

No. 635,684.

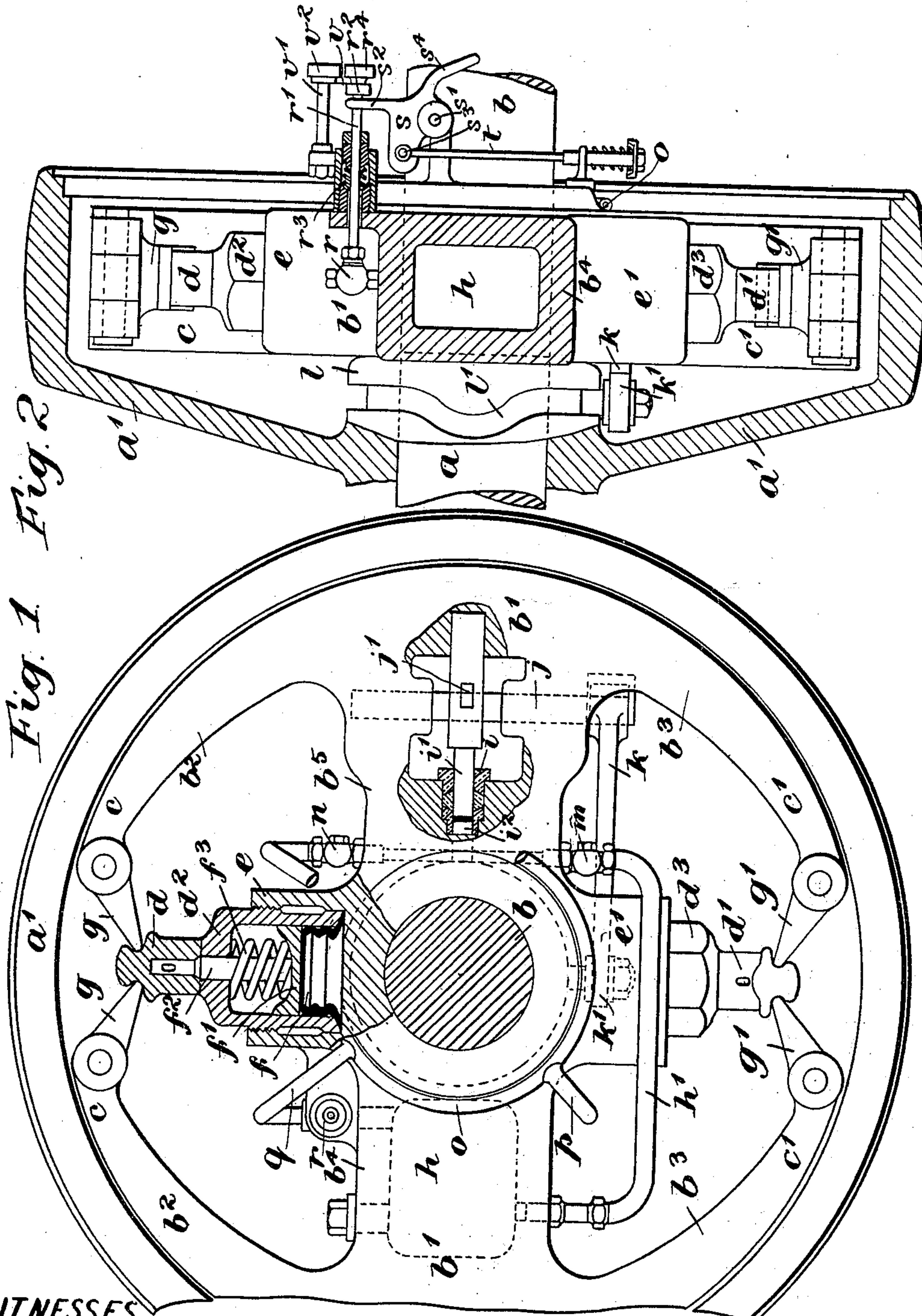
Patented Oct. 24, 1899.

A. HERSCHMANN.
FRICTION CLUTCH.

(Application filed May 6, 1898.)

(No Model.)

4 Sheets—Sheet 1.



WITNESSES

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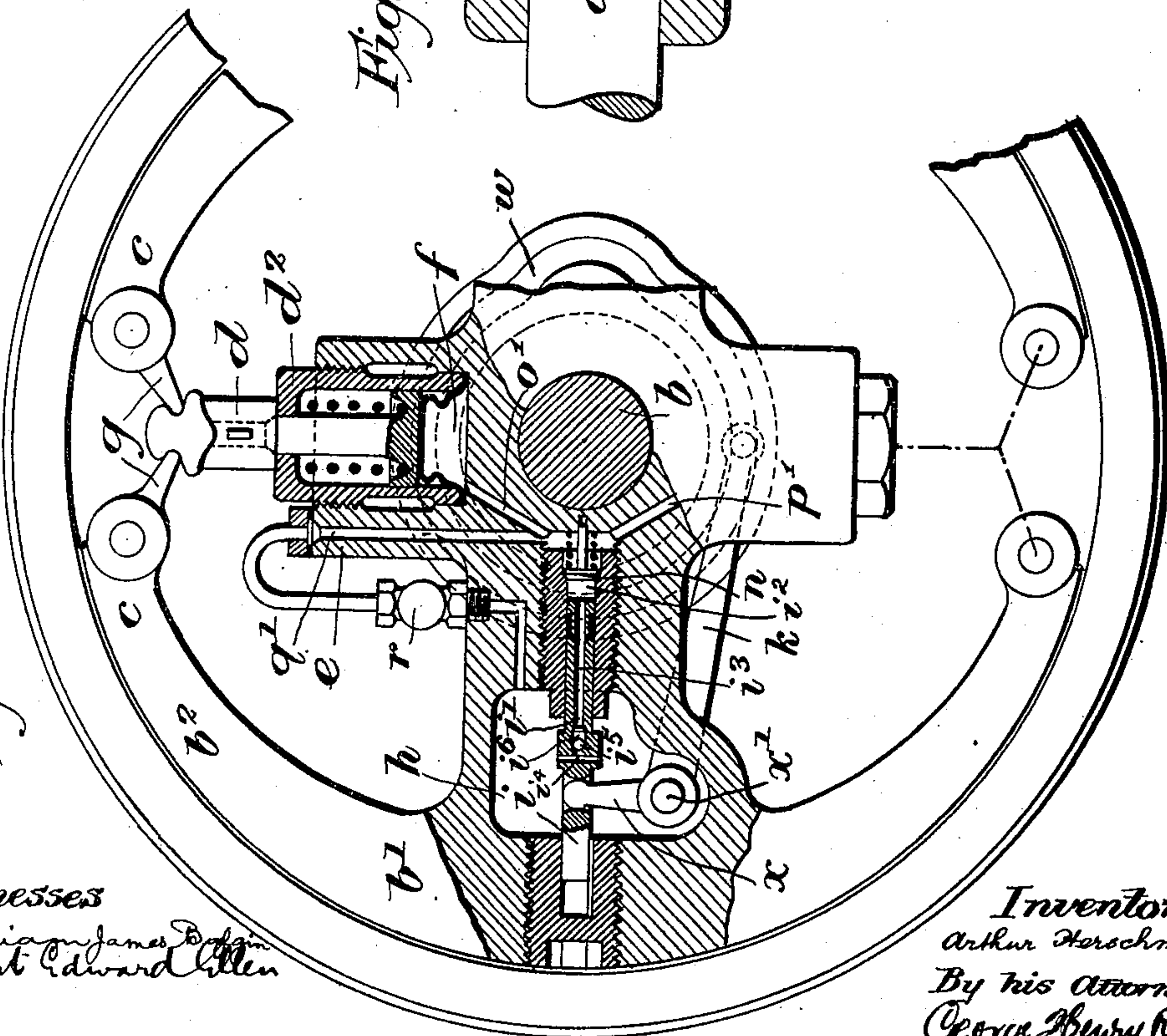
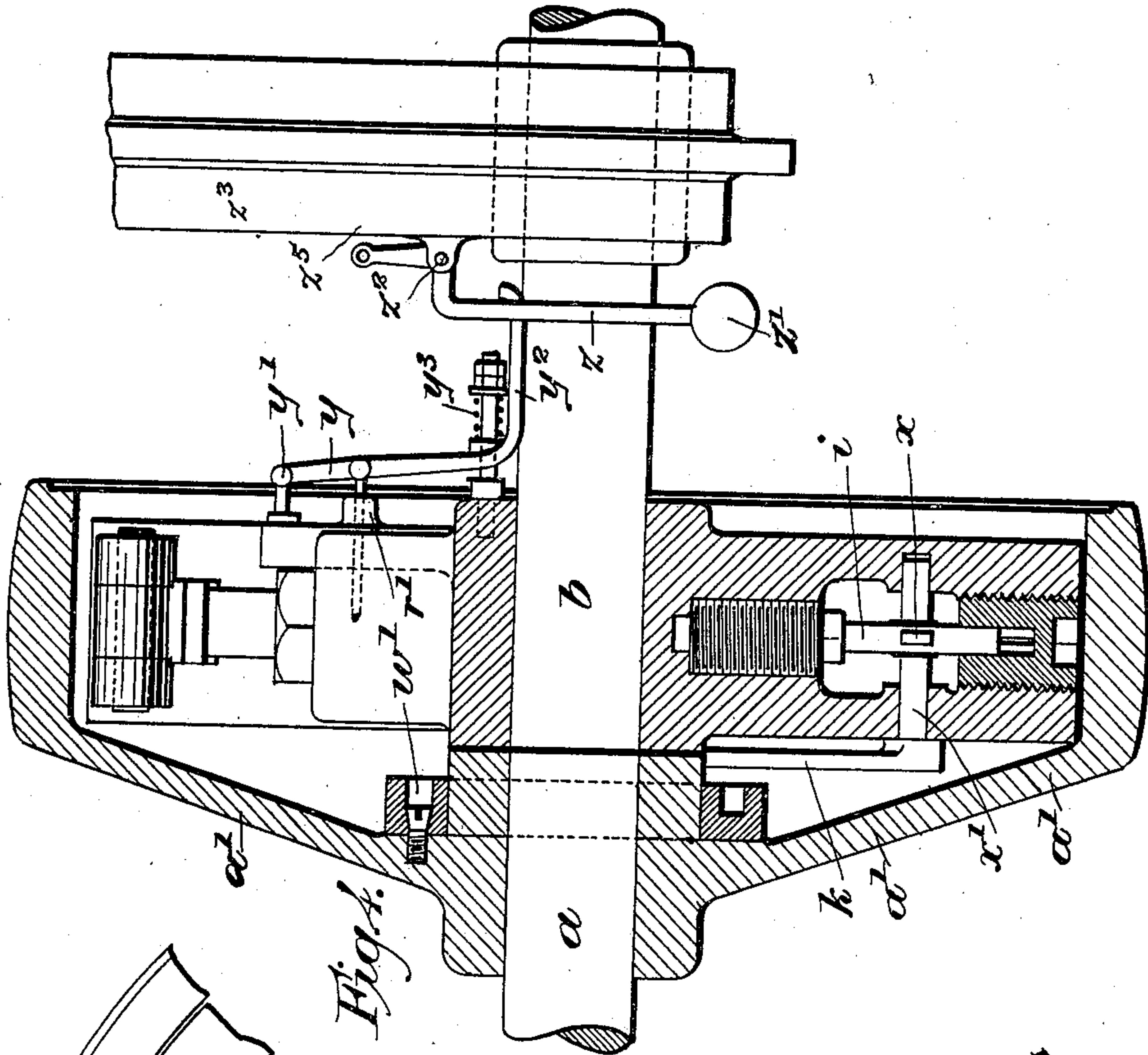
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Witnesses

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Fig. 6.

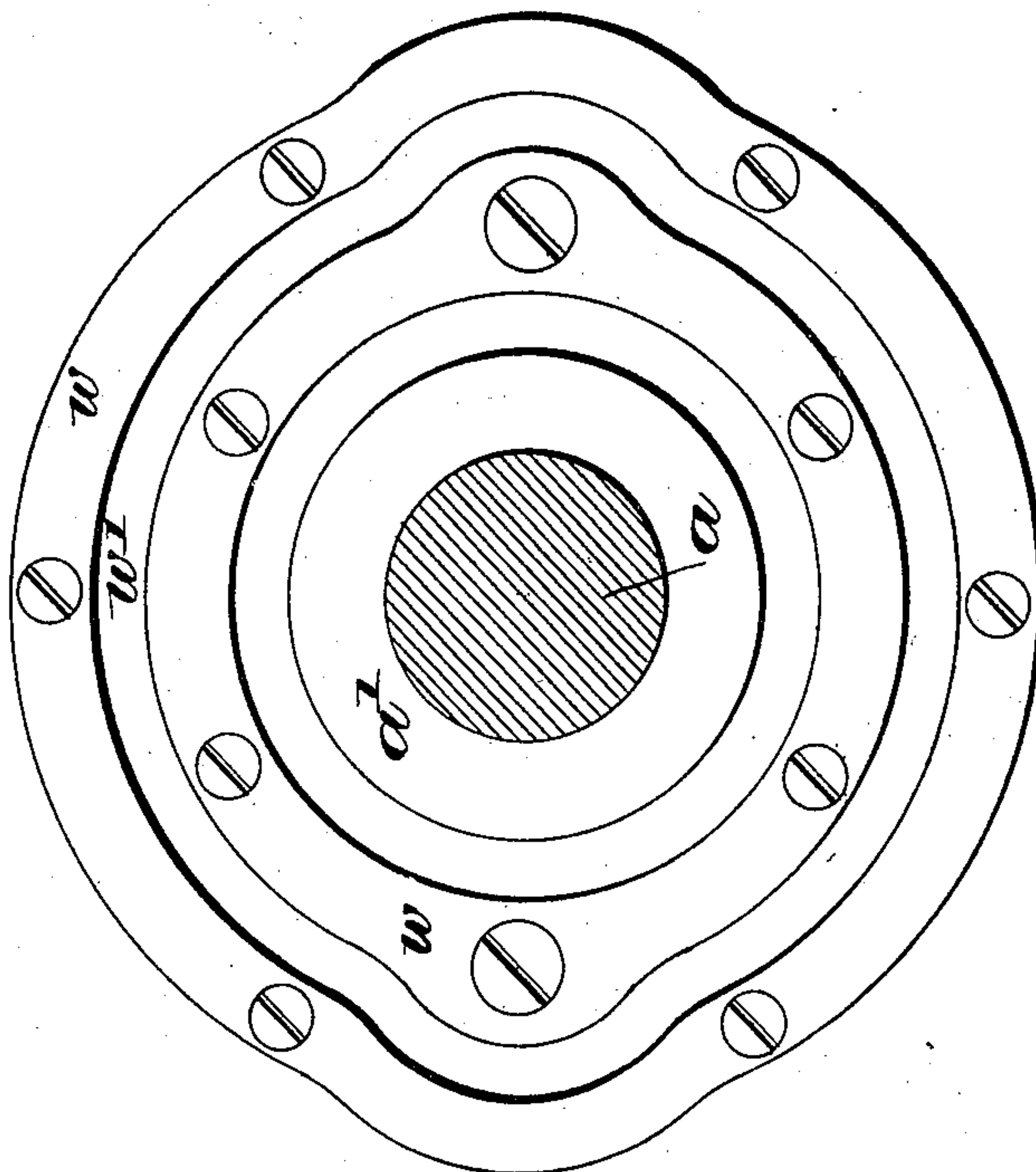
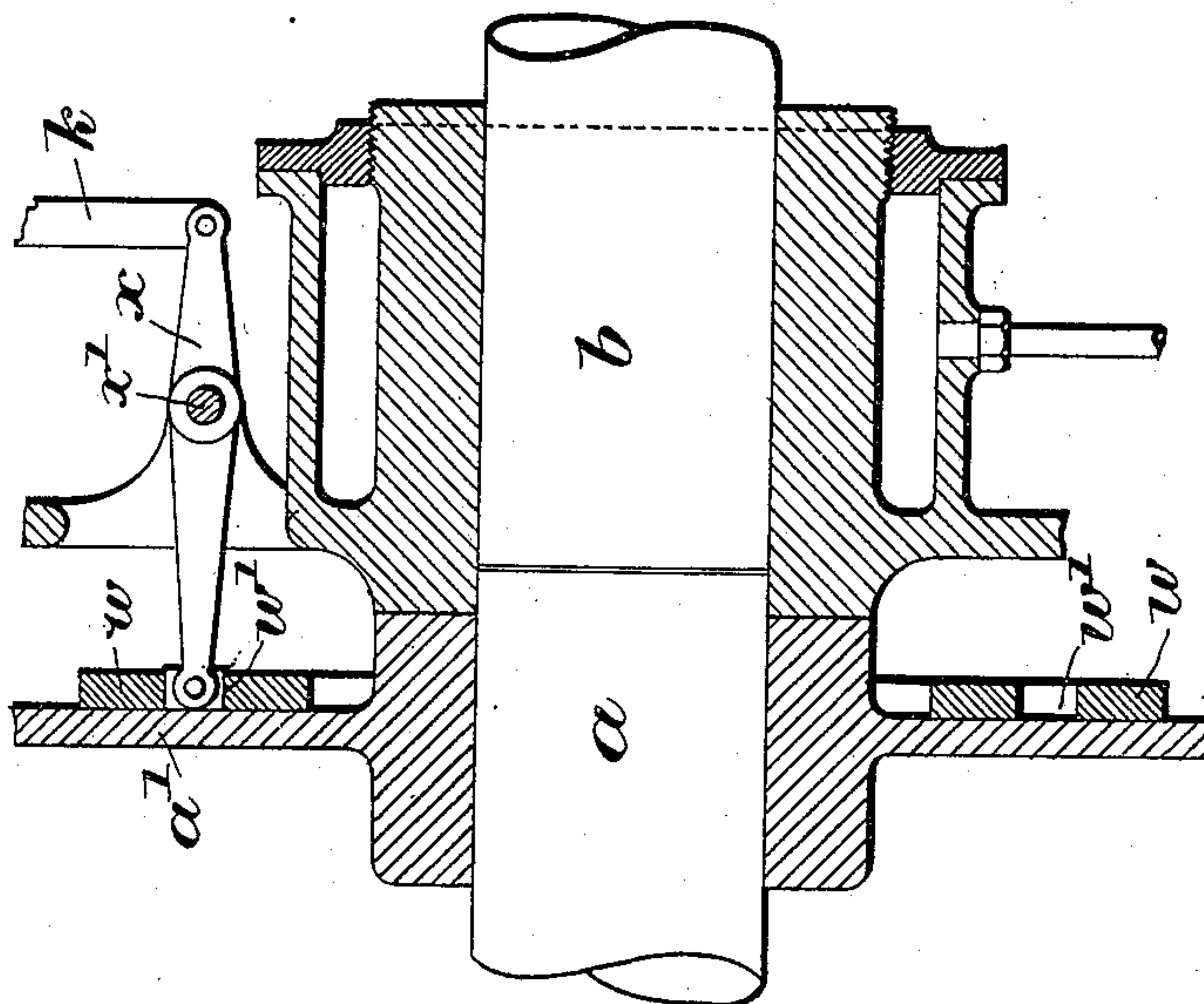


Fig. 5.



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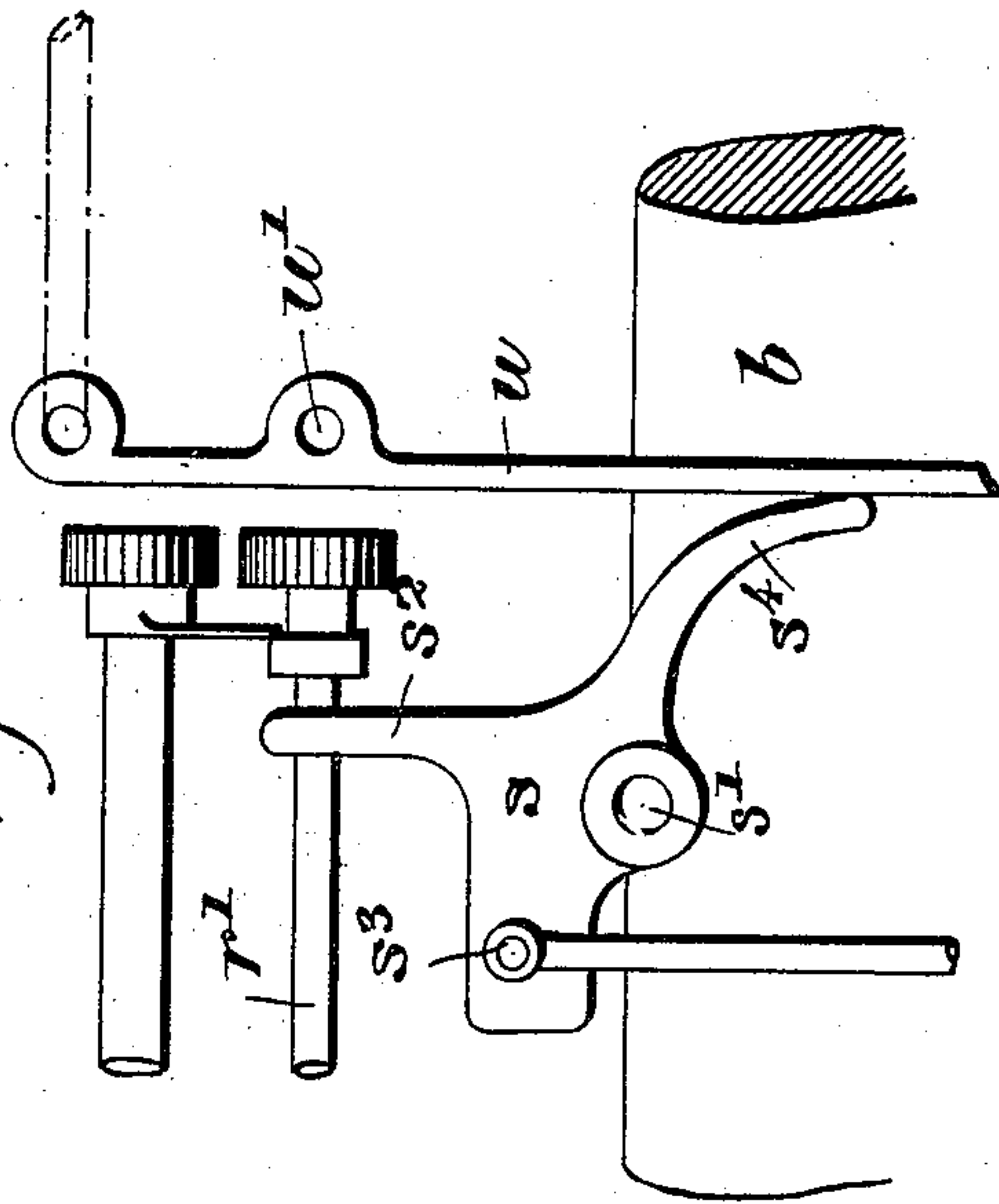
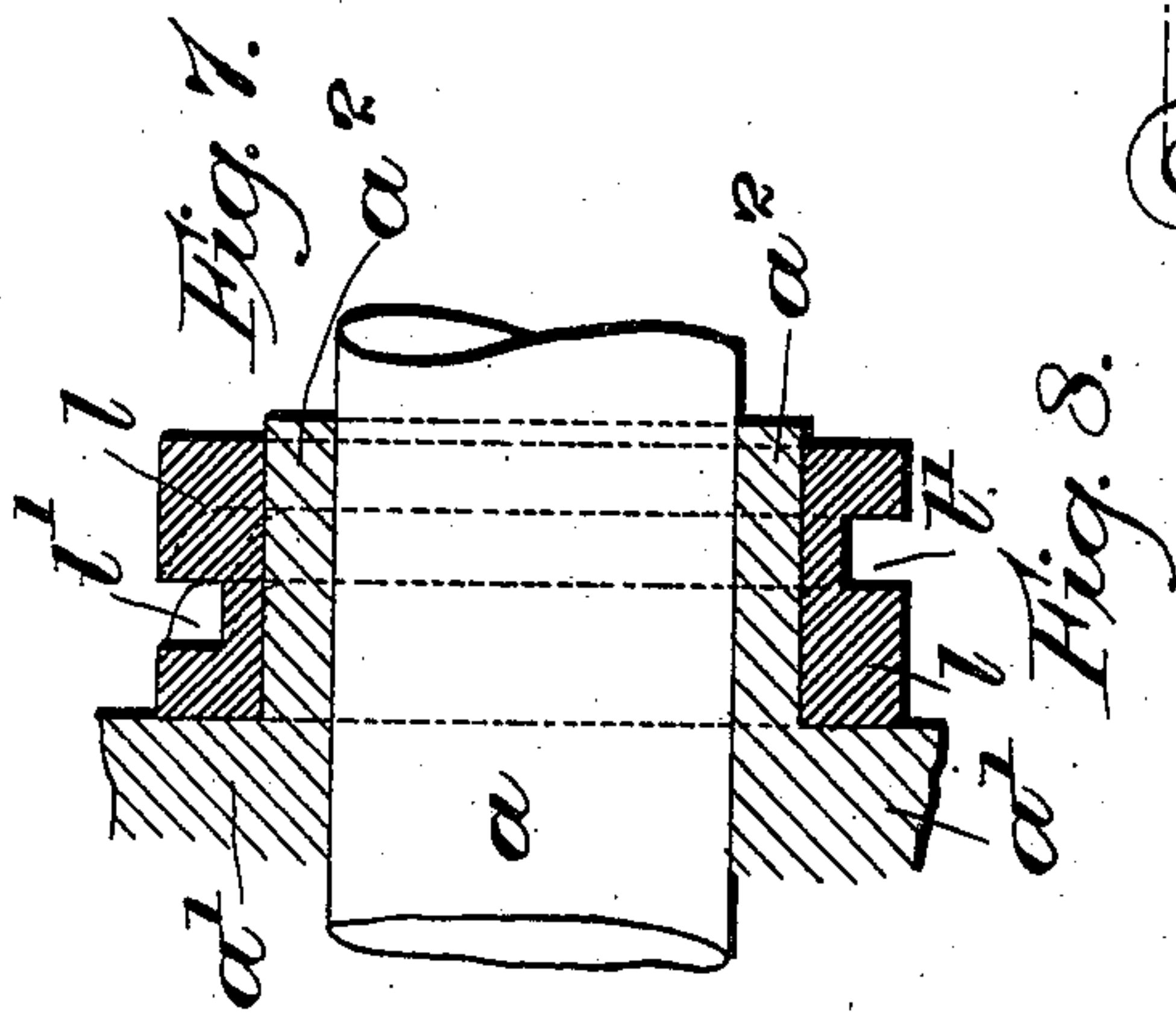
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(Application filed May 6, 1898.)

(No Model.)

4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

ARTHUR HERSCHMANN, OF BIRMINGHAM, ENGLAND.

FRICTION-CLUTCH.

SPECIFICATION forming part of Letters Patent No. 635,684, dated October 24, 1899.

Application filed May 6, 1898. Serial No. 679,939. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR HERSCHMANN, engineer, a subject of the Emperor of Austria-Hungary, residing at 155 Pershore road, Birmingham, England, have invented certain new and useful Improvements in Friction-Clutches, of which the following is a specification.

This invention relates to improvements in the construction of friction-clutches; and its object is to provide a simple and effective means by which such clutches can be put into and out of operative position at will and by which the contact between the two portions of the clutch is automatically regulated.

In the construction of these clutches I propose to employ cushions or tubes which can be inflated with air or filled with liquid, and these cushions or tubes bear against shoes or friction-blocks belonging to one part of the clutch which can press against the other part of the said clutch when the cushions or tubes are expanded so that connection is made. These cushions or tubes are inflated or filled automatically and are constantly kept distended while the clutch is in operation.

In order to more clearly describe this invention, reference is had to the accompanying drawings, in which—

Figure 1 is an elevation, partly in section, of a friction-clutch constructed according to this invention. Fig. 2 is a cross-sectional elevation of the same. Figs. 3 and 4 are similar views of a slightly-modified arrangement. Figs. 5, 6, 7, and 8 are detail views showing further modifications.

Upon the shaft a is fitted a disk a' , the outer surface of which serves as a pulley, if required. Within this disk a' a disk-like case b' upon the other shaft b is fitted, and at c c and c' c' on the periphery of this case b' friction-blocks may be fitted. Behind these friction-blocks heads d d' are fitted upon the casings d^2 d^3 , attached to the extensions e e' of the casing b' , and cushions f , of leather or other suitable material, which can be filled with liquid or air, are arranged in said casings d^2 d^3 , so that when distended by the liquid or air the heads d d' will be forced outward and by means of the toggle-levers g g g' g' will press the friction-blocks c c c' c' outward slightly radially against the inside of the disk

a' , this being allowed for by the elasticity and springiness of the arms b^2 b^2 b^3 b^3 , and the disk a' and the casing b' will be caused to turn together, thus coupling the shafts a b together.

Within the portion b^4 of the casing b' a reservoir h for the liquid is arranged, and within the portion b^5 a pump i is fitted, operated by means of the arm j' upon the oscillating spindle j . The spindle j is oscillated by means of the lever k , the end k' of which engages in the cam-groove l' of the cam l upon the shaft a . When the shafts a b are revolving together, there is of course no relative motion between the cam l upon the shaft a and the lever k , attached to the casing b' , upon the shaft b ; but if there is not sufficient friction between the friction-blocks at c c c' c' and the disk a' the disk a' and casing b' move relatively to one another, and the lever k will be oscillated by the cam l to operate the pump i to force liquid into the cushions f until the required pressure is attained to press the shoes into engagement with the disk a' , and the shafts a b again revolve together.

Liquid passes by means of the pipe h' from the reservoir h to the pump i and on the outward movement of the plunger i' is drawn into the barrel i^2 . On the inward stroke the valve m , by which the liquid entered, closes, and the liquid passes through the valve n to a ring o of piping, and from this ring o the liquid passes by means of pipes p to the cushions f . The pipe q is also connected to the ring o , and liquid can pass back from the reservoir h by means of an automatic valve r , to be hereinafter described.

The cushions f are provided with sliding disks f' , pins f^2 , and springs f^3 , by which the heads d' are caused to move outward and operate the friction-blocks at c c c' c' .

As there may be a tendency for the shafts a b to revolve at too-high a speed, a controlling device (shown separately in Fig. 8) is provided, acting on the valve r . A suitably-shaped lever s is pivoted at s' and is connected at s^2 to the valve-spindle r' and at s^3 is connected to the spring-rod t , by which it is retained in position under normal conditions; but if the speed becomes too high the lever s swings outward slightly under the influence of centrifugal force and against the action of

the spring-rod t and causes the valve r to open and allow of liquid passing from the ring o back to the reservoir h . The pressure in the cushions f is thus relieved, and the disk a' and casing b' can rotate independently until normal conditions are resumed and the pump i restores the pressure necessary to cause the shafts a b to rotate together again.

In order to separate the clutch so that one shaft rotates independently of the other, a forked lever u , pivoted at u' , is operated by means of a suitable external arrangement, which can be moved so as to contact with it when required to disengage the clutch. The forked lever u when thus operated presses on the arm s^4 , so as to actuate the lever s and open the valve r to relieve the pressure in the cushions, as above described. To secure the valve r in its open position, a spring-blade v is fitted upon the rod v' , and a collar r^2 is formed on the valve-rod r' . When the rod r' is moved to open the valve r , the collar r^2 moves past the spring-blade v , and the rod r' is retained and the valve r held open to effect the disengagement of the clutch. On releasing the collar r^2 from the spring-blade v the two portions of the clutch will again engage. It will of course be understood that the ordinary movement of the lever s under the action of centrifugal force is not sufficient to cause the collar r^2 to move past the spring-blade v ; but in the event of a dangerous increase of speed the collar will pass the spring-blade v and the clutch will be retained in its disengaged position. The spring r^3 returns the valve r to its closed position when the valve-rod r' is released.

The positions of the spring-blade v and the collar r^2 can be adjusted by means of the milled heads v^2 r^4 .

In Figs. 3 and 4 the parts are somewhat differently arranged, the reservoir h being formed around the pump i , and the admission-valve is within the plunger i' . A passage i^3 is formed by which liquid passes to the smaller passage i^4 . A ball-valve i^5 is fitted in the larger passage i^6 , and on the outward stroke of the plunger i' liquid passes through the passages i^4 i^6 past the valve i^5 to the pump-barrel i^2 . On the inward stroke the valve i^5 closes and liquid is forced through the valve n to the automatic valve r and to the cushions f , as above described. In this arrangement the pipes o p q are not used, and their purposes are effected by the passages o' p' q' , formed in the metal frame; also, the cam l is formed as a face-cam. A face-cam of a similar description is shown separately in Figs. 5 and 6, the cam-groove in this case being double. A face-plate w , having a cam-groove w' , is attached to the surface of the disk a' , and the lever k is connected to a lever x , pivoted at x' , and which engages with the groove w' , so as to operate the pump i .

Fig. 4 shows a second arrangement for disengaging the clutch. The lever y is pivoted to the casing at y' , and the rod r' , which op-

erated the valve or cock r , is connected to this lever at a short distance from its fulcrum. The lever y is formed with the extension y^2 , which projects outwardly from the clutch and is formed at its extremity with the bent part y^4 . The lever is also provided with the spring adjustment y^3 , which acts upon the lever so as to keep the valve or cock normally closed. To actuate the lever y , a swinging arm or lever z is employed, having the weight z' at its extremity. This arm is pivoted at z^2 to the shaft hanger or bracket z^3 and is formed with the extension z^4 , to which a chain or other connection z^5 is secured. On slacking again the weight z' causes the arm z to move, and when swung from its normal position it engages with the turned-up end y^4 of the extension y^2 . The lever y is thus operated and through the rod r' causes the discharge valve or cock to be opened.

Instead of only two sets of friction-blocks, as in the arrangements illustrated, more than two may be employed, and the pump i may be operated several times in each revolution, or more than one pump may be fitted, without departing from this invention.

When air is employed, no reservoir is needed.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a friction-clutch, a disk upon one of the shafts to be connected, a casing upon the other shaft and friction-surfaces carried by the casing and adapted to make contact with the inner surface of the disk, of cylinders in the casing, plungers in the said cylinders, connections between the plungers and the friction-surfaces, liquid-cushions behind the said plungers, a pump carried by the casing, means for oscillating the said pump when relative motion occurs between the driving and driven parts, a liquid-reservoir in the casing, connections between the reservoir and the liquid-cushions and between the pump and both reservoir and cushions, and a valve actuated automatically on excessive speed being attained allowing the liquid to escape from the cushions back to the reservoir, substantially as and for the purposes specified.

2. In a friction-clutch having friction-surfaces, cushions supplied with fluid-pressure adapted to apply the friction-surfaces, a pump actuated on relative motion occurring between the driving and driven parts and a discharge-pipe from the cushions, a cock fitted to the discharge-pipe, a spindle operating the said cock, a swinging lever engaging with the spindle and carried by the casing of the clutch, and a spring adjustment connected to the lever, the lever being adapted on the attainment of excessive speed to open the cock and relieve the cushions, substantially as described and for the purposes specified.

3. In a friction-clutch having friction-surfaces, cushions supplied with fluid-pressure

adapted to apply the friction-surfaces, a
pump actuated on relative motion occurring
between the driving and driven parts, and a
discharge-pipe from the cushions, a cock fit-
5 ted to the discharge-pipe, a spindle operat-
ing the cock, a swinging lever connected to
the spindle, a spring adjustment connected
to the lever and a spring-catch adapted to
engage with the spindle, and on the spindle
10 moving beyond a certain position to prevent

its return, the whole constructed and oper-
ating substantially as described and shown
and for the purposes specified.

In witness whereof I have hereunto set my
hand in the presence of two witnesses.

ARTHUR HERSCHMANN.

In presence of—

HENRY H. OLIVER,

RICHARD JUDGE.