

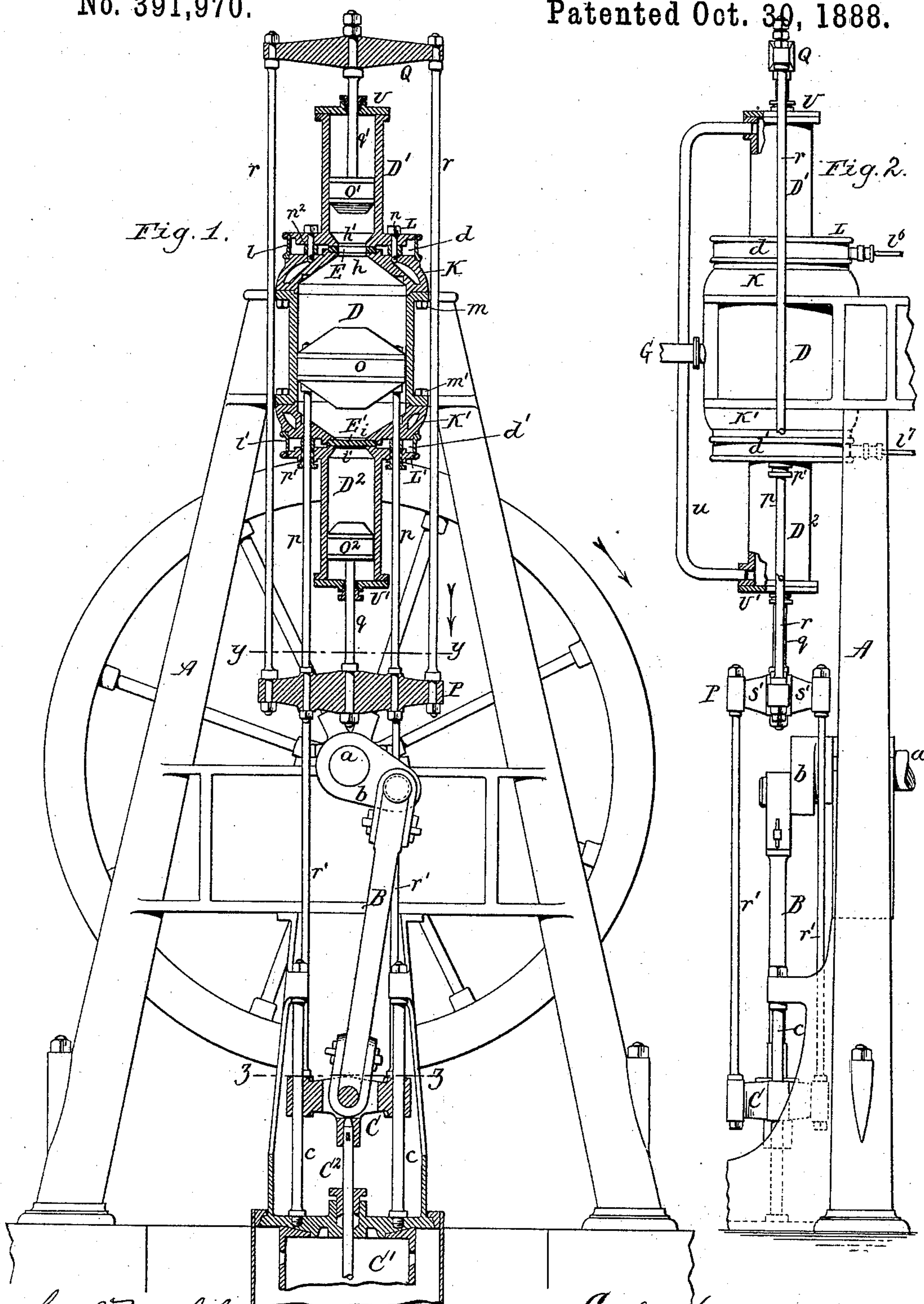
(No Model.)

2 Sheets—Sheet 1.

C. HOLLY.
STEAM ENGINE.

No. 391,970.

Patented Oct. 30, 1888.



Chas. Buchheit.
Theo. L. Poppe. } Witnesses.

Carlos Holly Inventor.
By Wilhelm Bonner Attorneys.

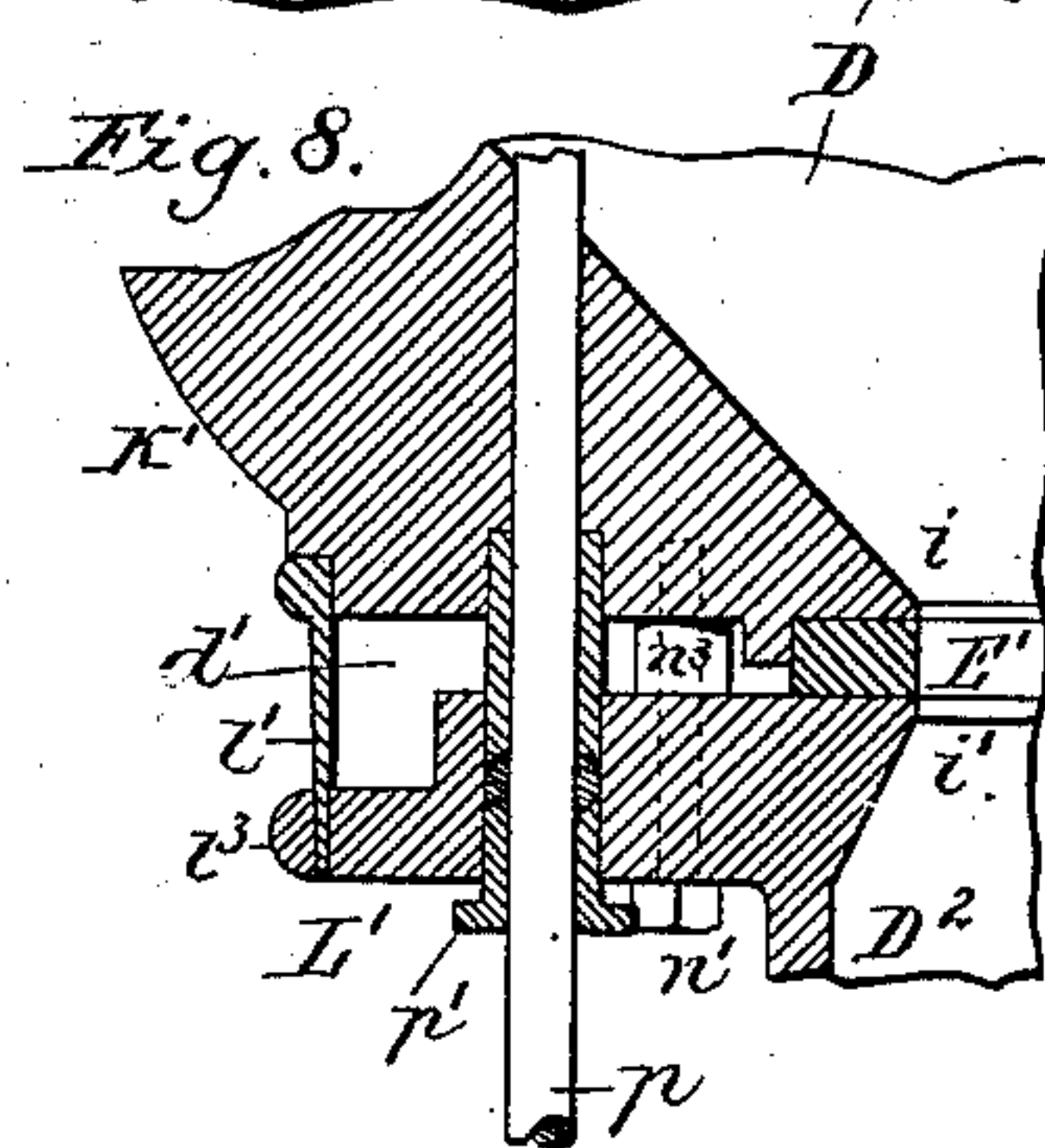
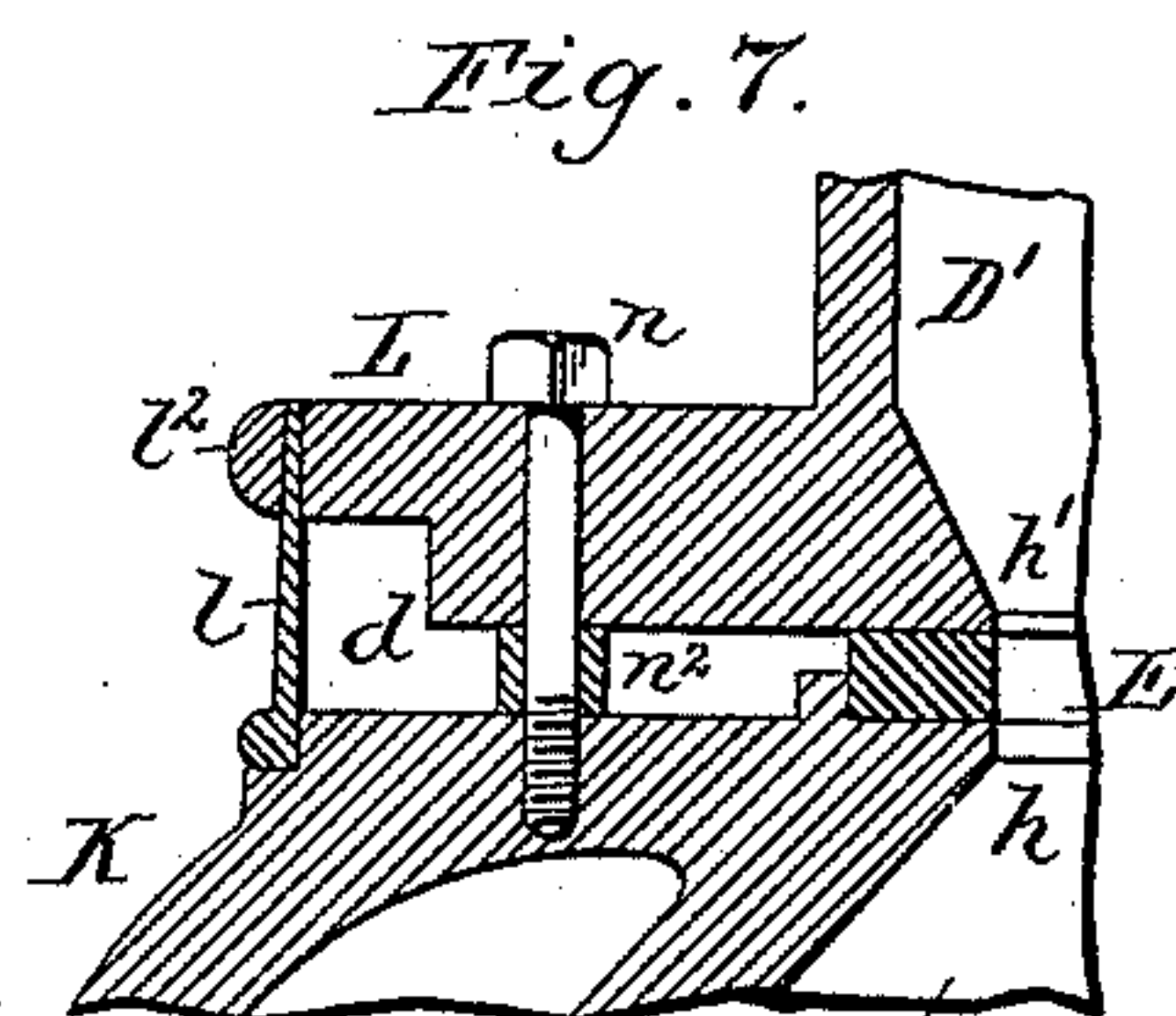
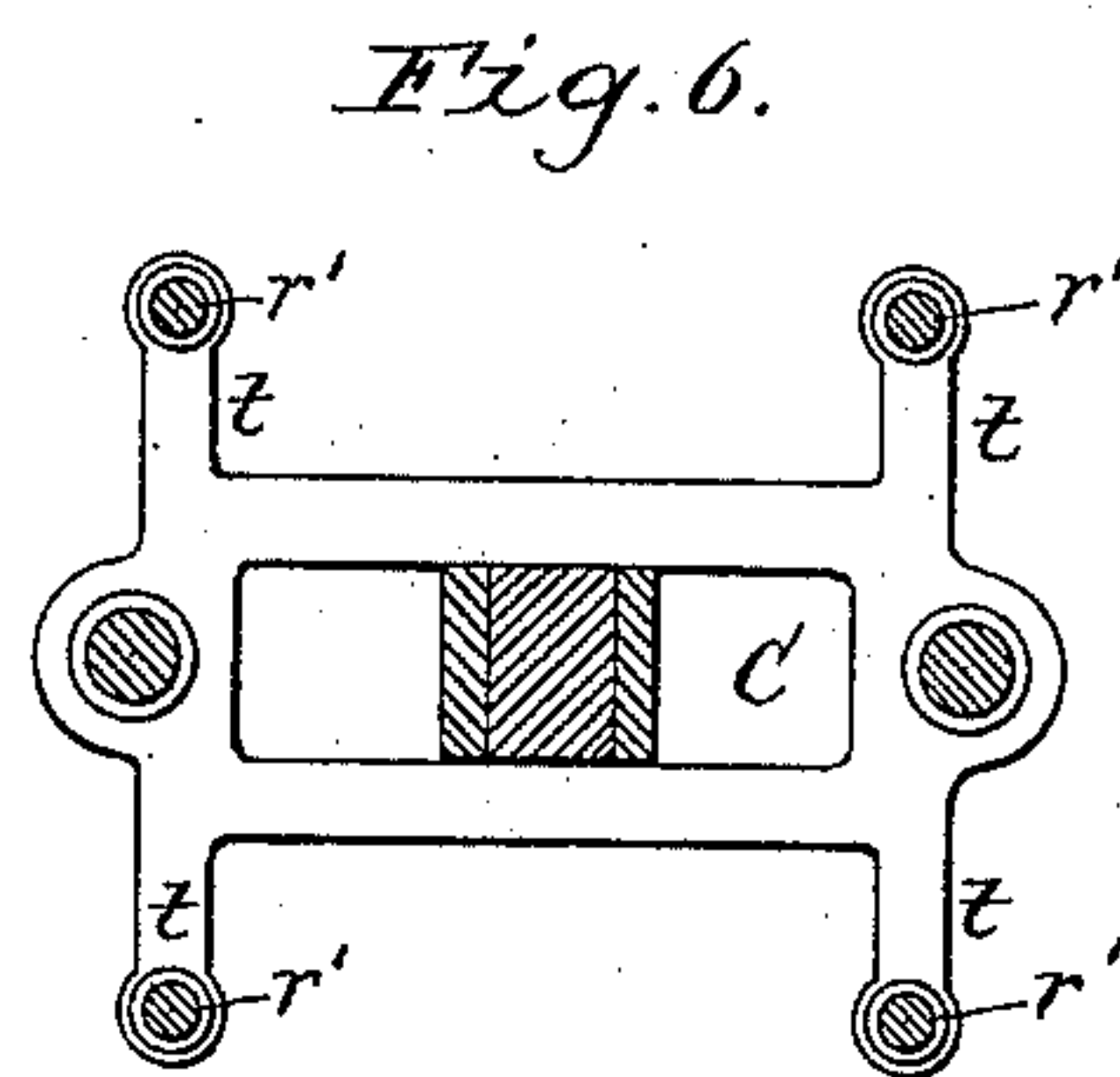
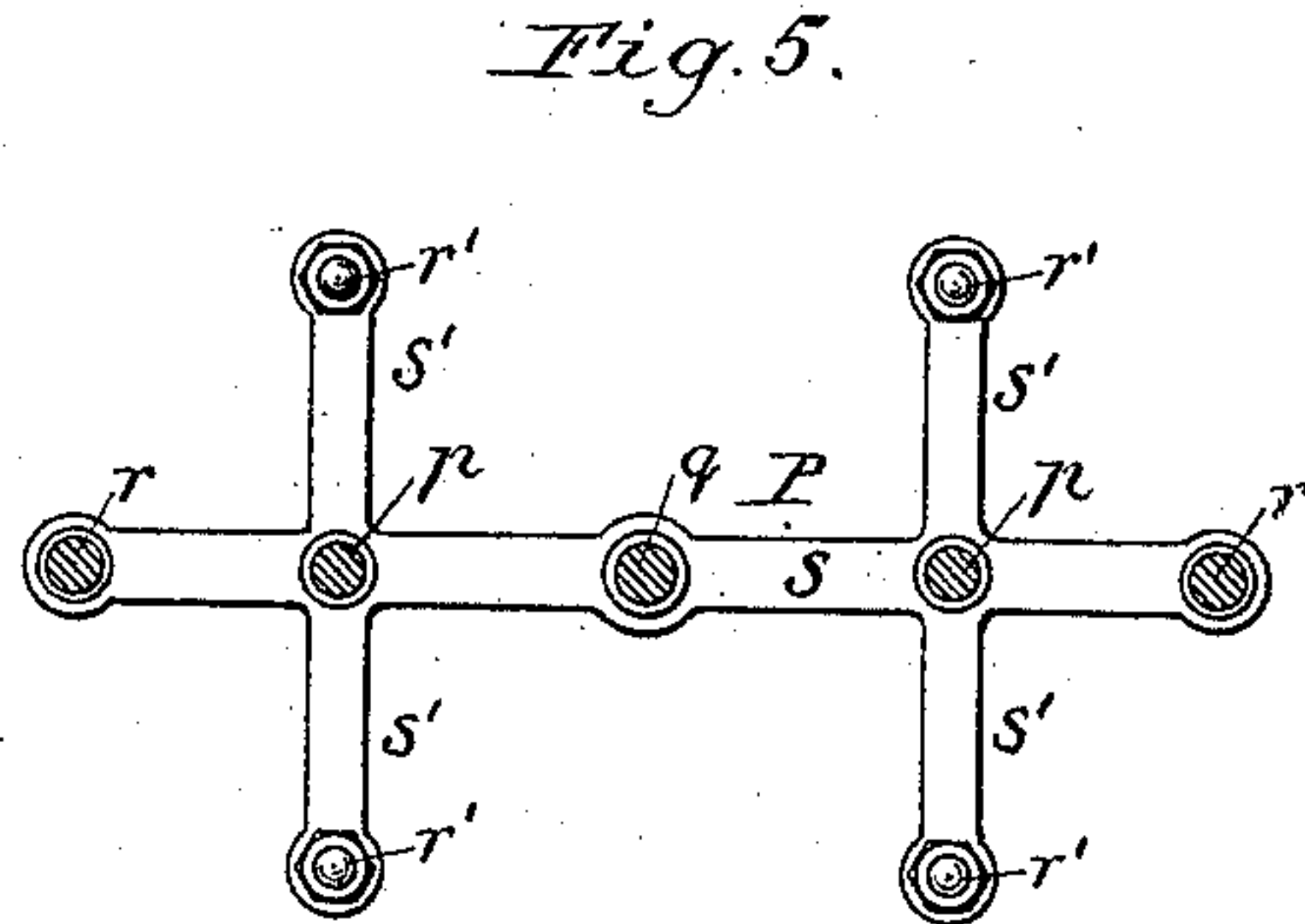
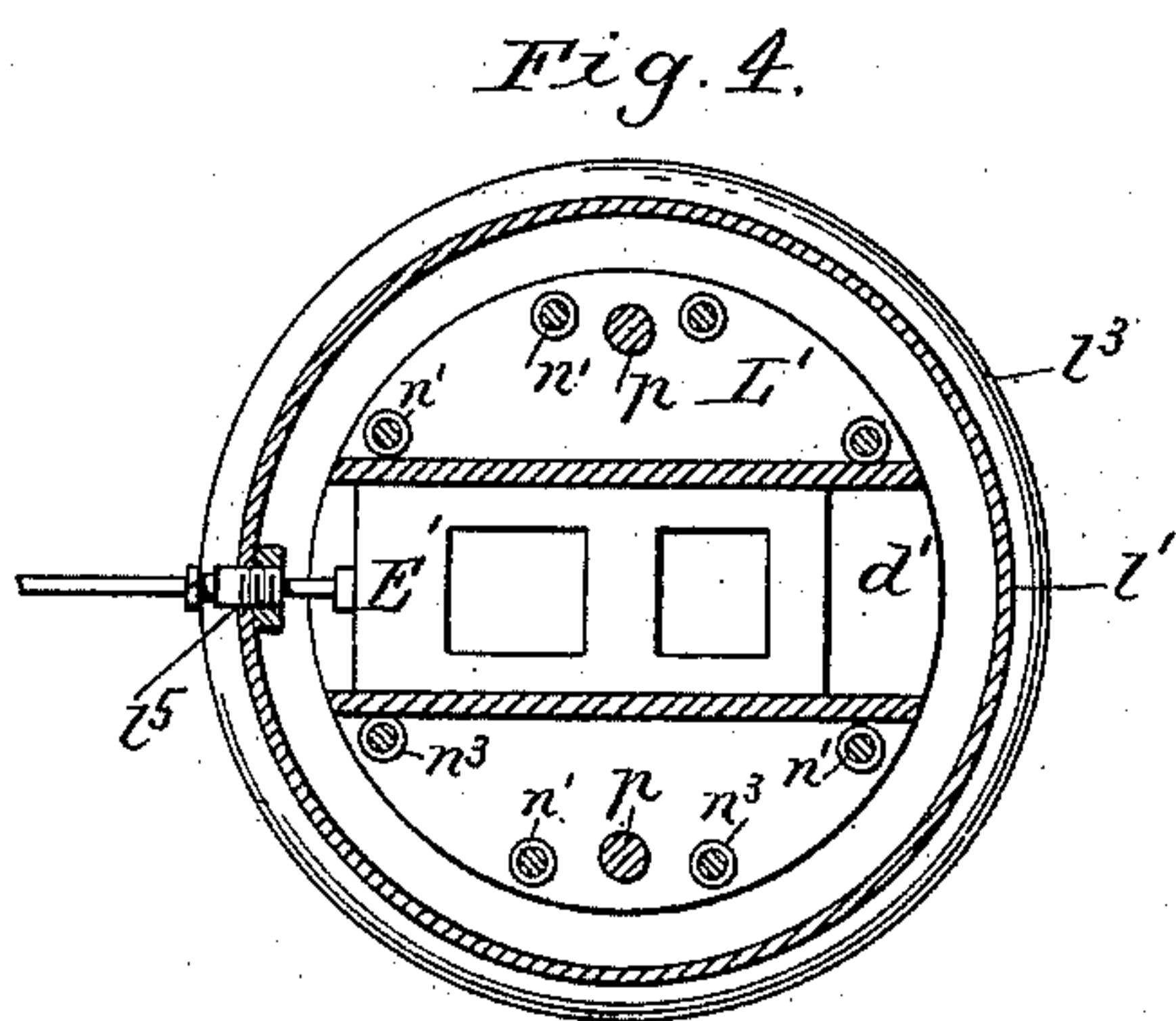
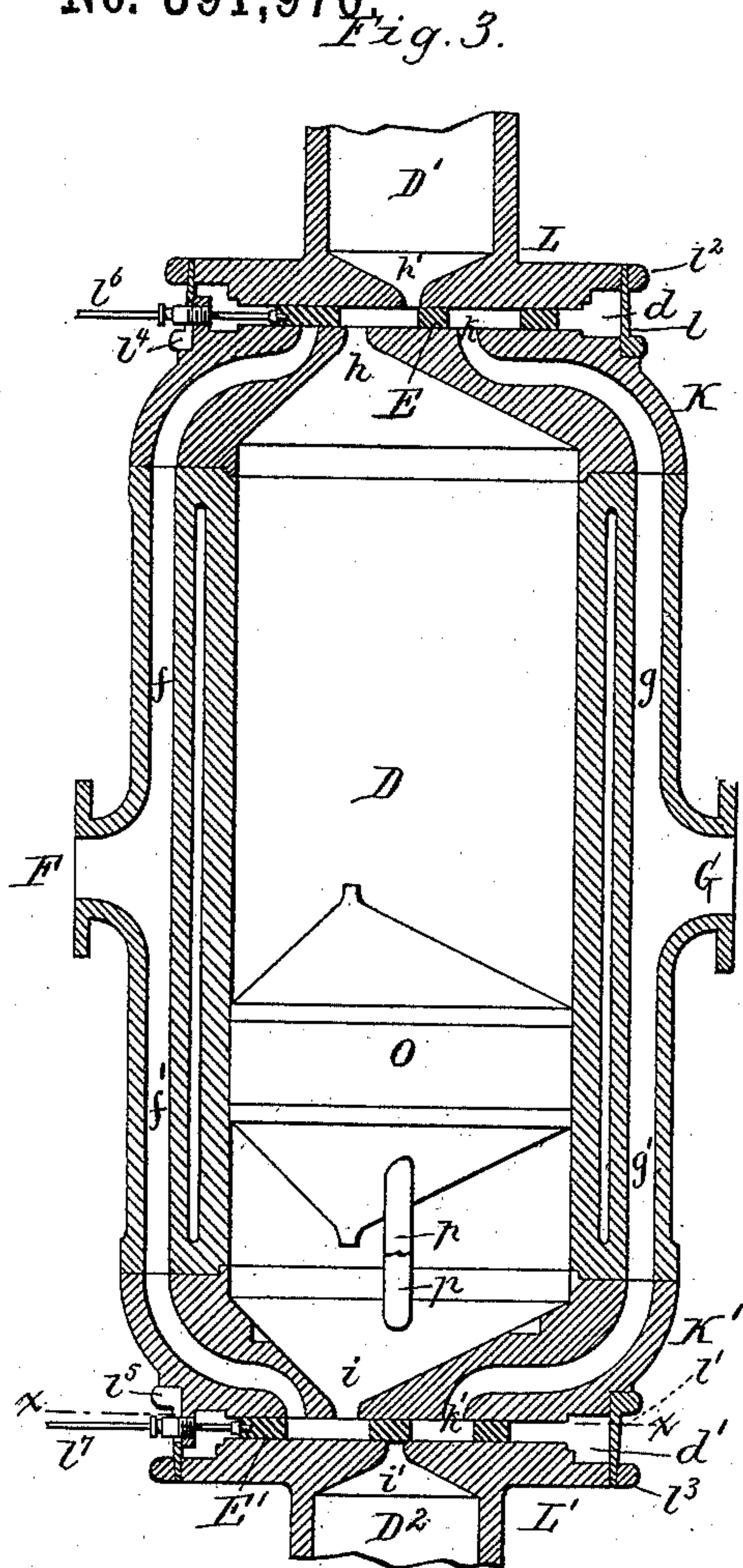
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2 Sheets—Sheet 2.

C. HOLLY.
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Chas. J. Buchheit.
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UNITED STATES PATENT OFFICE.

CARLOS HOLLY, OF LOCKPORT, NEW YORK.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 391,970, dated October 30, 1888.

Application filed September 14, 1887. Serial No. 249,678. (No model.)

To all whom it may concern:

Be it known that I, CARLOS HOLLY, of Lockport, in the county of Niagara and State of New York, have invented a new and useful Improvement in Steam-Engines, of which the following is a specification.

This invention relates to that class of compound engines which are provided with a double-acting low-pressure cylinder and two single-acting high-pressure cylinders arranged at opposite ends of the low-pressure cylinder.

The object of my invention is to simplify the construction of the engine; and my invention consists of the improvements which will be hereinafter fully set forth, and pointed out in the claims.

In the accompanying drawings, consisting of two sheets, Figure 1 is a sectional front elevation of a steam-engine provided with my improvements. Fig. 2 is a side elevation thereof. Fig. 3 is a vertical section of the low-pressure cylinder and the adjacent parts of the high-pressure cylinders on an enlarged scale. Fig. 4 is a horizontal section in line $x x$, Fig. 3. Figs. 5 and 6 are cross-sections in lines $y y$ and $z z$, Fig. 1, respectively. Fig. 7 is a fragmentary vertical section of the upper valve-chamber and connecting parts, on an enlarged scale, at right angles to Fig. 3. Fig. 8 is a similar fragmentary section of the lower valve chamber and connecting parts.

Like letters of reference refer to like parts in the several figures.

A represents the upright supporting-frame of the engine; a , the shaft; b , the crank, and B the pitman, all constructed in any suitable or well-known manner.

C represents the cross-head, and $c c$ the guides thereof.

C' represents a pump, which is connected with the cross-head C by a plunger-rod, C².

D represents the double-acting low-pressure cylinder, and D' D² the single-acting high-pressure cylinders, arranged at opposite ends of the low-pressure cylinder and connected therewith by intermediate valve-chambers, $d d'$, in which are arranged slide-valves E E', by which the flow of steam is controlled. These valves are actuated from the engine-shaft by eccentrics or cams in any suitable or well-known manner.

F represents the steam-inlet pipe, arranged centrally on the rear side of the low-pressure cylinder D; $f f'$, the steam-ports leading from

the inlet F, respectively, to the upper and lower valve chambers, $d d'$; G, the exhaust-pipe, and $g g'$ the exhaust-ports leading from the valve-chambers $d d'$ to the exhaust-pipe G.

h represents the steam-port in the upper end of the low-pressure cylinder D, and h' the steam-port in the lower end of the upper high-pressure cylinder, D'.

i represents the steam-port in the lower end of the low-pressure cylinder D, and i' the steam-port in the upper end of the lower high-pressure cylinder, D².

K represents the upper head of the low-pressure cylinder D, and K' the lower head thereof. The steam-ports $f f'$ and exhaust-ports $g g'$ extend through these heads to the flat valve-seats $k k'$, with which these heads are respectively provided and against which the valves E E' are arranged. The upper port, h , of the cylinder D is arranged in the upper head, K, between the ports f and g , and the lower port, i , is arranged in the lower head, K', between the ports f' and g' .

L represents the lower head of the upper high-pressure cylinder, D', arranged above the head K, with just sufficient space between the opposing faces of both heads to receive the valve E. The head L is provided with the port h' .

L' represents the upper head of the lower high-pressure cylinder, D², arranged below the lower head, K', of the low-pressure cylinder D, and provided with the steam-port i' . The lower valve, E', is arranged between the heads K' and L. The upper valve chamber, d , formed between the heads K and L, is closed circumferentially by a ring, l , and the lower valve-chamber, d' , is closed by a similar ring, l' . These rings are placed against the circumferential faces of the heads L L', on which they are secured by binding hoops $l^2 l^3$, as represented in Figs. 7 and 8.

The body portion of the low-pressure cylinder D is cast on or secured to the main frame A, and the heads K K' are secured to the body portion by screws $m m'$. The high-pressure cylinders D' D² are secured to the heads K K' by screws $n n'$, which are provided between the heads K and L and K' and L' with stay washers or sleeves $n^2 n^3$, whereby the heads are held at the proper distance apart. This construction of the parts permits ready access to the valves and their seats upon removing the high-pressure cylinders, and permits of

the ready adjustment of the parts for wear. When such adjustment is required, the stay-sleeves $n^2 n^3$ are properly shortened by planing or otherwise. The rings $l l'$ are provided with notches $l^4 l^5$, which straddle the valve-rods $l^6 l^7$ and permit the rings to be removed when it is desired to examine the valves.

O represents the piston of the low-pressure cylinder, and $O' O^2$ the pistons of the high-pressure cylinders $D' D^2$.

$p p$ represent two piston-rods extending downwardly from the piston O through the lower head, K' , of the low-pressure cylinder D to a yoke, P, arranged below the cylinders. The piston-rods $p p$ pass through stuffing-boxes p' , arranged in the upper head, L' , of the cylinder D^2 , and extending through the valve-chamber d' into the lower head, K' , of the cylinder D, as clearly shown in Fig. 8.

q represents a piston-rod connecting the center of the yoke P with the lower high-pressure piston, O^2 .

q' is a piston rod extending upwardly from the upper high-pressure piston, O' , to a yoke, Q, arranged above the cylinders.

$r r$ represent two rods connecting the upper yoke, Q, with the lower yoke, P, outside of the cylinders.

r' represents four rods connecting the lower yoke, P, with the cross-head C. In this manner the three pistons $O O' O^2$ are rigidly and securely connected with the lower yoke, P, by the rods $p q q' r$ and the yoke Q, while only two stuffing-boxes are required at the points where the piston-rods $p p$ pass through the lower heads, $K' L'$, thus greatly simplifying the construction of the engine. This construction of the connecting mechanism provides very short communications between the low-pressure cylinder and the high-pressure cylinders, thereby reducing the loss by expansion in these passages to a minimum.

The lower yoke, P, is composed of a central bar, s , to which the rods $q, p p$, and $r r$ are secured, and four laterally-projecting bars, s' , to the extremities of which the four descending rods r' are secured, as clearly represented in Figs. 1, 2, and 5. The cross-head C is provided with four lateral projecting bars, t , to the extremities of which the lower ends of the rods r' are secured, as clearly represented in Figs. 1, 2, and 6. The four vertical rods r' form, with the lower yoke, P, and the cross-head C, a rigid open frame, which affords sufficient space for the free movement of the pitman B and crank b .

U represents the head which closes the upper end of the upper high-pressure cylinder, D' , and U' the head which closes the lower end of the lower high-pressure cylinder, D^2 .

u represents a pipe which connects the upper end of the upper cylinder, D' , with the lower end of the lower cylinder, D^2 , so that the hot air and vapors contained in the passive ends of these cylinders pass alternately from one cylinder to the other, thereby preventing the loss of heat which takes place when the ex-

ternal air is alternately admitted to the passive end of each high-pressure cylinder and expelled in a heated state therefrom.

I claim as my invention—

1. The combination, with the double-acting low-pressure cylinder and single-acting high-pressure cylinders arranged at opposite ends thereof, of the low-pressure piston O, provided with piston-rods $p p$, passing through one end of the low-pressure cylinder, the high-pressure piston O' , provided with a piston-rod, q' , a yoke, Q, attached to the piston-rod q' , a high-pressure piston, O^2 , provided with a piston-rod, q , a yoke, P, attached to the piston-rods q and $p p$, and rods r , connecting the yokes Q and P outside of the cylinders, substantially as set forth.

2. The combination, with the cylinders D D' D^2 , pistons $O O' O^2$, yoke P, and rods connecting said yoke with the pistons, of the cross-head C, parallel rods r' , connecting the cross-head with the yoke P, and the pitman B, and crank b , arranged between the rods r' , substantially as set forth.

3. The combination, with the low-pressure cylinder D, of the detachable heads $K K'$, steam-ports $f f'$, and exhaust-ports $g g'$, formed in the body of the cylinder and extending through the heads $K K'$, ports $h i$, formed in the heads $K K'$, detachable high-pressure cylinders $D' D^2$, provided with ports $h' i'$, and valves $E E'$, arranged between the high-pressure cylinders $D' D^2$ and the heads $K K'$, substantially as set forth.

4. The combination, with the low-pressure cylinder D, of the detachable heads $K K'$, high-pressure cylinders $D' D^2$, screws and stay-sleeves connecting the high-pressure cylinders to the heads $K K'$, and valves $E E'$, arranged between the high-pressure cylinders and the heads $K K'$, substantially as set forth.

5. The combination, with the low-pressure cylinder D, of the detachable heads $K K'$, high-pressure cylinders $D' D^2$, valves $E E'$, arranged between the cylinders $D' D^2$ and the heads $K K'$, and removable rings $l l'$, inclosing the space between the heads $K K'$ and the cylinders $D D'$, substantially as set forth.

6. The combination, with the low-pressure cylinder D, having a lower head, K' , and the high-pressure cylinder D^2 , having an upper head, L' , said heads being separated by a valve-chamber, d' , of a piston, O, arranged in the low-pressure cylinder, piston-rods p , attached to said piston and extending through the heads $K' L'$ and the valve chamber d' , and stuffing-boxes p' , surrounding the piston-rods p and extending through the head L' , the valve-chamber d' , and into the head K' , substantially as set forth.

Witness my hand this 25th day of August, 1887.

CARLOS HOLLY.

Witnesses:

JNO. J. BONNER,
FRED. C. GEYER.