

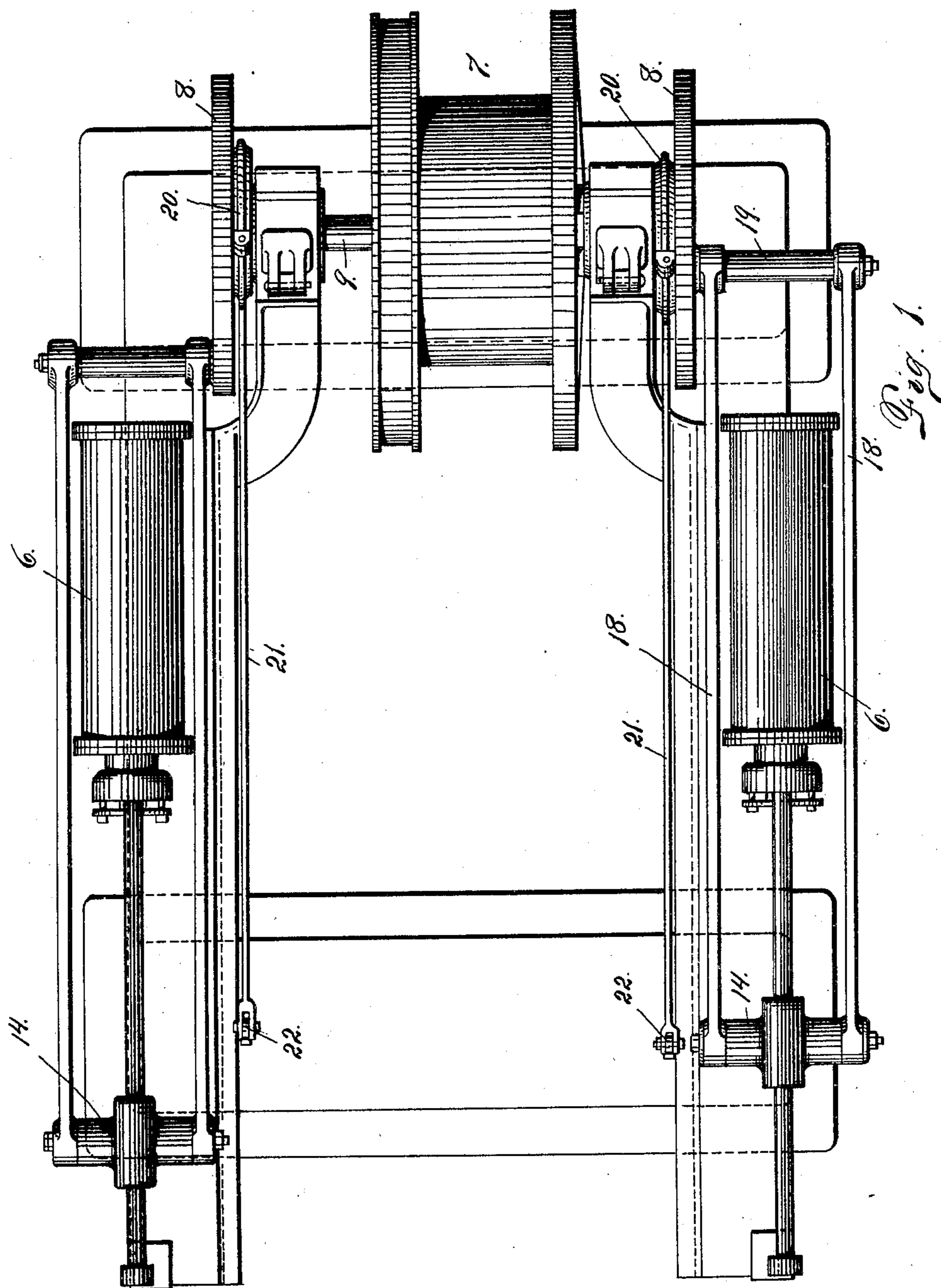
No. 793,561.

PATENTED JUNE 27, 1905.

H. BOLTHOFF.  
ENGINE.

APPLICATION FILED JUNE 19, 1902.

3 SHEETS—SHEET 1.



WITNESSES:

Otto E. Hoddick.  
Dena Nelson.

INVENTOR.

Henry Bolthoff.

BY

Attorney.

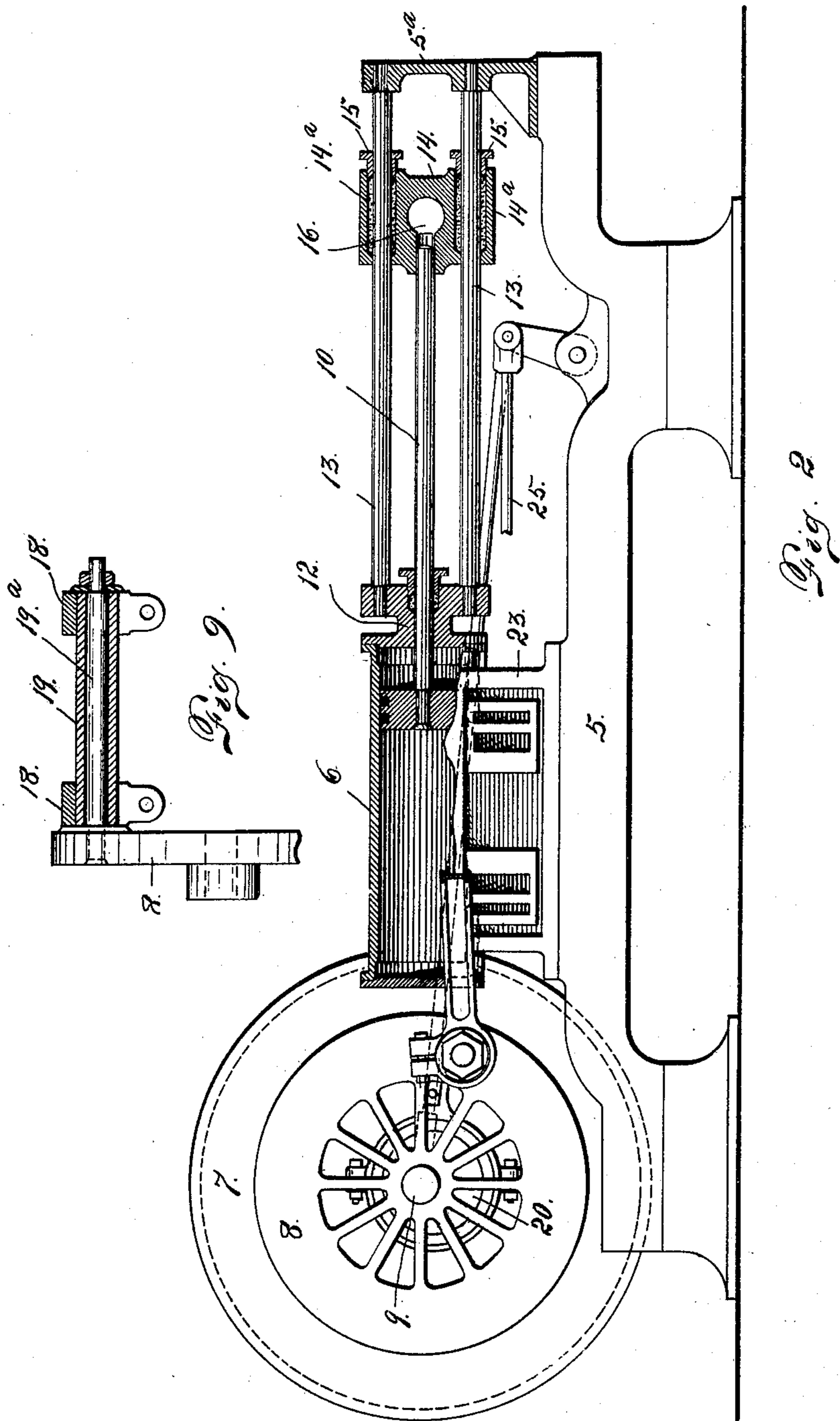
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WITNESSES:  
Otto E. Hoddick.  
Dana Nelson.

INVENTOR.  
Henry Bolthoff.  
BY *[Signature]* ATTORNEY.

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3 SHEETS—SHEET 3.

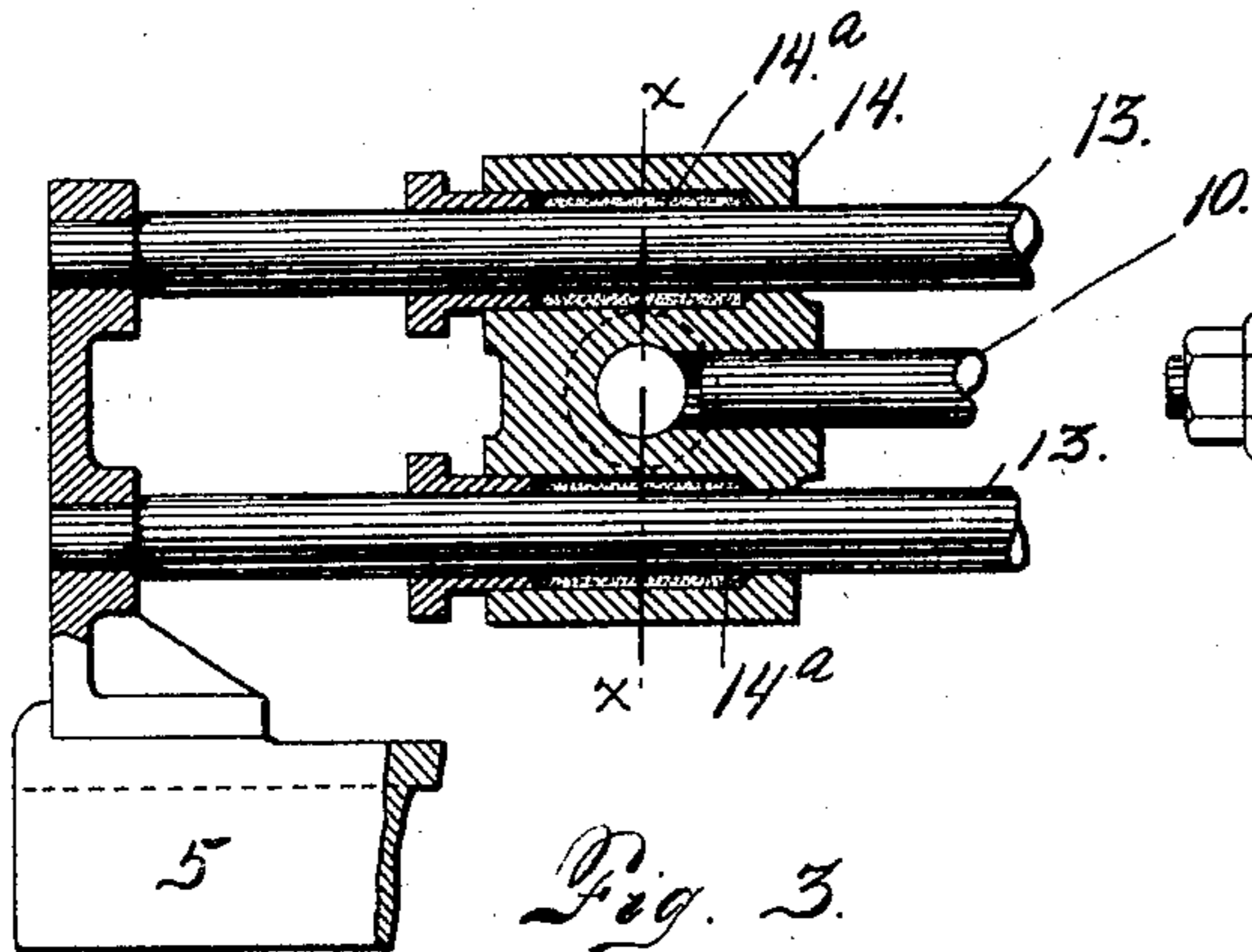


Fig. 3.

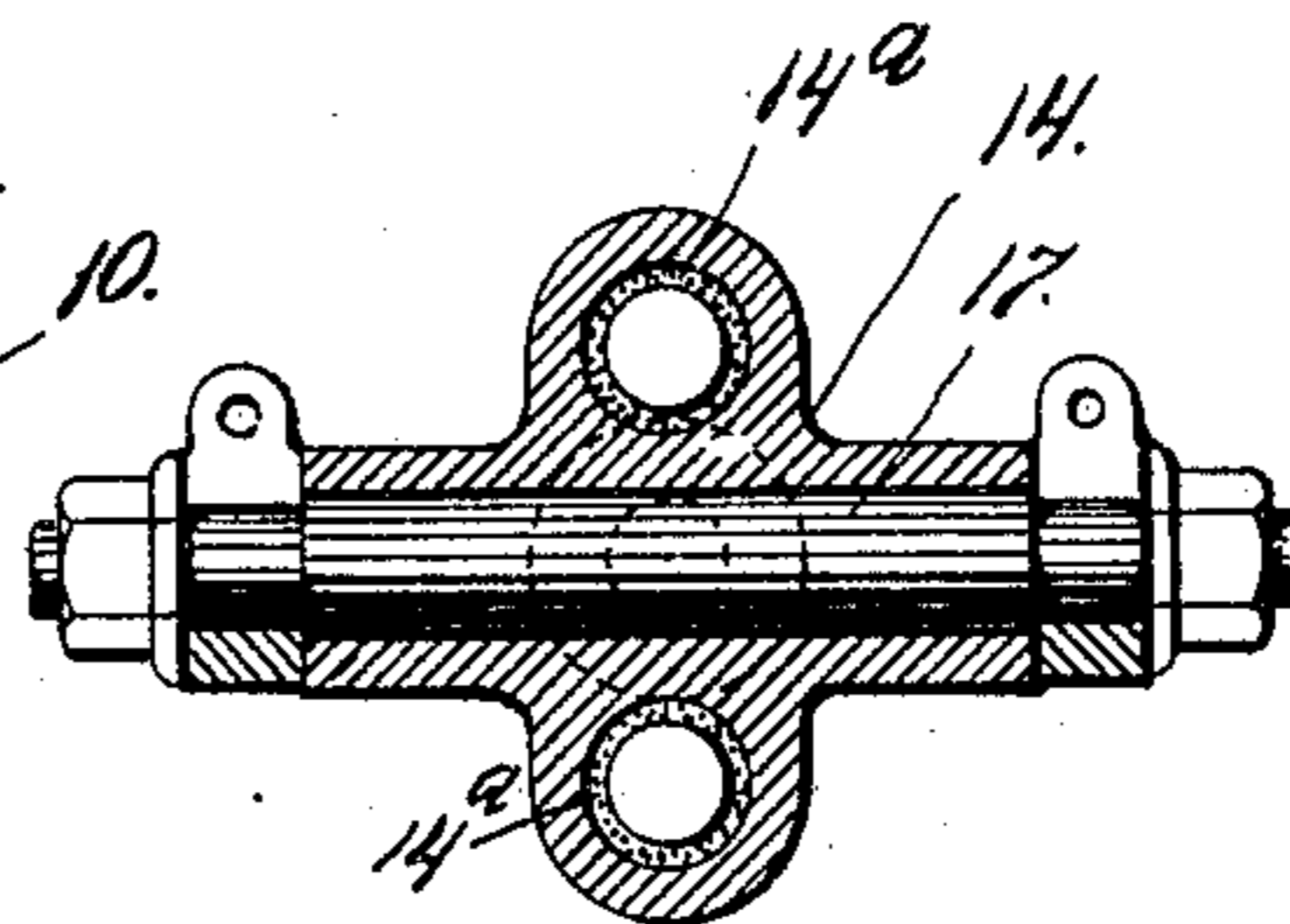


Fig. 4.

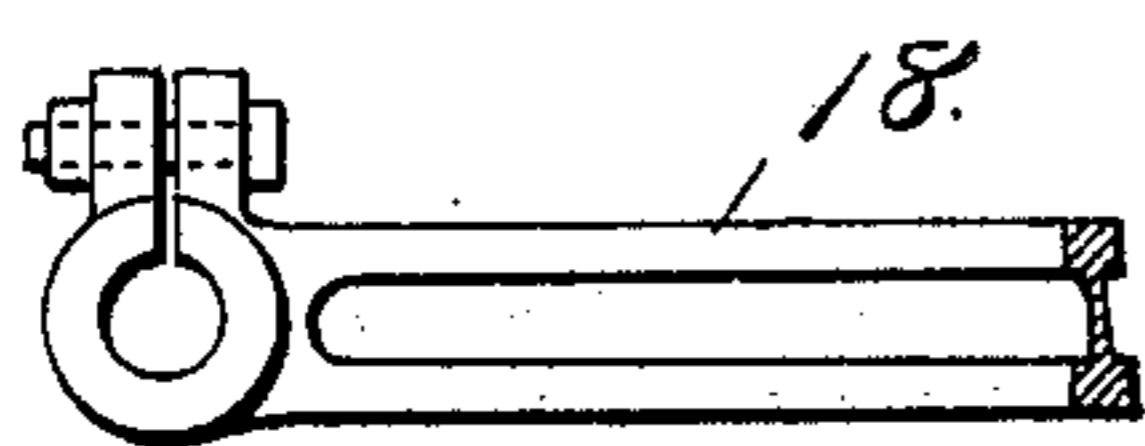


Fig. 5.

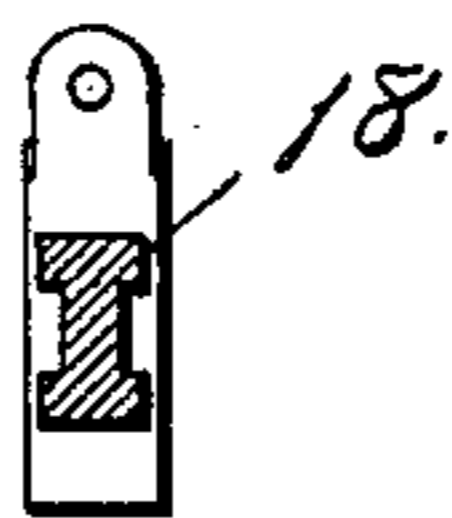


Fig. 7.

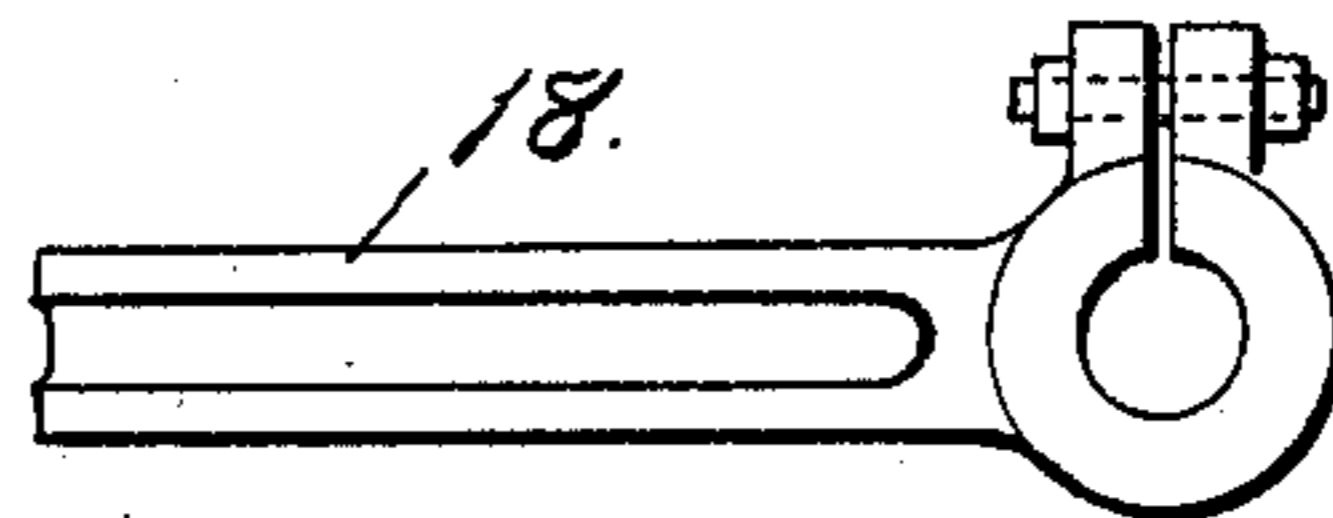


Fig. 6.

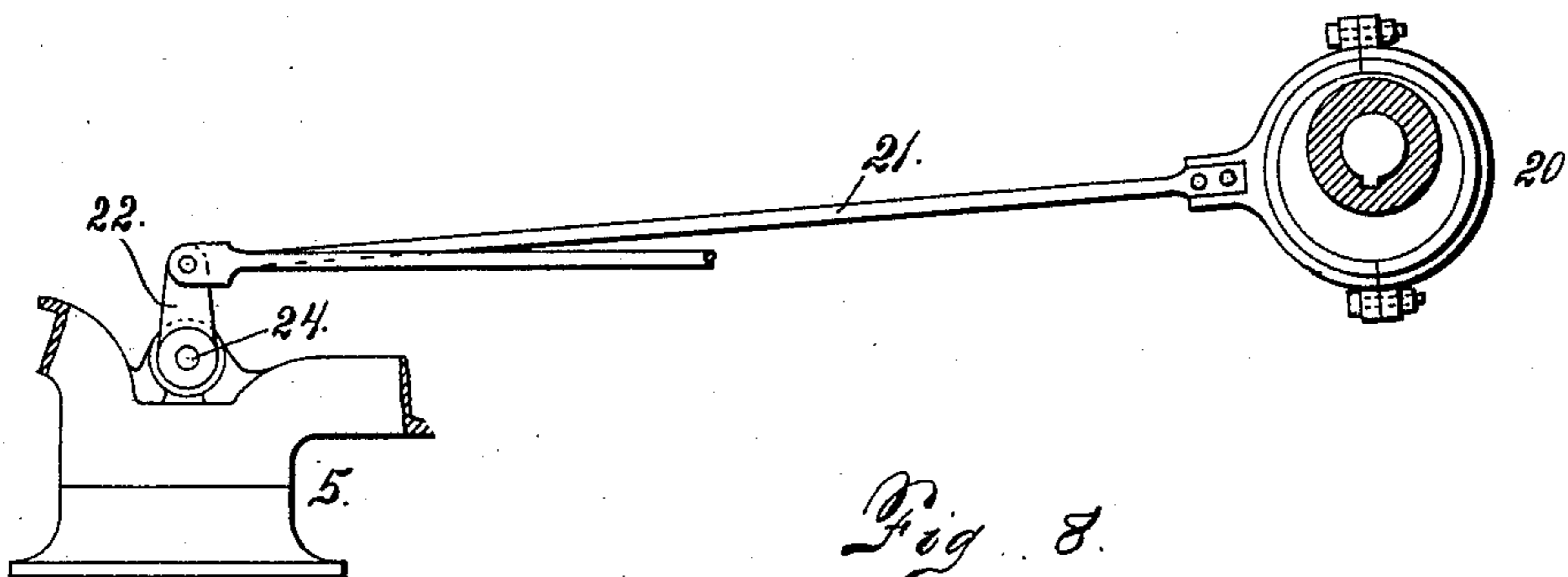


Fig. 8.

WITNESSES:

Otto E. Hoddick.  
Dena Nelson.

INVENTOR.

Henry Bolthoff.  
BY  
Attorney.

# UNITED STATES PATENT OFFICE.

HENRY BOLTHOFF, OF DENVER, COLORADO.

## ENGINE.

SPECIFICATION forming part of Letters Patent No. 793,561, dated June 27, 1905.

Application filed June 19, 1902. Serial No. 112,316.

*To all whom it may concern:*

Be it known that I, HENRY BOLTHOFF, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Direct-Acting Hoisting-Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in direct-acting hoisting-engines or engines having the power applied directly to the shaft of the winding drum or spool, as distinguished from those engines having the power applied through the instrumentality of gears. As heretofore constructed engines of this character have had the drum located remote from the steam-cylinders, the connecting-rods being extended in the line of the cross-heads forwardly to the crank-wheels of the main shaft, upon which the drum or spool is mounted, thus making the length of the apparatus and the space required for its occupancy considerable.

My object is to overcome this difficulty and provide a machine of this class which shall be of compact construction, and to this end I locate the drum rearwardly of the cross-head and employ connecting-rods extending rearwardly from the cross-head to the crank-wheels of the shaft-drum, thus making the machine much more compact and of only about half the length of the ordinary construction, as heretofore specified.

Having briefly outlined the nature of the invention and the objects I expect to attain thereby, I will proceed to describe the same in detail and subsequently point out in the claims the novel features.

Referring to the drawings, Figure 1 is a top or plan view of my improved hoisting-engine. Fig. 2 is a side elevation of the same, partly in section. Fig. 3 is a fragmentary detail view illustrating the cross-head, its guides, and the piston-stems, parts being shown

in section. Fig. 4 is a section taken through the cross-head on the line *xx*, Fig. 3, the guide-rods being removed. Figs. 5 and 6 illustrate one of the connecting-rods extending from the cross-head pin to the crank-wheel pin. Fig. 7 is a cross-section of the same. Fig. 8 is a detail view illustrating the eccentric construction for controlling the slide-valve. Fig. 9 is a section taken through the sleeve of the crank-wheel pin, the parts being shown on a larger scale.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate the engine-frame; 6, the steam-cylinder; 7, the winding-drum, and 8 the crank-wheels fast on the drum-shaft 9. The piston rod or stem 10 of each cylinder passes through a stuffing-box 12. Above and below the gland the stuffing-box is provided with openings in which are inserted the extremities of two guide-rods 13, whose opposite extremities are supported by a part 5<sup>a</sup> of the frame. Upon the rods 13 is slidably mounted the cross-head 14, with which the outer extremity of the piston-rod is connected. This piston rod or stem is located intermediate the rods 13, one being above and the other below. The cross-head where the guide-rods 13 pass therethrough is provided with packing-chambers filled with packing material 14<sup>a</sup> and closed at one end by glands 15. This cross-head is horizontally bored in the plane of the piston-stem, as shown at 16, to receive a pin 17. To the opposite extremities of this cross-head pin are clamped the extremities of two parallel rods 18, which extend rearwardly from the cross-head on opposite sides of the cylinder. The extremities of these rods remote from the cross-head are clamped to a sleeve 19, mounted on a pin 19<sup>a</sup>, fast on a crank-wheel 8.

Between each crank-wheel and the bearing for the shaft 5 is located an eccentric 20, mounted on the drum-shaft. From the strap of this eccentric leads a rod 21 to a crank-arm 22, pivotally mounted on the frame 24. Another rod 25 leads rearwardly from the crank-arm 22 and is connected with the slide-valve of the steam-chest 23, which is located beneath the cylinder. This steam-chest arrangement

allows the moisture of condensation in the cylinder to flow downwardly through the ports and escape therefrom instead of accumulating in the cylinder.

5 For convenience of description the term "forward" as used in this specification means toward the left in Fig. 1 and toward the right in Fig. 2, while "rearward" or "backward" indicates the opposite direction in said figures.

10 From the foregoing description the use and operation of my improved hoisting-engine will be readily understood and need not be further described in detail.

Attention is called to the fact that the drum 15 may either be made fast directly on its shaft or connected therewith by ordinary clutch mechanism. The clutch is not shown, as nothing is claimed on this feature in this specification.

20 As the extremities of the rods 18 are clamped to the pin 17, the latter turns in the cross-head, and for the same reason each crank-wheel pin turns in its sleeve. By reason of the fact that the extremities of the connecting-rods 18 are 25 clamped to their engaging parts the two rods, the cross-head pin 17, and the crank-wheel sleeve 19 form a rigid yoke of rectangular shape, causing the two parallel rods 18 to operate exactly in unison.

30 Having thus described my invention, what I claim is—

1. The combination with a suitable frame, of a drum suitably mounted thereon, a cylinder located forward of the drum-axis, a crank-

wheel fast on the drum-shaft, two guides, one 35 above the other, and extending forwardly of the cylinder, said guides being supported on the frame at one extremity and on the cylinder at the opposite extremity, a cross-head mounted on the guide-rods, a horizontal pin 40 passed through the cross-head between the rods and loose in the cross-head, a pin fast on the crank-wheel outside of its center, a sleeve loose on the crank-wheel pin, and two parallel 45 rods straddling the cylinder and having their extremities rigidly clamped respectively to the cross-head pin and the sleeve of the crank-wheel pin forming a rigid rectangular yoke.

2. In a hoisting-engine, the combination with a crank-wheel on the operating-shaft and 50 a cross-head suitably mounted, the latter having a loose pin passing therethrough and having protruding extremities, the crank-wheel having a loose sleeve on its pin, and a connection between the cross-head pin and the 55 sleeve of the crank-wheel pin, comprising two separated rods rigidly clamped at one extremity to the opposite ends of the cross-head pin, and at the opposite extremity to the opposite ends of the sleeve of the crank-wheel 60 pin, forming a rigid rectangular frame or yoke.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY BOLTHOFF.

Witnesses:

DENA NELSON,  
A. J. O'BRIEN.