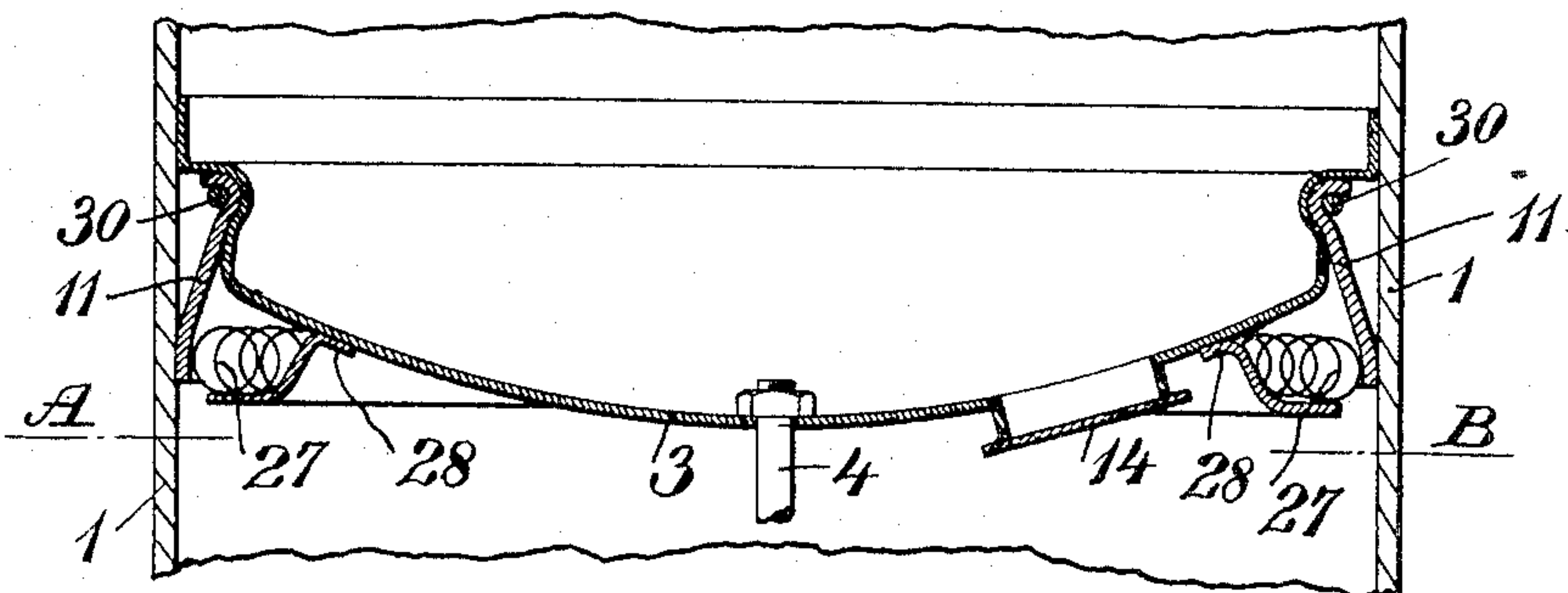


Fig. 3.

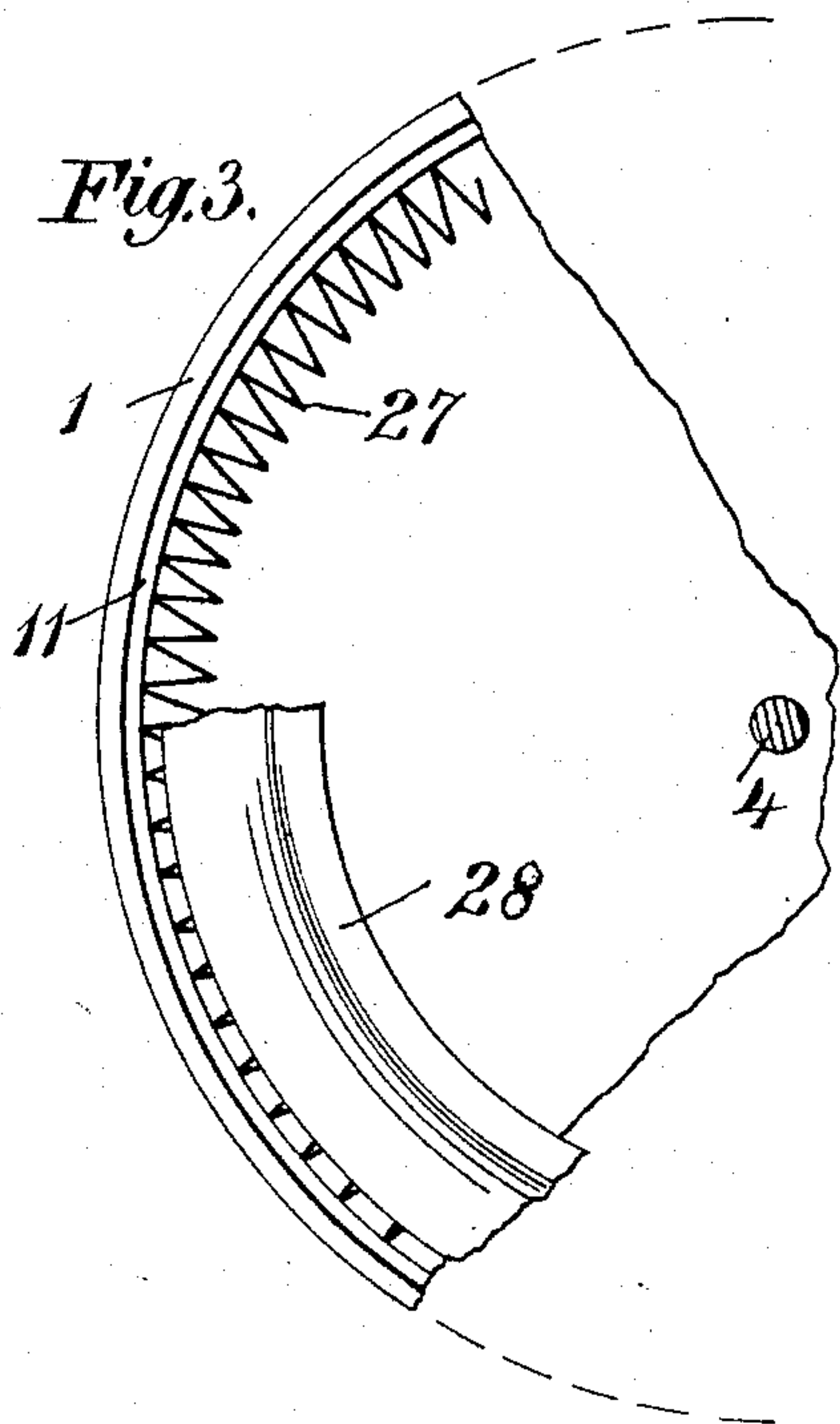
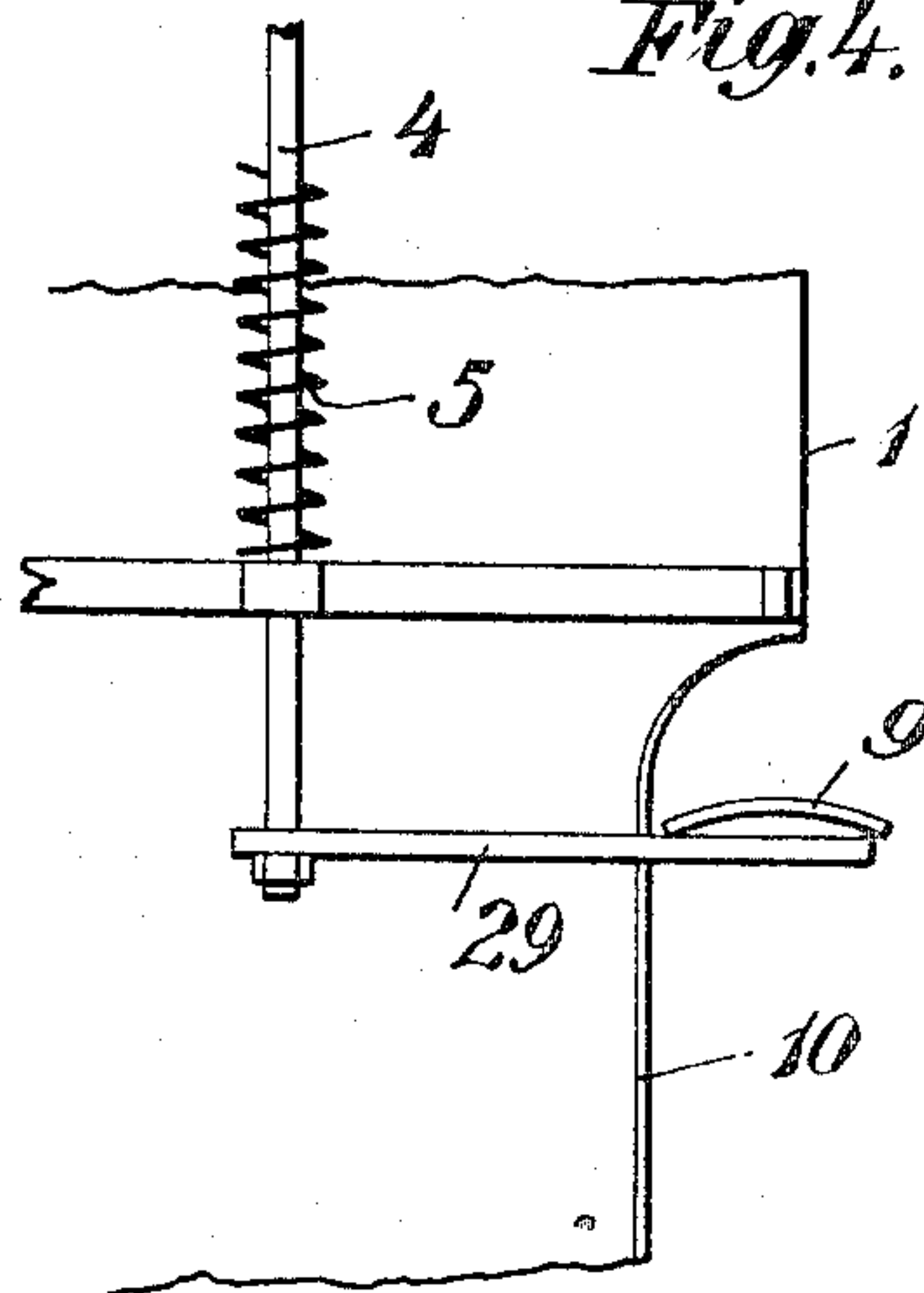


Fig. 4.



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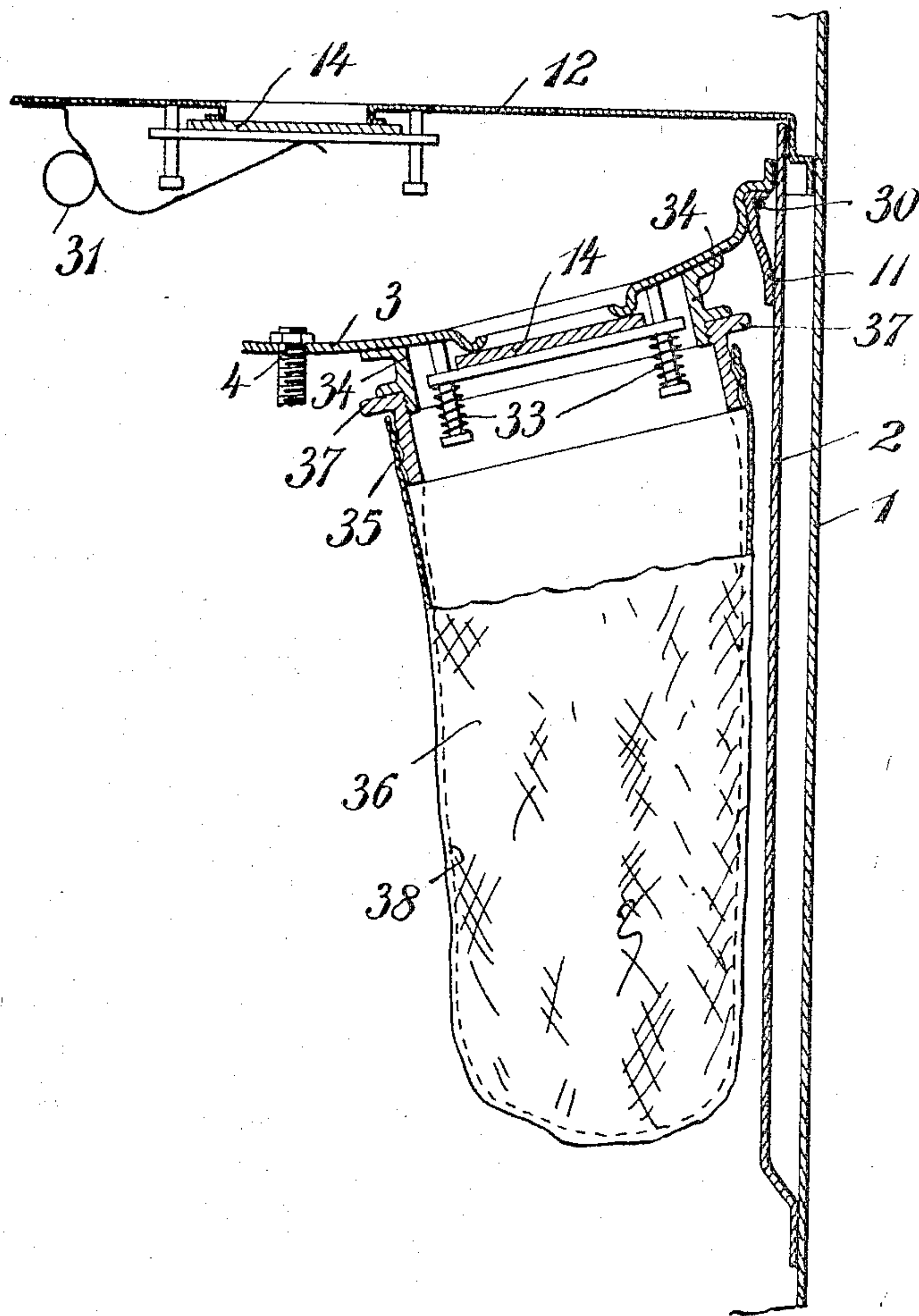
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Fig. 5.



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UNITED STATES PATENT OFFICE.

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SUCTION APPARATUS.

943,426.

Specification of Letters Patent.

Patented Dec. 14, 1909.

Application filed February 13, 1908. Serial No. 415,705.

To all whom it may concern:

Be it known that I, MAX LEBENBERG, subject of the King of Prussia, residing at Alte Schönhauserstrasse 23, Berlin, in Germany, have invented new and useful Improvements in Suction Apparatus, of which the following is a specification.

This invention relates to a suction apparatus which produces an uninterrupted or continuous suction action by allowing the suction force or action caused by the displacement of a piston to act on the one hand at the suctional mouthpiece, and on the other hand to move an auxiliary piston, arranged in a cylinder connected with the suction conduit or tube against the force of a spring, in such a manner that as soon as the suction action of the main piston ceases the auxiliary piston is moved back into its initial position by the spring, thus causing on its own part a suction force or action making itself felt in the suction conduit or tube.

The suction apparatus forming the subject matter of this invention is chiefly meant for operating on a small scale and its construction is consequently simple. Ordinary leather collars or packings are used for the pistons, which, specially in warm and dry rooms easily become loose and thus no longer tight. In order to prevent this a helical spring in the form of a closed circle is arranged between the piston and the lower end of the leather collar or packing, which spring has the tendency to expand outwardly all around, thus tightly and securely pressing the leather collar under all circumstances against the sides of the cylinder. The main piston is suitably actuated by means of a pedal lever. If the same projects a certain distance out of the casing as is the case in the old apparatus of this type, then the apparatus is liable to tilt during treading owing to the great length of the lever. In order to prevent this disadvantage the pedal lever is arranged according to the present invention in such a manner that the same reaches into the interior of the apparatus and is arranged as nearly as possible in the plane containing the center of gravity of the apparatus.

In the accompanying drawings. Figure 1 is a vertical section through one form of the apparatus. Fig. 2 is a section through

the packing for the piston on a larger scale. Fig. 3 is a partial section on the line A—B of Fig. 2. Fig. 4 is a modification of the treading device partially in section, and Fig. 5 is a modification of the suction piston in section.

The main casing 1 may be cylindrical, and in its upper end is a suction chamber 13. The cylinder 2 is arranged in the casing 1 and the main piston 3 may be moved up and down in the cylinder to create a partial vacuum in the suction chamber. The piston is connected with a rod 4 centrally guided through a cross-piece, which rod is under the action of a helical spring 5 which tends to maintain the piston in its raised position. The lever 31 provided with a treadle 9 and moving on the pivot 7 is connected with the piston through the intermediary of a joint or pivot 6 and the pivoted rod 8^a. The pedal lever can move up and down in a slot 10 provided in the lower portion of the casing of the apparatus, the treadle being arranged as close as possible to the plane containing the center of gravity of the apparatus, so as to prevent a tilting of the light casing of the apparatus while the treadle is being actuated.

The main piston 3 is provided with a leather collar or packing 11 and two valves 14, one of which is arranged in the cylinder lid 12. In the suction chamber 13 above the cylinder, a filter or screen 15 is suspended in which the dust, introduced into the apparatus through the suction conduit or tube and provided as usual with a suctional mouthpiece, may collect. A cylinder 17 inclosed by a shell 16 is arranged above the bag, in which cylinder a piston having a leather collar or packing 24 is adapted to move up and down.

The cylinder 16 is provided with a lid 18 having an air opening 22. A piston rod 20 being guided in a straight line through a cross piece of the cylinder is arranged on the piston 19, which piston rod is surrounded by a helical spring 21. The space in the cylinder 17 below piston 19 forms a relief chamber for the suction chamber as hereinafter explained.

If the pedal lever 8 is moved in the downward direction and pulls after it the main piston 3 through the intermediary of the

pivoted rod 8^a, then a suction action or effect makes itself felt in the chamber 13 as well as within the bag 15 and the suction conduit or tube 23, so that the dust is conveyed
 5 through the latter into the bag. Simultaneously a partial thinning of the air takes place beneath the piston 19, owing to which the piston 19 moves downward against the force of the spring 21. As soon as the main
 10 piston 3 begins to rise again then the suction effect ceases beneath the auxiliary piston 19 so that the latter may yield to the action of its spring 21 and move upward. Owing to this a renewed suction force or effect is pro-
 15 duced in the bag 15 and in the suction conduit or tube 23, so that both on the downward movement as well as on the upward movement of the pedal lever 8, a suction effort makes itself felt in the suction conduit
 20 or tube 23. The spring 21 is tensioned accordingly and the piston 19 moves up and down only within narrow limits while the apparatus is being worked.

The chamber above the main piston 3 is
 25 in communication with a tube 23, leading to the suction mouth-piece, which is attached in the common way at the end of a hose pipe. If the piston 3 is moved to the lower end by means of the treadle 9 then the chamber
 30 above the piston 3 will be enlarged, so that a partial vacuum and a suction action in the tube 23 is produced. The sack 15 does not hinder this action and is only provided for receiving the dust, which is sucked through
 35 the tube 23.

The apparatus is provided at its front side with a stirrup shaped handle 25 and two rollers generally not in contact with the ground or floor. If the operator takes hold
 40 of the handle 25 and tilts the apparatus a little toward himself so that the rollers 26 come into contact with the ground or floor, then these rollers form supports for the apparatus and the latter may thus be easily
 45 moved, while in its upright position it stands firmly and securely.

The method by which the leather collars for the main and auxiliary pistons are tightened is specially shown in Figs. 2 and
 50 3. The collars are connected with the sheet metal piston by means of a wire 30 and are under the action of the helical spring 27 which is embedded by means of a ring 28 between the body of the piston and the
 55 lower end of the leather collar. The free ends of the helical spring 27 are connected with each other in such a manner that the spring forms a closed circle which has a greater diameter in its natural position than
 60 is possible for the same to assume in its embedded position. For this reason the spring presses the free end of the leather collar tightly against the sides of the cylinder. Should therefore the leather get dry
 65 or shrink owing to the apparatus standing

in dry rooms or the like, then the helical spring nevertheless insures a completely secure, reliable and tight packing.

Fig. 4 shows an actuating device for the main piston in which a pedal lever 29 is
 70 directly attached to the piston rod, so that the part of the treadle where it is operated is situated as nearly as possible in the plane containing the center of gravity of the ap-
 75 paratus. The treadle 9 is in any case, arranged in such a manner that the center of gravity of the same lies within the supporting points of the apparatus. A tilting of the latter cannot therefore take place.

In the modification shown in Fig. 5 the
 80 part 3 of the main piston is provided with a collar 34 having a thread at its end, on to which thread a sleeve or ring 35 is screwed. A screen 36 consisting of fabric, is attached to this sleeve 35. In order to prevent a
 85 swinging to and fro of this screen during the upward and downward movements of the piston the same may be made stiff by means of a support consisting of wire gauze. If the upper valve 14 opens during the
 90 working of the piston overcoming the force of the spring 31, and if the lower valve 14 opens overcoming the force of the spring 33, then the dust carried along from the uppermost screen 15 is caught in the auxil-
 95 iary screen 36 so that the parts of the apparatus do not get dirty. In order to conveniently unscrew the sleeve 35 together with the auxiliary screen, the former is provided with a milled edge 37.
 100

All the parts are easily accessible and can also be cleaned conveniently.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be per-
 105 formed, I declare that what I claim is:—

1. In combination, a casing having a suction-chamber, a main piston in said casing, and means for operating said piston, a relief-chamber connected with the suction
 110 chamber, and a spring-controlled piston in said relief chamber.

2. In combination, a casing having a suction chamber a main piston in the said casing, and means for operating said piston, a
 115 relief-chamber connected with the suction chamber, and a spring controlled piston in said relief chamber.

3. In suction apparatus, the combination of a casing, a suction-chamber therein, a
 120 main piston in one end of said chamber, means for reciprocating said piston, a relief-chamber communicating with the suction chamber, a piston in said relief-chamber adapted to be operated inwardly by the suc-
 125 tion in the suction-chamber, and means for returning said relief-piston to normal position.

4. In suction apparatus, the combination of a casing, a suction chamber therein, a
 130

main piston in one end of said chamber provided with a valve, means for reciprocating said piston, a relief chamber communicating with the suction-chamber, a piston in said
5 chamber adapted to be operated inwardly by the suction in the suction-chamber, and means for returning said relief piston to normal position.

In testimony whereof I have signed my name to this specification in the presence of 10 two subscribing witnesses.

MAX LEBENBERG.

Witnesses:

M. LILIENTELD,
EMIL PAPENBRUCH.