

No. 764,706.

PATENTED JULY 12, 1904

J. BRAUNWALDER.
AIR OR GAS COMPRESSOR.
APPLICATION FILED JAN. 22, 1903.

NO MODEL.

4 SHEETS—SHEET 1

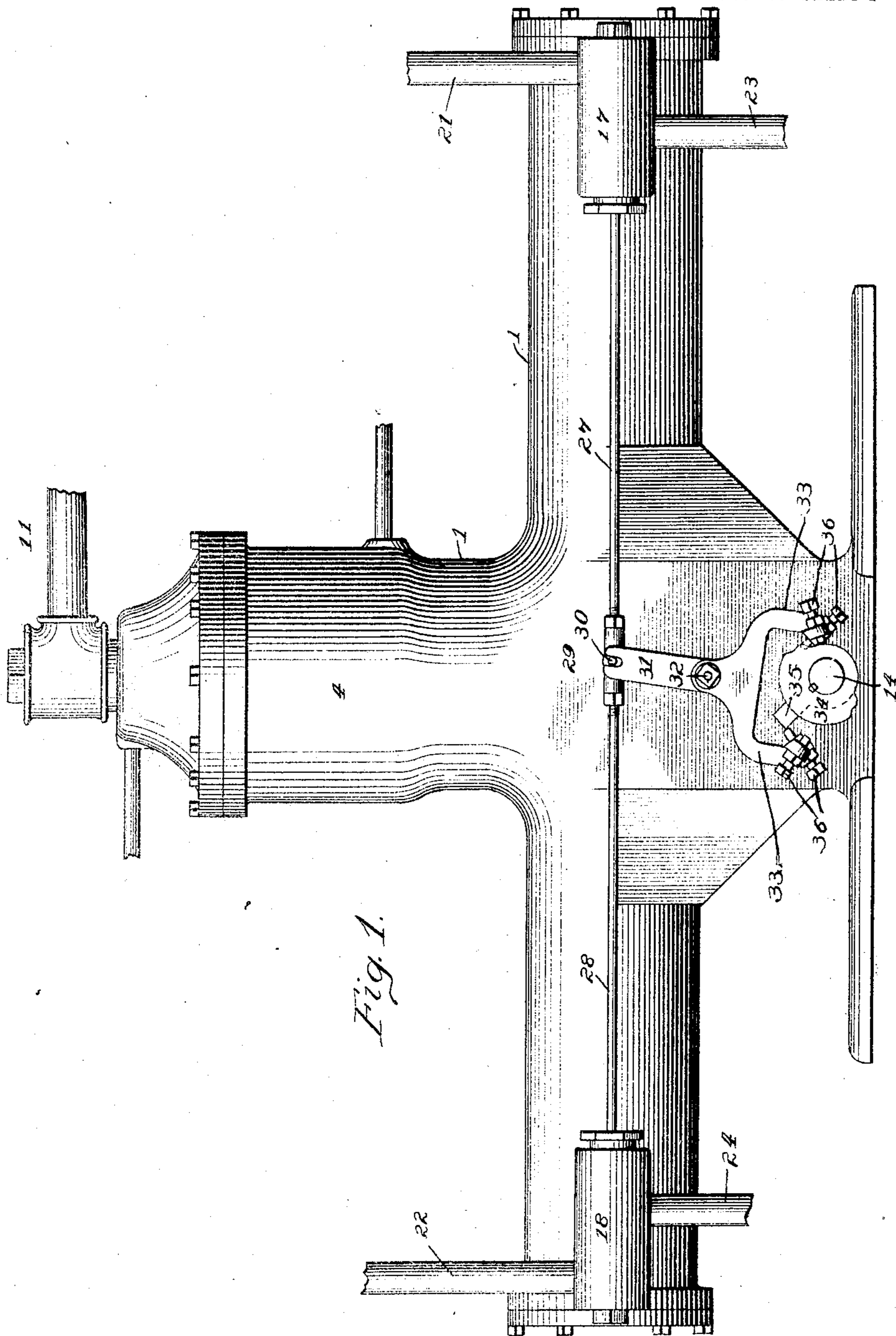


Fig. 1.

Witnesses:

J. H. King
C. I. Cobb.

Inventor:

John Braunwalder
By John M. Hill

att'y

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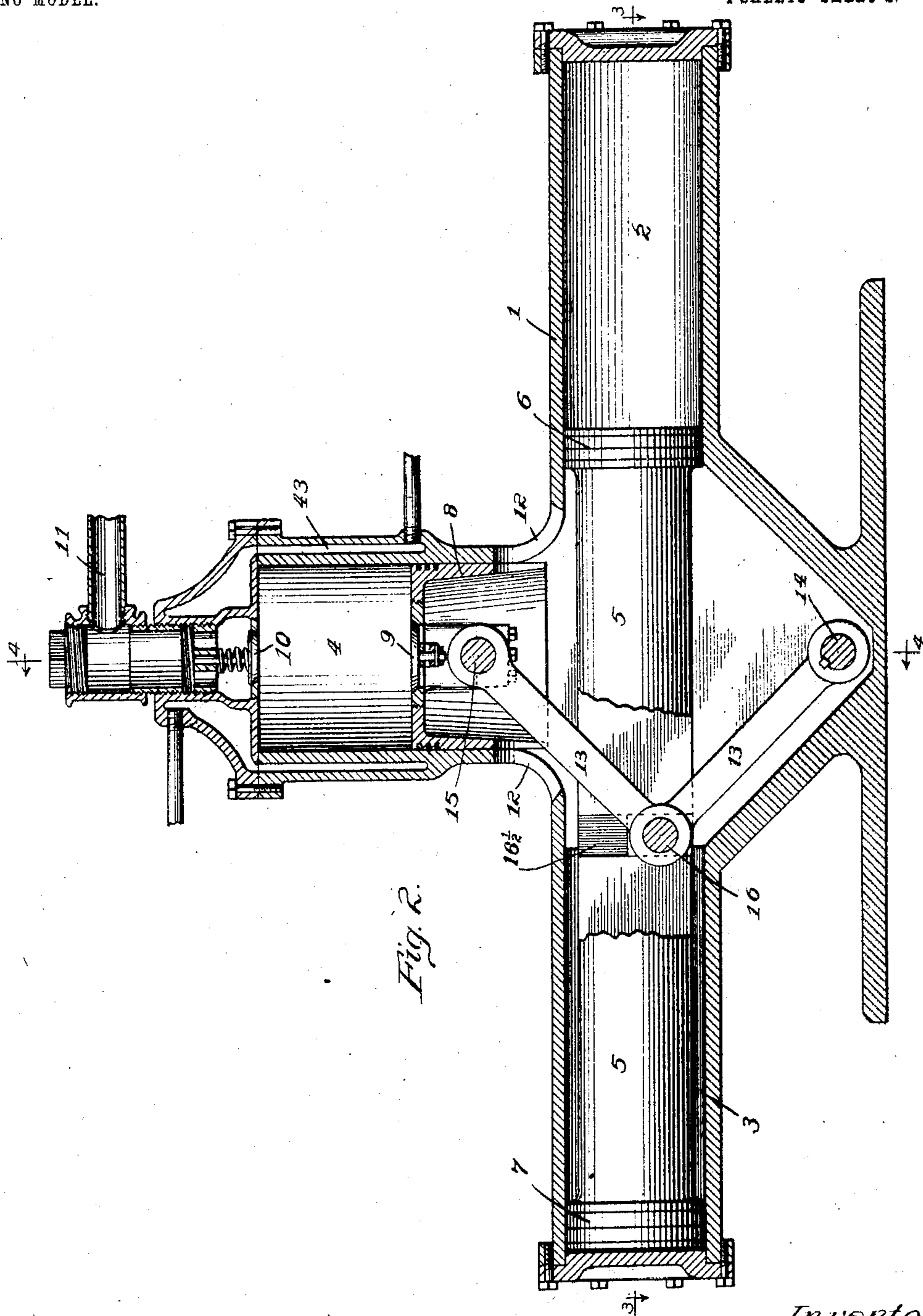


Fig. 2.

Witnesses:

J. H. King
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Inventor:

John Braunwalder
By John W. Hill

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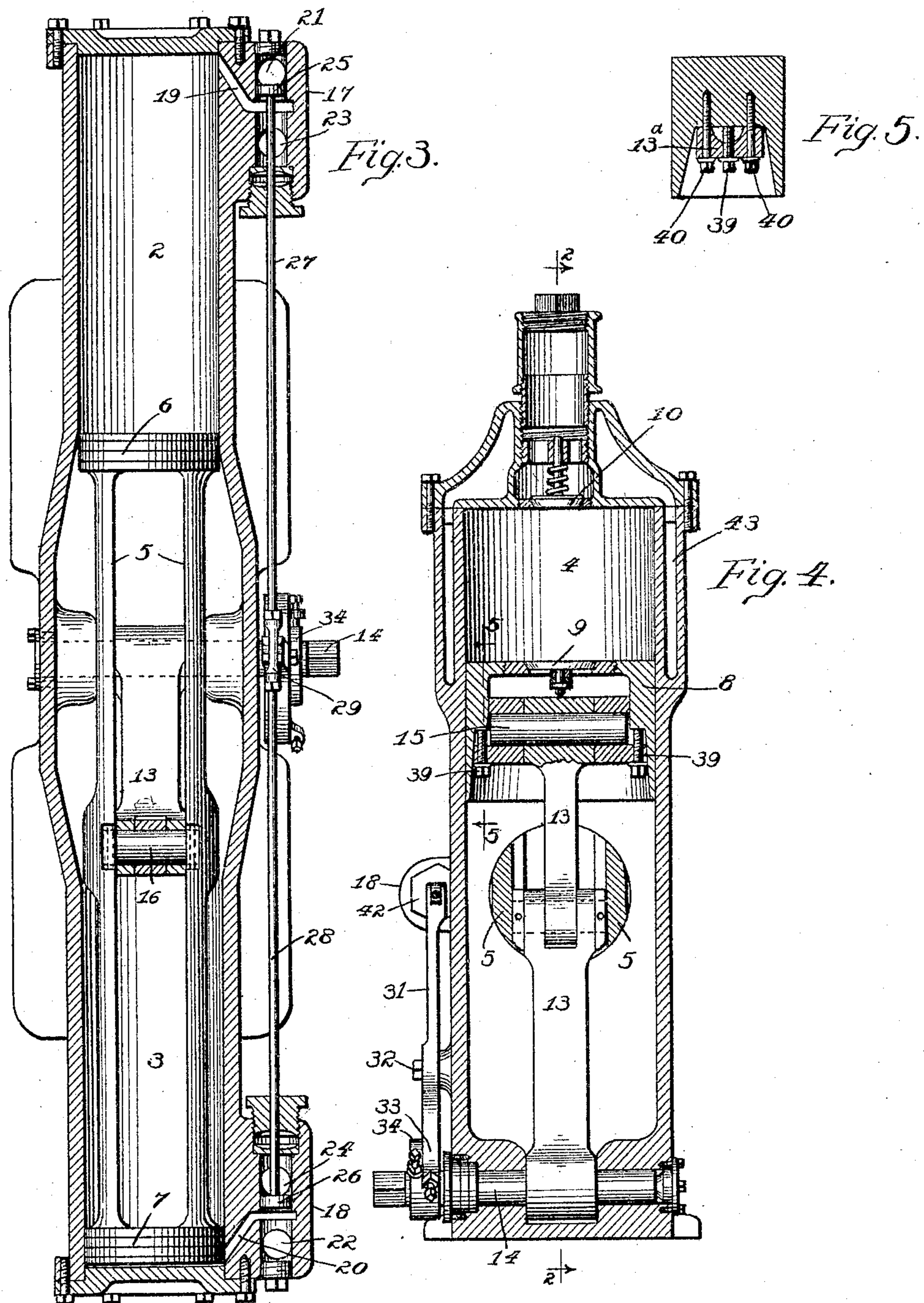
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

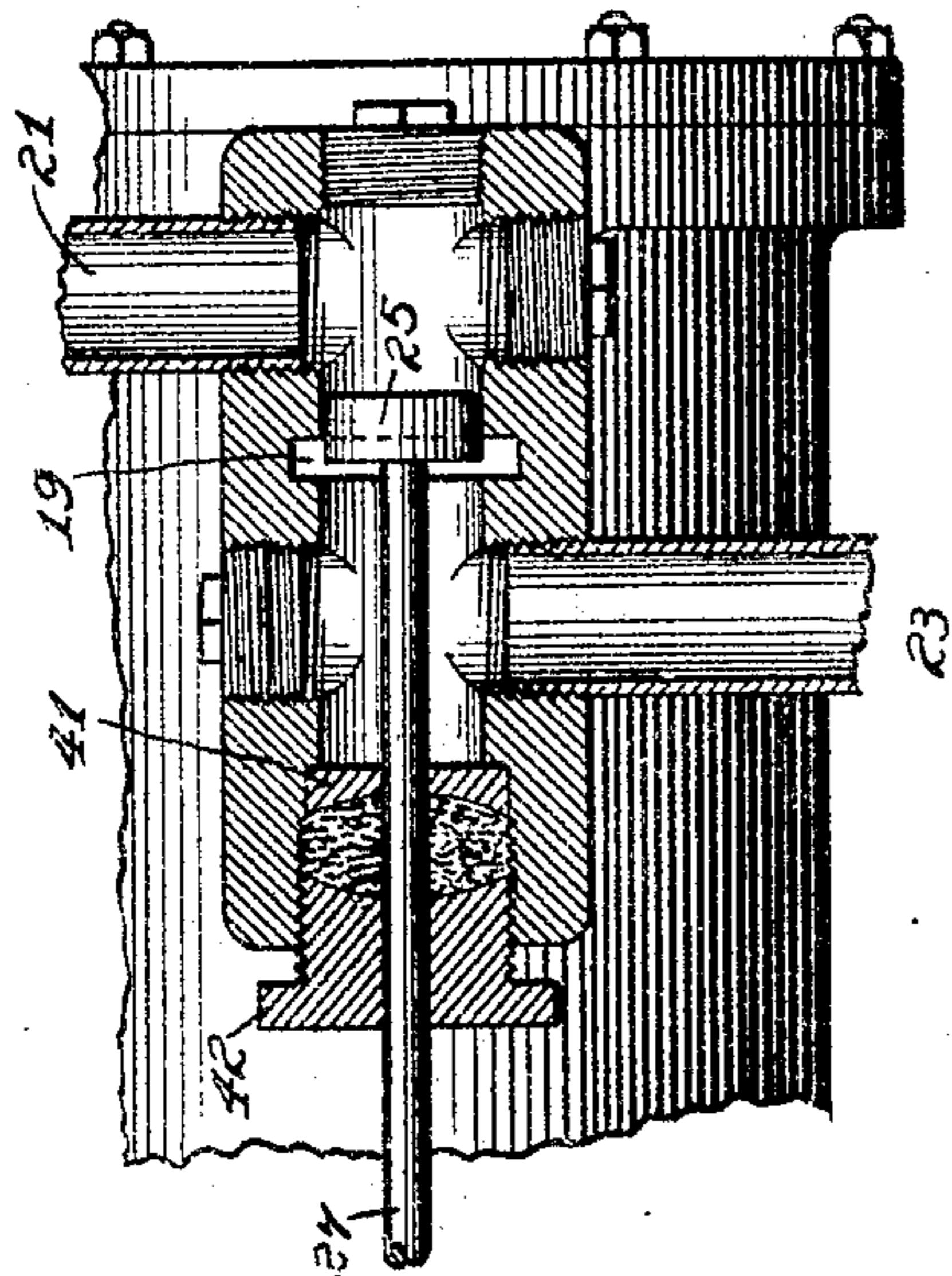
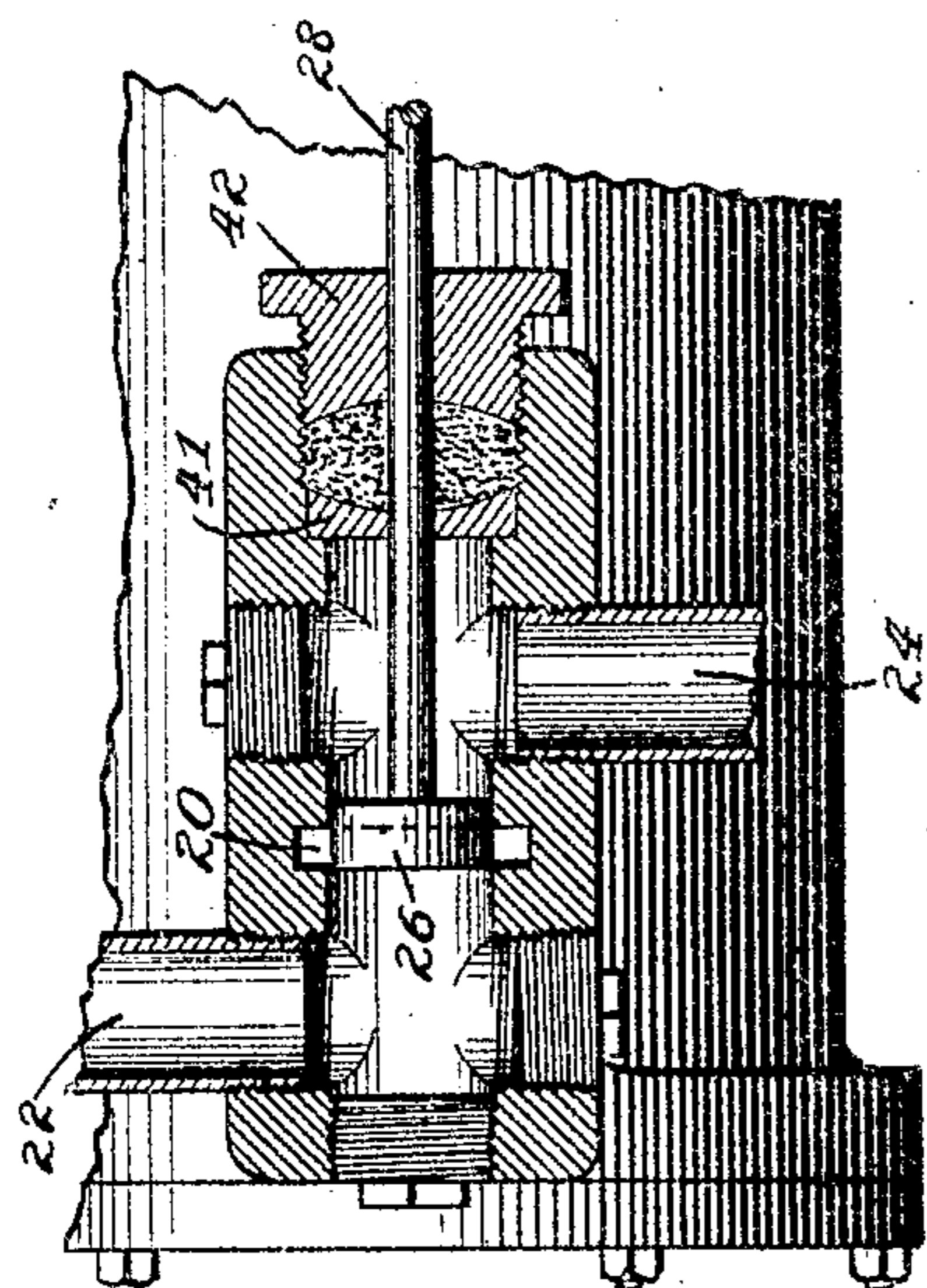


Fig. 6.



Witnesses:

J. H. King
C. J. Cobb.

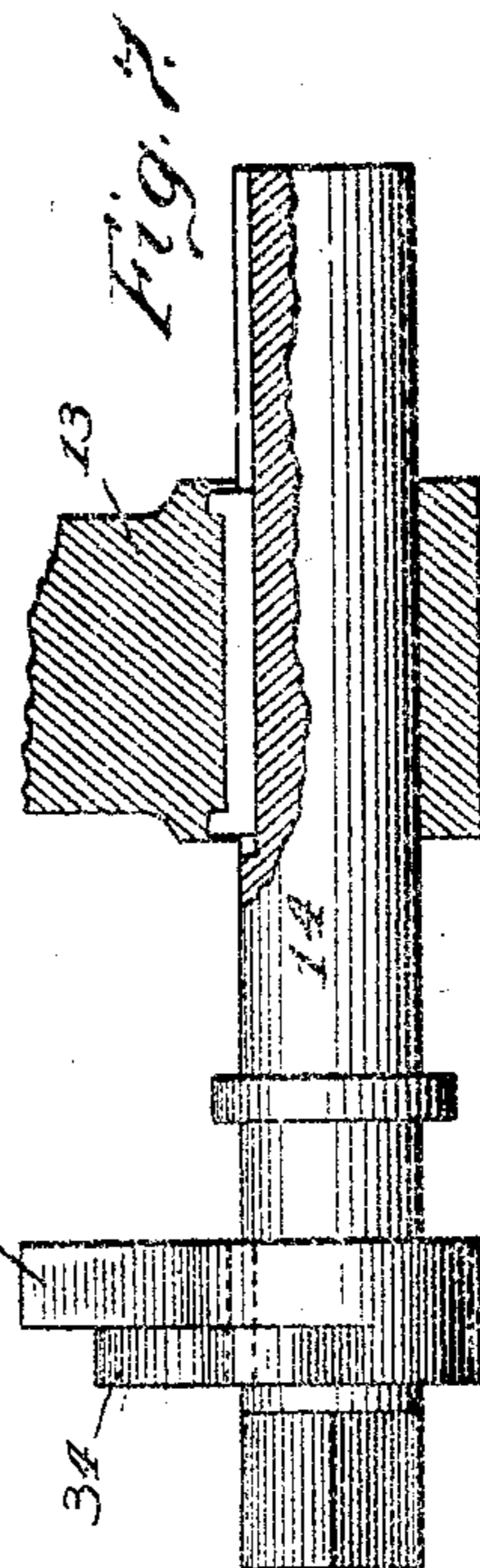
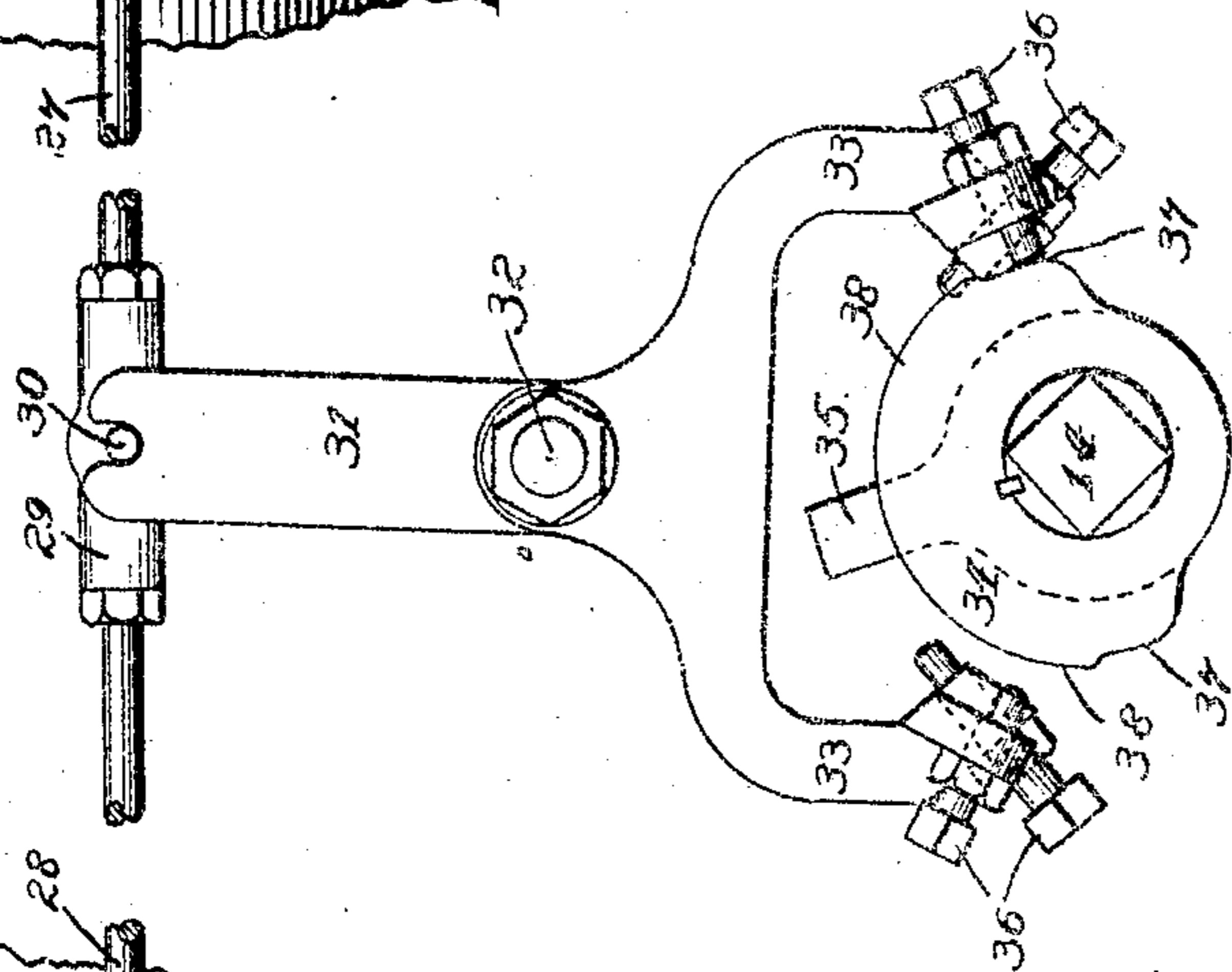


Fig. 9.

Inventor:
John Braunwalder
By John M. Hall
Att'y.

UNITED STATES PATENT OFFICE.

JOHN BRAUNWALDER, OF CHICAGO, ILLINOIS.

AIR OR GAS COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 764,706, dated July 12, 1904.

Application filed January 22, 1903. Serial No. 140,066. (No model.)

To all whom it may concern:

Be it known that I, JOHN BRAUNWALDER, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Air or Gas Compressors, of which the following is a description.

My invention belongs to that class of devices in which by the operation of a member air is drawn into the apparatus and thence forced onward into a receiver under pressure.

The object of my invention is to produce a simple, economical, and effective device for the purpose set forth.

To this end my invention consists in the novel construction, arrangement, and combination of parts herein set forth and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts, Figure 1 is a side elevation of my invention. Fig. 2 is a central vertical section of the same in line 2 2 of Fig. 4. Fig. 3 is a horizontal section in line 3 3 of Fig. 2. Fig. 4 is a vertical transverse section in line 4 4 of Fig. 2. Fig. 5 is a detail view taken in line 5 5, Fig. 4. Fig. 6 is a sectional detail view showing the relative position of the various parts in operation, and Fig. 7 is a detail view.

In the drawings, 1 represents a triple cylinder providing piston-chambers 2 3 4. The chambers 2 and 3 are preferably in line, as shown, and provided with a double piston 5, the two heads 6 and 7 being connected so as to move in unison. The piston 8, arranged to reciprocate in the chamber 4, is provided with a suitable valve 9, which as the piston is moved upward will close and force the air in said chamber onward into a suitable receptacle, the air in its passage passing by the valve 10 and thence onward through the pipe 11. On the reverse movement the valve 10 is firmly seated, while as the piston 8 moves downward the partial vacuum formed in the chamber 4 will cause the operation of the valve 9 and draw in air, which freely circulates through suitable openings 12 12 or equivalent means.

13 13 is a toggle-lever keyed at one end to a rock-shaft 14 and having its opposite end pivotally secured to the piston 8 at 15, as clearly shown in Fig. 2. The central portion of the toggle-lever is pivotally secured to the double piston 5, as at 16. A central longitudinal slot 16½ is formed in the piston 5 to permit the operation of the toggle-lever as the piston is reciprocated.

The chambers 2 and 3 are provided with valve-chambers 17 18, (see Figs. 3 and 4,) provided with ports 19 20, leading from the valve-chambers to the ends of the chambers 2 and 3, respectively.

21 22 are the induction-ports to the valve-chests, conveying the steam or other medium thereto.

23 24, respectively, are the exhaust-ports from the valve-chambers.

25 26 are piston-valves arranged within the valve-chambers 17 18 and so connected as to operate or move in unison. As shown, the valves 25 26 are adjustably connected by a valve-rod 27 28, as shown at 29. The distance between the valves is slightly greater than the distance between the ports 19 20, for a purpose hereinafter described. A projecting pin 30, carried by the valve-rod 27 28 or equivalent means, preferably upon the connection 29, engages the fork of the oscillating lever 31, pivotally supported, as at 32, and provided with the forked arms 33 33, extending in opposite directions from the pivotal support. That member of the toggle 13 which is keyed or otherwise secured to the rock-shaft 14 acts as a bell-crank lever, as shown in Figs. 2, 6, and 7, and as the toggle-lever is operated back and forth the said shaft is given a partial reciprocal rotation. A cam 34 is secured to the outer end of the shaft 14 and is arranged to contact with the extending arms 33 33 alternately to oscillate the opposite end of the lever 31, and thus operate the valve-rod and the valves. In the preferred form the said cam is provided with an extending arm 35, centrally extending from the periphery of the cam in such a manner as to engage with the arms 33 33 and positively insure the final operation of the lever 31, as hereinafter explained. Adjusting-screws 36 36 may be

employed to regulate the operation of the lever 31, or other equivalent means may be employed for the similar purpose.

In my invention the double cam 34, carried
5 by the rock-shaft 14 and its connected parts, occupies an important position in operating and controlling the valve mechanism. It will be noted that said cam is provided with two
10 working faces, which are substantial duplicates of each other. Each is provided with a primary step or face 38 and a secondary step or face 37. The extension 35 operates as a
15 third shoulder or stop for the cam, thus providing for three separate and distinct movements of the valves. The operation of the said cam and the valves will be clearly understood by a careful examination of Figs. 3 and
20 6. In Fig. 3 the cam and its connecting parts are shown in the position indicated in Fig. 1, in which the valves are at their limit toward the right. As here shown, the chamber 2 is ex-
25 hausting through the port 19 and the exhaust 23, while the chamber 3 to the left is taking steam through the inlet 22 and port 20. As the cam turns to the right, Fig. 1, the first shoulder or face 38 contacts with the right-hand arm
30 of the lever 31 and moves the valves to the position shown in Fig. 6. As here shown, the valve closes the port 20 toward the left, cutting off the steam and marking the beginning
35 of the expansion period in the chamber 3, while the valve 25 on the right but partially closes the port 19, still permitting a partial exhaust therethrough, Fig. 6. As the cam
40 continues to rotate toward the right the next shoulder or face 37 comes into active operation, moving the valves toward the left a further limited distance. This distance is sufficient to close the port 19 on the right, cutting
45 off the exhaust without uncovering the port 20 on the left. The expansion period in the chamber 3 still continues, while the compression begins in chamber 2 on the right. As the arm 35 contacts with the arm 33 to the
50 right the valves are shifted farther to the left, opening the port 20 on the left to exhaust and opening the port 19 on the right to admit steam to the chamber 2. As before set forth, the distance between the valves 25 26 is
55 slightly greater than the distance between the ports 19 and 20 in order to permit the operation described. In the reverse movement the operation is simply reversed and is substantially the same. It will be observed that the
60 movement of the valves is positive and prompt, obviating the necessity of a continual movement of the valves common in devices of this kind. As before pointed out, the set-screws 36 provide means for adjusting the parts so
as to secure the most satisfactory and efficient operation of the cam and its connected parts.

Fig. 5 shows the detail of one method by which the connection between the toggle-le-
65 ver 13 and the piston 8 may be made, so as to

admit of a reasonable degree of adjustability. By loosening or tightening the bolts 40 and setting the adjusting-bolt 39 in the reverse direction the two parts are adjustable as to one
70 another in order to secure the greatest efficiency in operation.

In the preferred form shown in Fig. 6 the valves are provided with stuffing-boxes of peculiar construction. As shown, a collar 41 is
75 loosely seated in a suitable recess and the part 42 provided with the usual screw-thread construction to screw toward the same. Between the two is a space to be filled with any suitable packing material. It is obvious that the
80 pressure within the valve-chest will have a tendency to force the collar 41 toward the packing material, and so automatically tend to prevent any leak of steam at that point. It is also obvious that the part 42 may be screwed
85 down in position to more closely compress the packing material in the usual manner. The air-chamber 4, Fig. 4, is provided with the usual water-jacket 43.

The operation of the device is obvious from an examination of the drawings in connection
90 with the description heretofore given.

It is obvious my invention may be employed for compressing gases, if desired. Hence I wish by the use of the term "air" in the
95 claims to be understood as contemplating any gases which are susceptible of such manipulation.

Having thus described my improvement, it is obvious immaterial modifications may be
100 made without departing from the spirit of my invention. Hence I do not wish to be understood as limiting myself to the exact form and construction shown.

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

1. In a device of the kind described, an air-chamber provided with a piston, and valves for controlling the admission and ejection of
110 air therefrom, in combination with a cylinder provided with a reciprocating piston and a toggle-lever connected at one end to the air-piston, at its opposite end to a fixed point, and having its knuckle connected to the re-
115 ciprocating piston.

2. In a device of the kind described, an air-chamber provided with a piston, and valves for controlling the admission and ejection of
120 air therefrom, in combination with a cylinder provided with a double-headed reciprocating piston and a toggle-lever connected at one end to the air-piston, at its opposite end to a fixed point, and having its knuckle connected to the reciprocating piston at a point intermediate
125 of its ends.

3. In a device of the kind described, an air-chamber provided with a piston, valves for controlling the admission and ejection of air
130 therefrom, in combination with a cylinder provided with a reciprocating piston and a

toggle-lever connected at one end to the air-piston, at its opposite end to a fixed point, and having its knuckle connected to the reciprocating piston, and a valve-gear operatively connected to the pivoted fixed end of the toggle to govern the actuating fluid for the reciprocating piston in consonance with the movement of the piston and position of the toggle.

10 4. In a device of the kind described, an air-chamber, provided with a piston, and valves for controlling the admission and ejection of air therefrom, in combination with a cylinder

provided with a reciprocating piston and a toggle-lever adjustably connected at one end 15 to the air-piston, at its opposite end to a fixed point, and having its knuckle connected to the reciprocating piston.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses. 20

JOHN BRAUNWALDER.

Witnesses:

JOHN W. HILL,
CHARLES I. COBB.