

No. 713,691.

Patented Nov. 18, 1902.

C. P. E. SCHNEIDER & J. B. G. A. CANET.

RECOIL APPARATUS FOR GUNS.

(Application filed Apr. 17, 1901.)

(No Model.)

3 Sheets—Sheet 1.

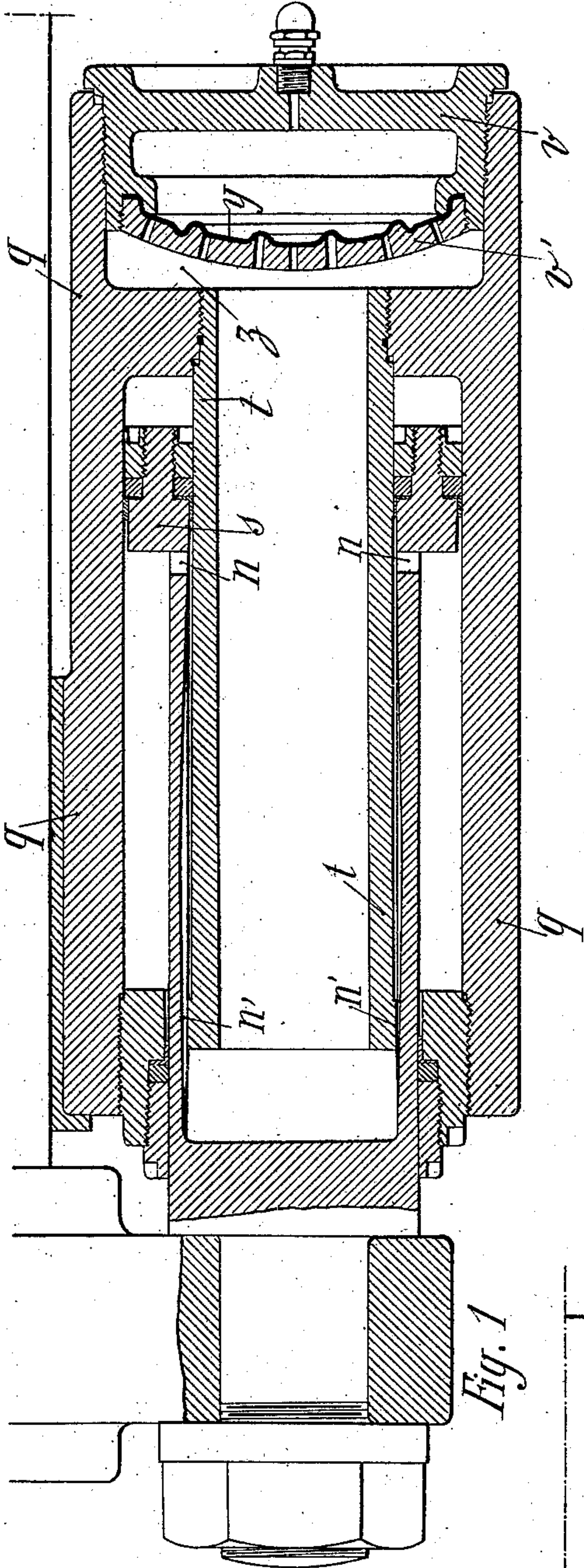
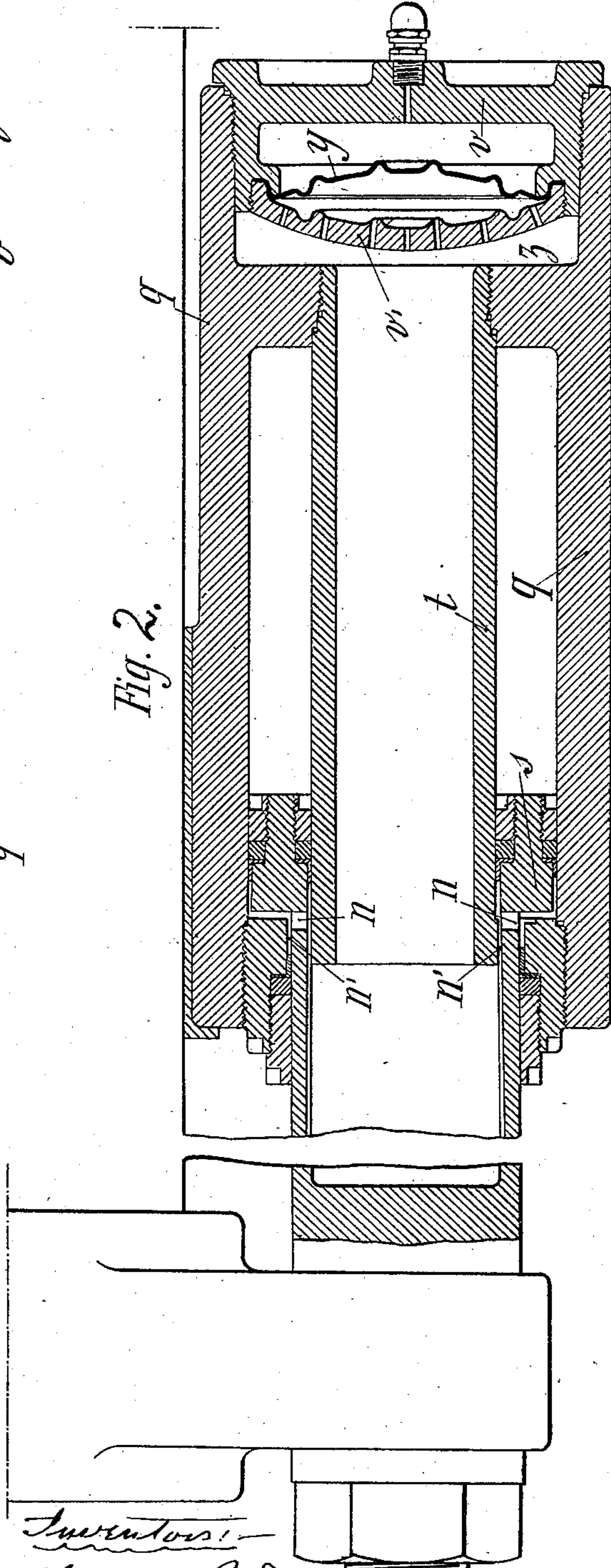


Fig. 1

Fig. 2.



Witnesses  
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3 Sheets—Sheet 2.

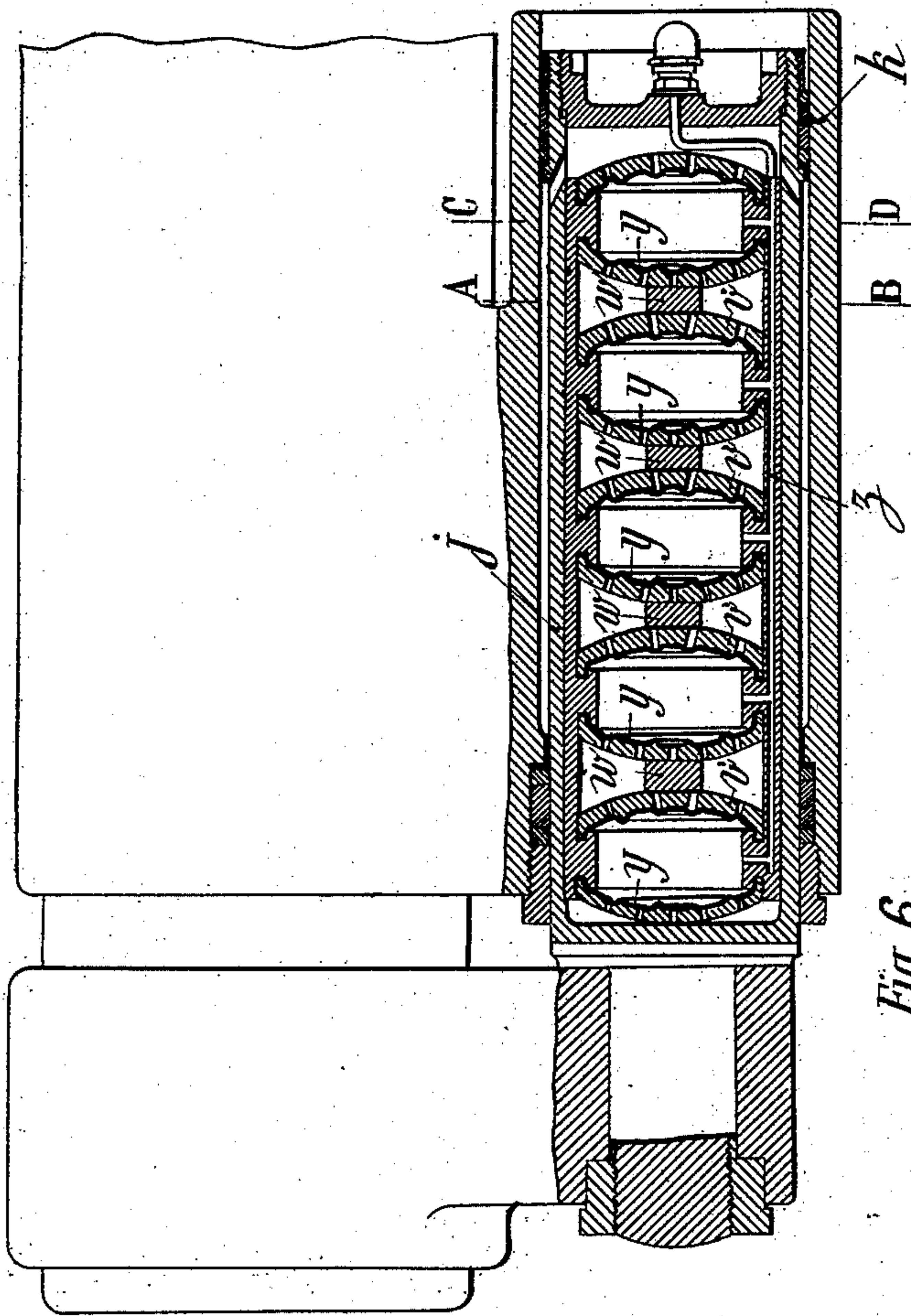


Fig. 3.

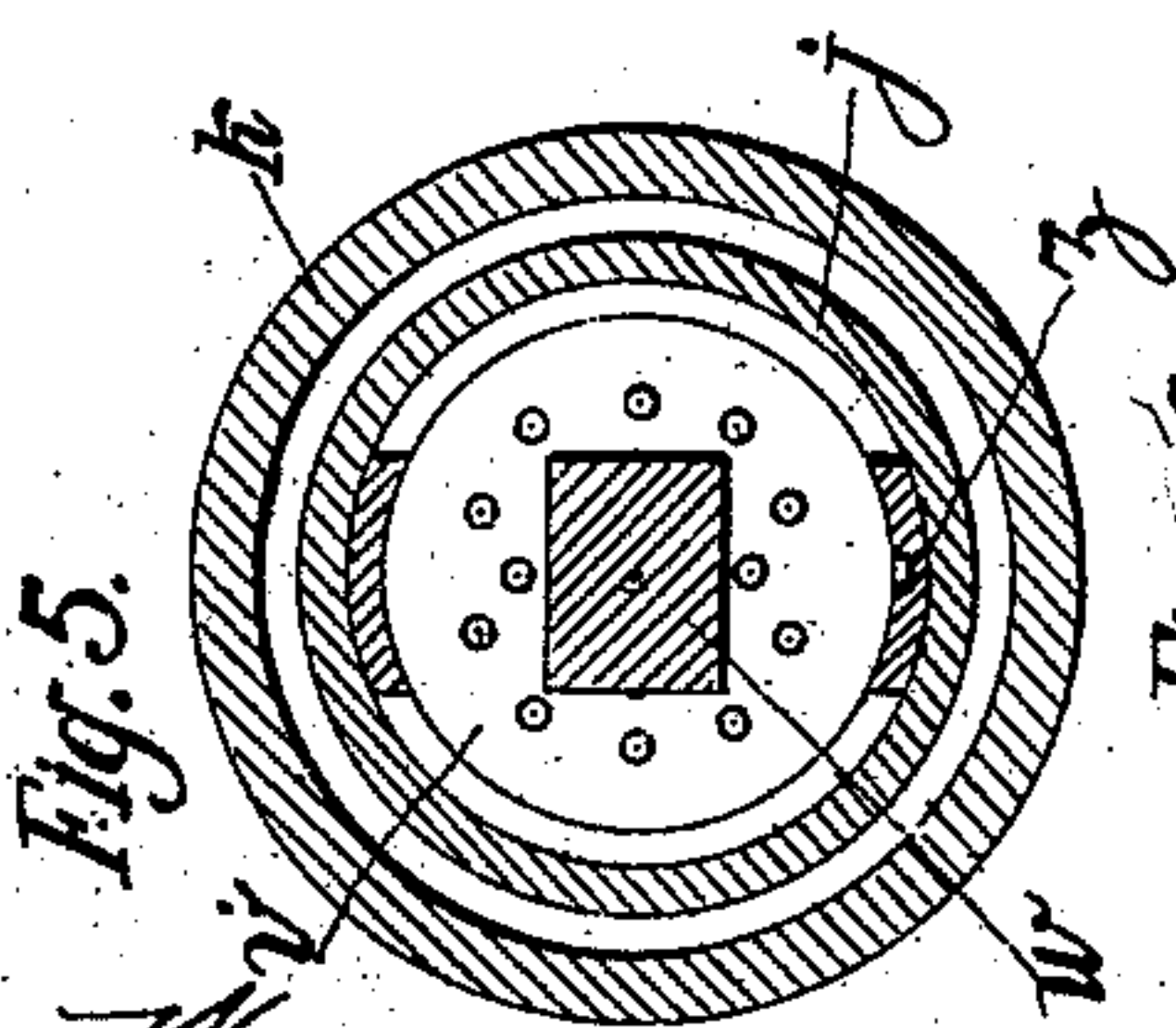


Fig. 5.

Fig. 4.

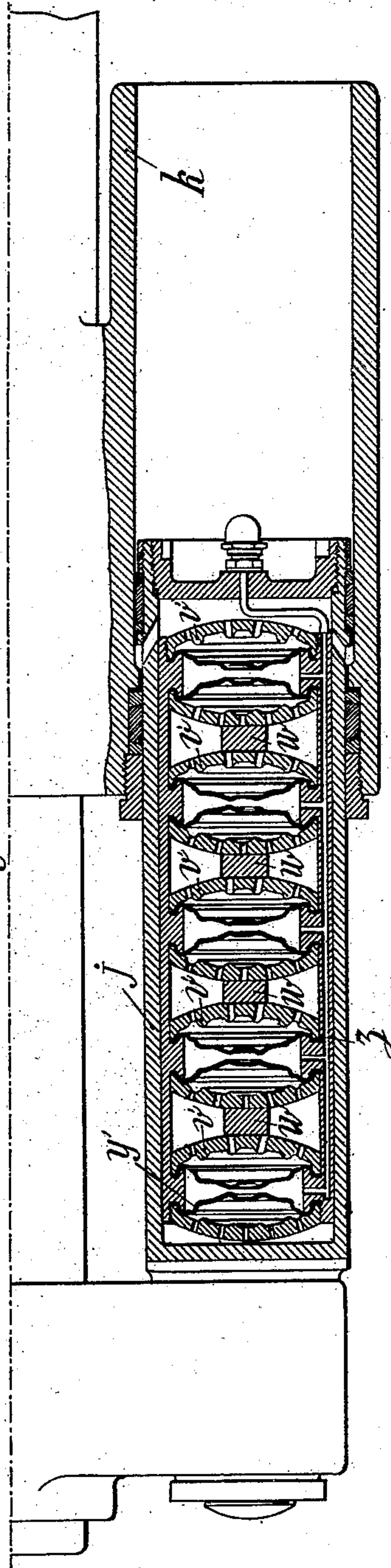
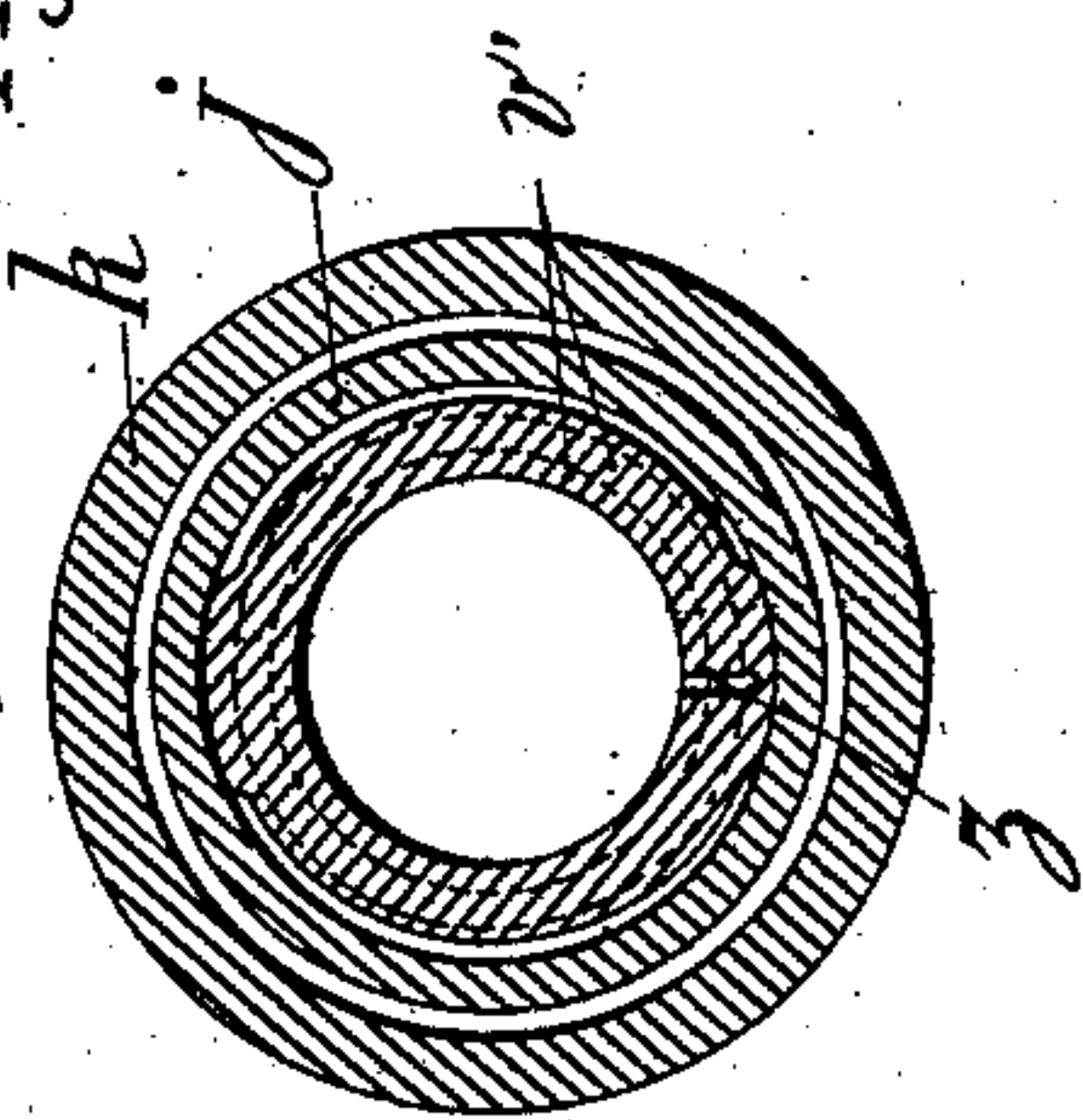


Fig. 6.

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3 Sheets—Sheet 3.

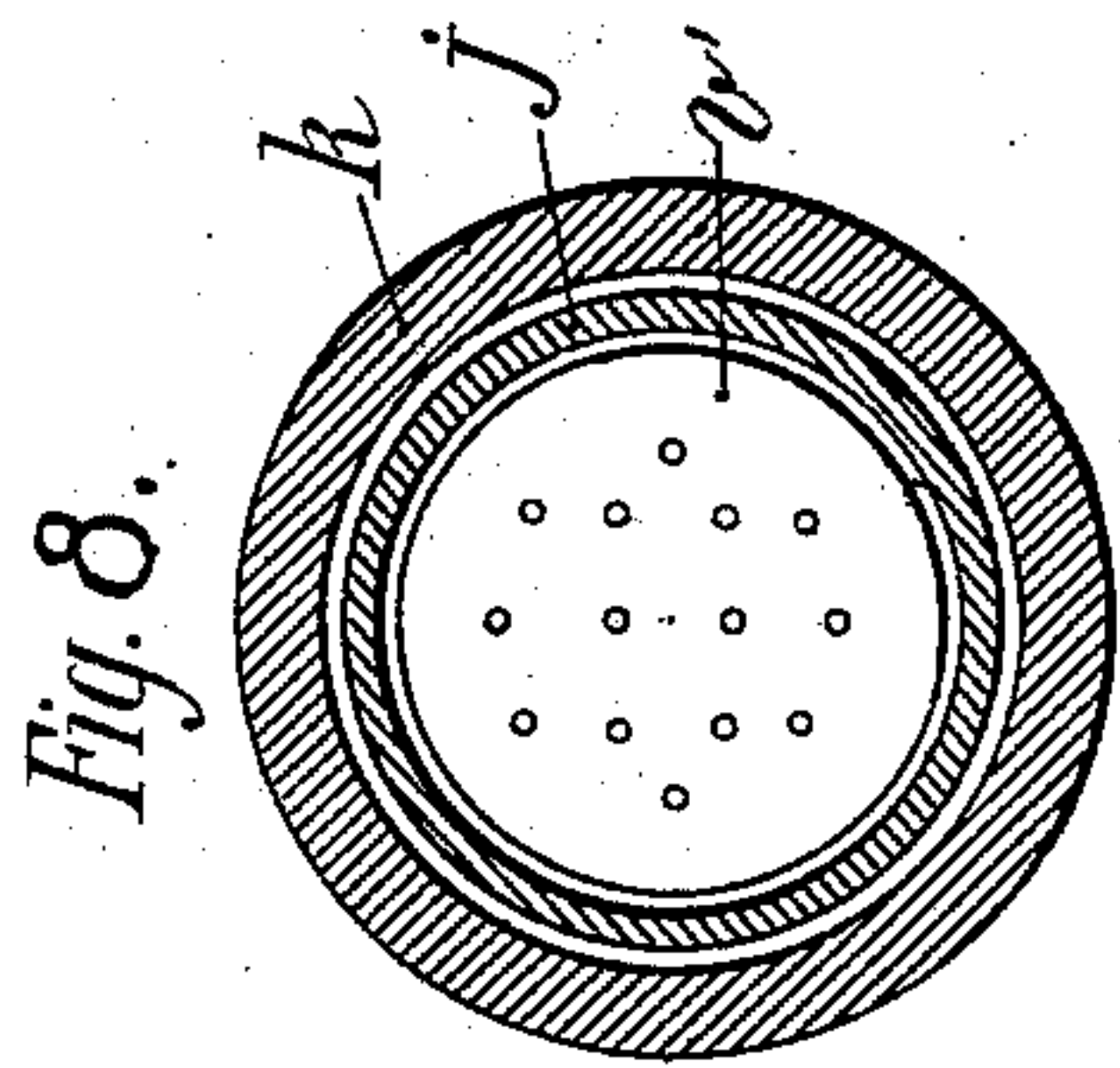
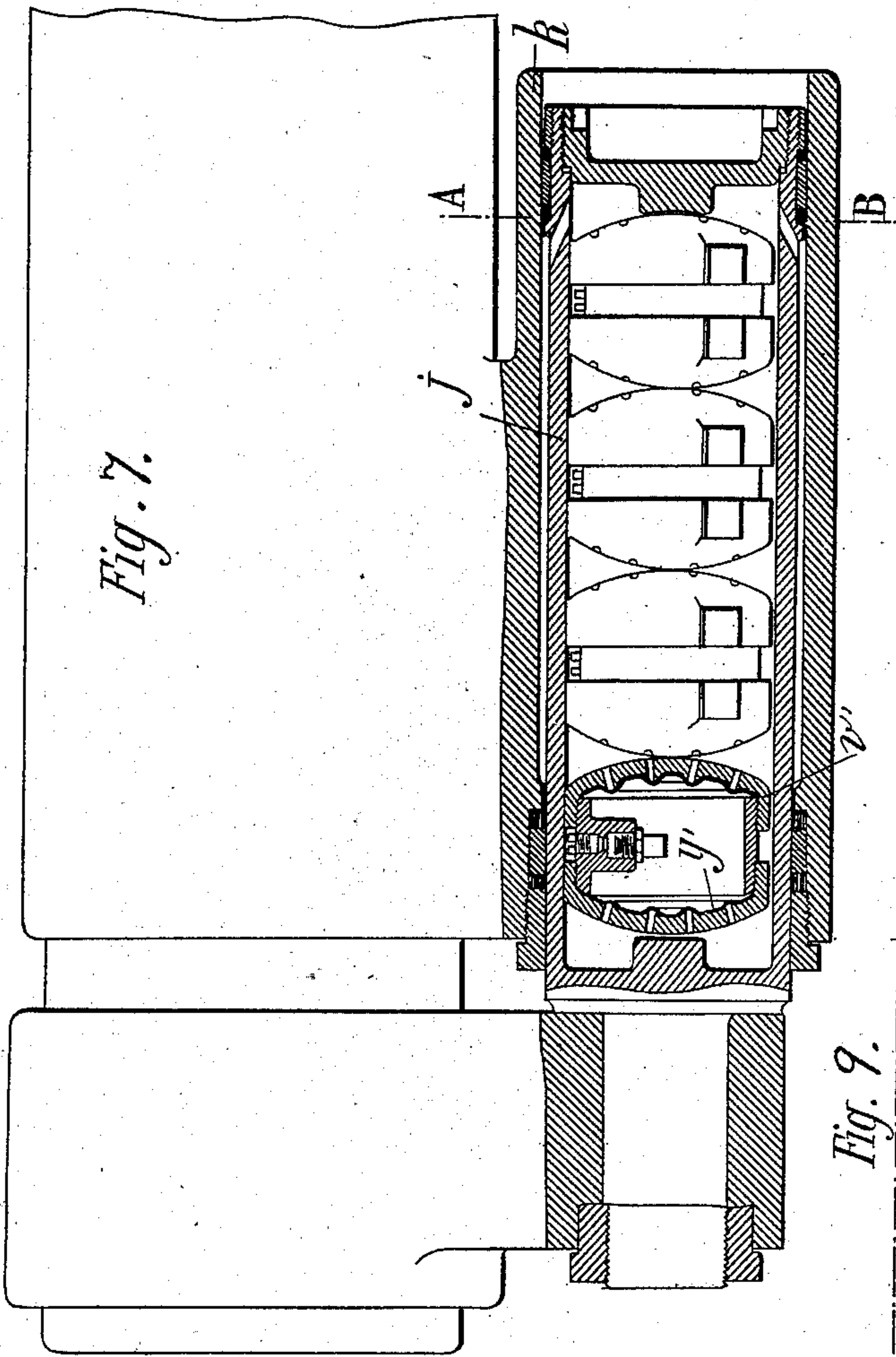
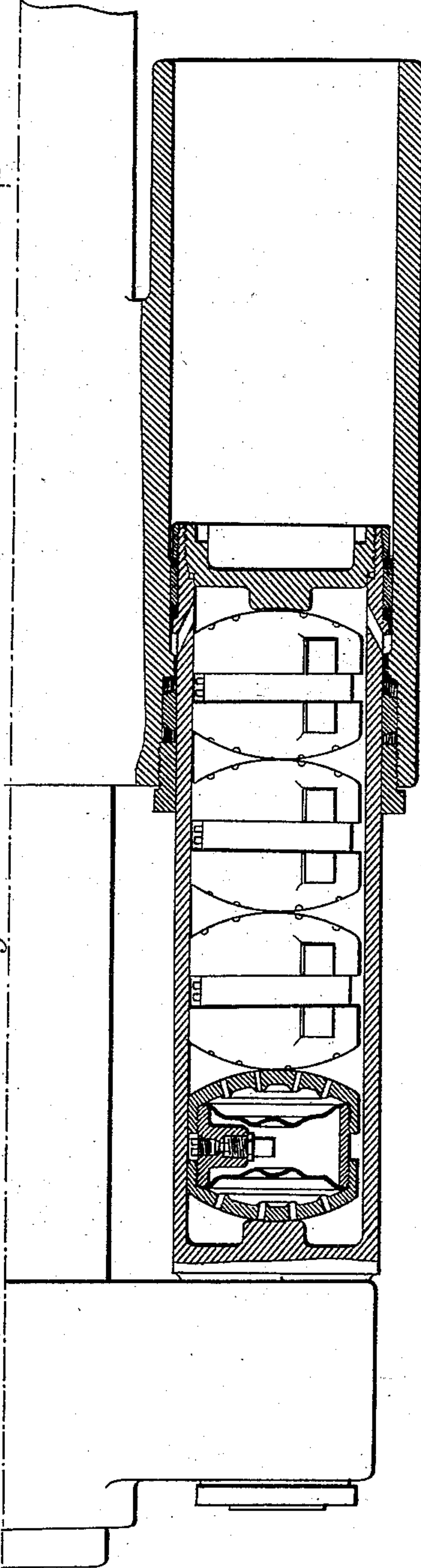


Fig. 9.



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# UNITED STATES PATENT OFFICE.

CHARLES PROSPER EUGENE SCHNEIDER AND JEAN BAPTISTE GUSTAVE  
ADOLPHE CANET, OF LE CREUSOT, FRANCE.

## RECOIL APPARATUS FOR GUNS.

SPECIFICATION forming part of Letters Patent No. 713,691, dated November 18, 1902.

Application filed April 17, 1901. Serial No. 56,307. (No model.)

*To all whom it may concern:*

Be it known that we, CHARLES PROSPER EUGENE SCHNEIDER, ironmaster, and JEAN BAPTISTE GUSTAVE ADOLPHE CANET, engineer, residing at Le Creusot, Saône-et-Loire, France, have invented certain new and useful Improvements in and Relating to Recoil Apparatus for Guns, of which the following is a full, clear, and exact specification.

10 This invention relates to recoil apparatus for guns, said apparatus according to this invention being characterized by one or more chambers or hermetic envelops containing a suitable elastic fluid or gas under pressure.  
15 The elastic fluid under pressure, separated from the liquid of the recoil apparatus by an elastic partition, is during the recoil of the gun subjected to a pressure greater than its initial tension or pressure by the liquid  
20 which is acted upon by a compression or liquid-expelling piston in connection with the gun, the compression of the elastic fluid being effected by the deformation of the elastic partition. At the termination of the recoil  
25 the compressed elastic fluid reacts upon the said liquid and piston for returning the gun to battery.

Our invention is particularly characterized by the use of one or more elastic envelops in the form of a concavo-convex disk or disks.  
30 These disks are made with circular corrugations acting to facilitate their deformation, which is limited by rigid diaphragms perforated for the passage of liquid therethrough, this disposition obviating any kind of packing, whether of leather, india-rubber, or hemp, and the like, between the two bodies. The various parts of the reservoir or receptacle for containing the elastic-fluid envelop are  
35 brazed together, and the only joints that exist in the apparatus are those which separate the liquid from the atmosphere.

In order that our said invention may be fully understood and readily carried into  
45 practice, we will proceed to describe the same more fully with reference to the accompanying drawings.

Figures 1 and 2 are longitudinal sections through recoil apparatus embodying our invention, Fig. 1 showing the parts in position  
50 before, and Fig. 2 after, recoil of the gun.

Figs. 3 and 6 are similar views of another embodiment of our invention. Figs. 4 and 5 are transverse sections on lines C D and A B, respectively, of Fig. 3. Figs. 7 and 9 are  
55 views similar to Figs. 1 and 2 of still another embodiment of our invention, and Fig. 8 is a transverse section on line A B of Fig. 7.

In the arrangement shown in Figs. 1 and 2 the same cylinder contains the hydraulic  
60 brake, the compressor, and the reservoir of elastic fluid under pressure within its elastic envelop.

Within the cylinder *q*, which is connected with a fixed part of the gun-mounting, is a  
65 hollow piston *s*, that is fixed to the gun by means of a bracket and moves therewith. Within the piston *s* is a hollow rod *t*, fixed to the cylinder *q*. At the forward part of the cylinder *q* there is a compression-chamber  
70 *z*, which contains the elastic-fluid reservoir, formed of a cylinder *v*, which carries at one end a charging-nozzle and which is closed at the other end by a disk or cap *y*, of elastic material, such as steel, copper, india-rubber,  
75 or other appropriate substance. During the recoil the liquid contained in the annular space between the piston *s* and the cylinder *q* is forced into the interior of the piston by passing through orifices *n* of uniform section  
80 and through orifices *n'* of varying section. As the volume of the rod *t* is less than the volume of the liquid expelled on the recoil, the part of the liquid which can find no room in the interior of the cylinder *q* is driven  
85 into the compression-chamber situated at the front of the cylinder. The disk or cap *y*, which occupies when the gun is in battery the position indicated in Fig. 1, becomes deflected or deformed by the expelled liquid,  
90 and at the completion of the recoil it occupies the position shown at Fig. 2. This disk or cap is formed with circular corrugations designed to facilitate its deflection or deformation. A rigid plate or plug *v'*, formed  
95 with holes for the passage of the liquid supports the elastic disk or cap and permits of charging the elastic-fluid reservoir when it is dismounted. The plate *v'* is screw-threaded at its periphery into the rigid non-flexible  
100 part *v* and bears upon the edge of the disk *y*, thereby securely but removably holding said



disk in place. At the completion of the recoil the elastic fluid under pressure reacts upon the elastic disk or cap  $y$ , and thus drives the liquid into the piston and returns the gun to battery.

Referring to Figs. 3 and 6, the elastic-fluid reservoir is composed of a series of double convex chambers or compartments, each of which is provided with a double elastic backing, formed of curved disks or caps  $y'$ , similar to the aforesaid disk or cap  $y$ , (shown in Figs. 1 and 2,) but smaller in size. The external deformation of the elastic disks or caps is limited in the manner previously described by rigid back plates  $v'$ , formed with holes for the passage of the liquid and maintained in position by blocks or keys  $w$ . All the double convex chambers communicate with each other by a pipe  $z$ , extending to a charging-nozzle provided on the exterior of the piston  $j$ . This arrangement permits the reservoir to be charged with elastic fluid without having to dismount the said chambers. During the recoil the liquid expelled from the cylinder  $k$  by the piston  $j$  enters the interior of the latter and compresses the elastic fluid inclosed in the double convex chambers  $v'$  by deforming the disks or caps  $y$ , which thereupon assume the position indicated. At the completion of the recoil the compressed elastic fluid reacts upon the said elastic disks or caps, which thereby drive the said liquid into the cylinder  $k$  and return the gun to battery.

The modified arrangement of Figs. 7, 8, and 9 differs from the last preceding arrangement in that the double convex chambers are not connected with each other by a pipe, and each chamber is fitted with a charging-nozzle. The introduction of the elastic liquid under pressure into the said chambers will therefore require to be effected after they have been dismounted. The operation of the parts during the recoil and the return to battery of the gun is the same as in the last-described arrangement.

What we claim in connection with recoil apparatus for guns is—

1. In a recoil apparatus for guns, a cylinder, a piston in said cylinder acting to compress a fluid upon recoil of the gun, and a closed chamber containing fluid under pressure formed in part by a rigid wall and in part by a flexible disk or cap exposed to the fluid which is adapted to be compressed by the piston said disk being free at its middle part to move with variations in the pressure of said fluid.

2. In a recoil apparatus for guns, a cylinder, a piston in said cylinder acting to compress a fluid upon recoil of the gun, a closed chamber containing fluid under pressure formed in part by a flexible disk or cap exposed to the fluid which is adapted to be compressed by the piston said disk being free at its middle part to move with variations in the pressure of said fluid, and means

removably securing said disk in place about its edge.

3. In a recoil apparatus for guns, a cylinder, a piston in said cylinder acting to compress a fluid upon recoil of the gun, a closed chamber containing fluid under pressure formed in part by a rigid wall and in part by a flexible disk or cap exposed to the fluid which is adapted to be compressed by the piston said disk being free at its middle part to move with variations in the pressure of said fluid, and a stop limiting the movement of the disk due to the outward pressure of the fluid in the closed chamber.

4. In a recoil apparatus for guns, a cylinder, a piston in said cylinder acting to compress a fluid upon recoil of the gun, a closed chamber containing fluid under pressure formed in part by a flexible disk or cap, and a perforated rigid plate through which said elastic disk or cap is exposed to the fluid which is adapted to be compressed by the piston said plate acting as a stop to limit the movement of the disk due to the outward pressure of the fluid in the closed chamber.

5. In a recoil apparatus for guns, a cylinder, a piston in said cylinder acting to compress a fluid upon recoil of the gun, a closed chamber containing fluid under pressure formed in part by a rigid wall and in part by a flexible disk or cap free at its middle part to move with variations in the pressure of the fluid adapted to be compressed by the piston, and a perforated rigid plate through which said elastic disk or cap is exposed to said fluid said plate acting as a stop to limit the movement of the disk due to the outward pressure of the fluid in the chamber and to secure the flexible disk about its edge.

6. In a recoil apparatus for guns, a cylinder, a piston in said cylinder acting to compress a fluid upon recoil of the gun, a closed chamber removably associated with the piston and cylinder containing fluid under pressure formed in part by a flexible disk or cap exposed to the fluid adapted to be compressed by the piston, and an inlet-passage leading from the chamber to the outside of the apparatus through which the chamber may be charged with fluid before or after it is mounted in place.

7. In a recoil apparatus for guns, a cylinder, a piston in said cylinder acting to compress a fluid upon recoil of the gun, a closed chamber removably associated with the piston and cylinder containing fluid under pressure and formed in part by a flexible disk or cap exposed to the fluid adapted to be compressed by the piston, an inlet-passage leading from the chamber to the outside of the apparatus through which the chamber may be charged with fluid before or after it is mounted in place, and a perforated plate attached to the removable chamber limiting the outward movement of the disk due to the outward pressure of the fluid in the chamber.

8. In a recoil apparatus for guns, a cylin-



der, a piston in said cylinder acting to compress a fluid upon recoil of the gun, and a closed chamber containing a fluid under pressure formed in part by a corrugated flexible disk or cap exposed to the fluid in the cylinder.

9. In a recoil apparatus for guns, a cylinder, a piston in said cylinder acting to compress a fluid upon recoil of the gun, and a closed chamber containing a fluid under pressure formed in part by a concentrically-corrugated flexible disk or cap exposed to the fluid in the cylinder.

10. In a recoil apparatus for guns, a cylinder, a piston in said cylinder acting to compress a fluid upon recoil of the gun, and a

plurality of closed chambers containing fluid under pressure and each formed in part by a rigid wall and in part by a flexible disk or cap exposed to the fluid which is adapted to be compressed by the piston, said disk being free at its middle part to move with variations in the pressure of said fluid.

In witness whereof we have hereunto set our hands in presence of two witnesses.

CHARLES PROSPER EUGENE SCHNEIDER.

JEAN BAPTISTE GUSTAVE ADOLPHE CANET.

Witnesses:

JEAN GARNET,

EDMOND BLAISE.