

No. 748,302.

PATENTED DEC. 29, 1903.

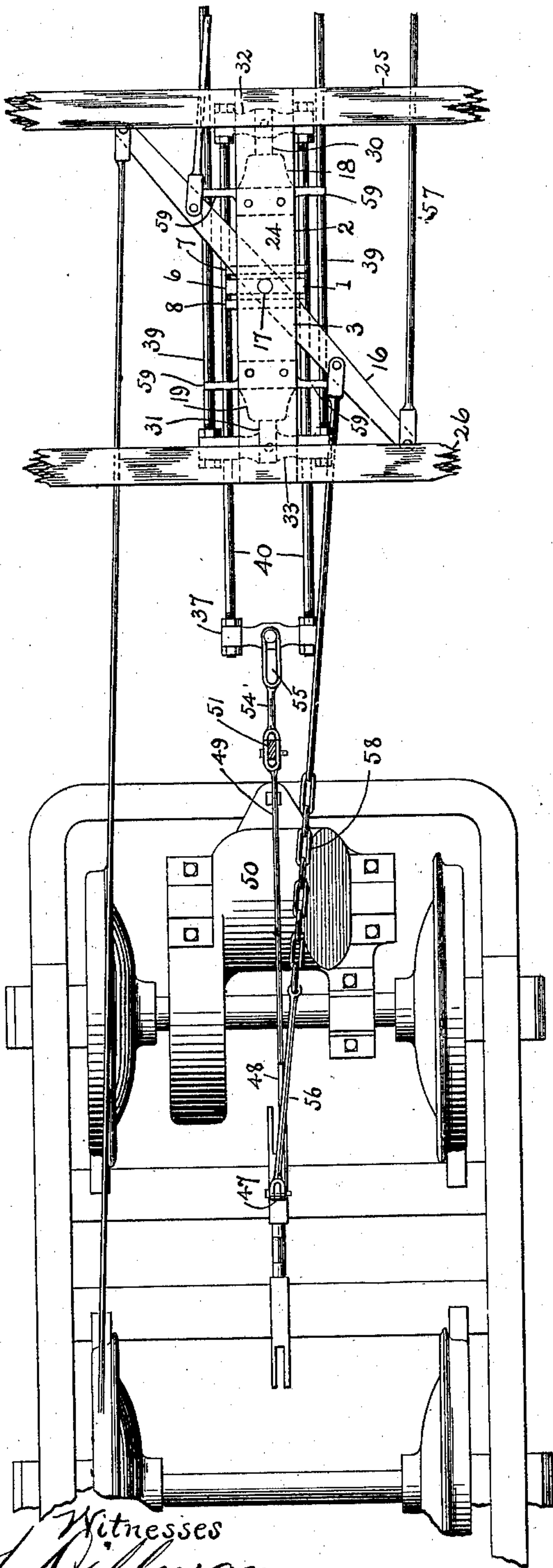
W. H. NIGHTINGALE.  
DUPLEX AIR BRAKE SYSTEM.

APPLICATION FILED DEC. 8, 1902.

NO MODEL.

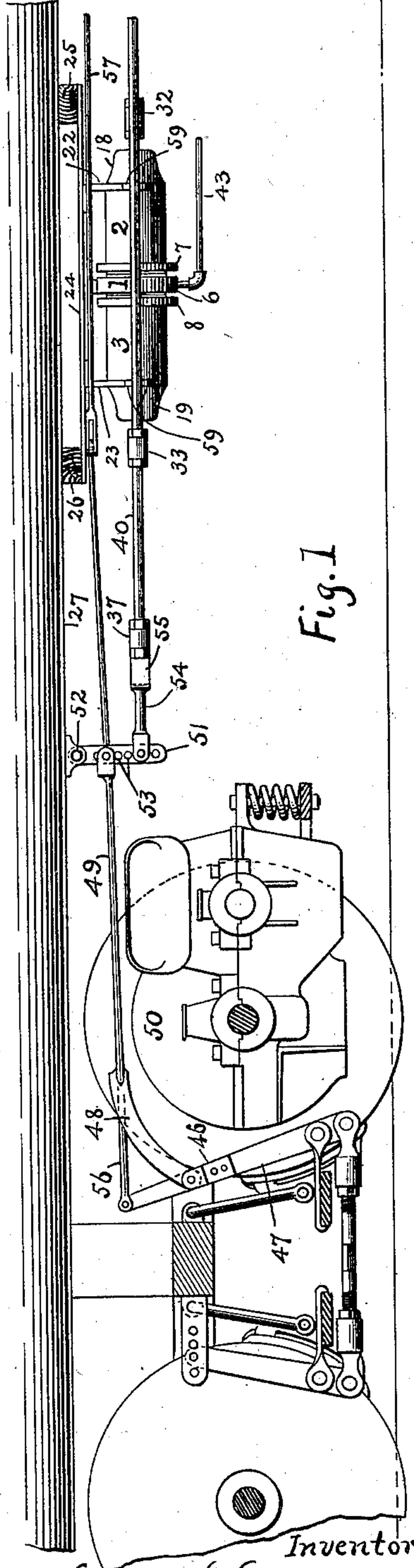
3 SHEETS—SHEET 1.

Fig. 2



Witnesses  
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Fig. 1



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3 SHEETS—SHEET 2.

Fig. 4

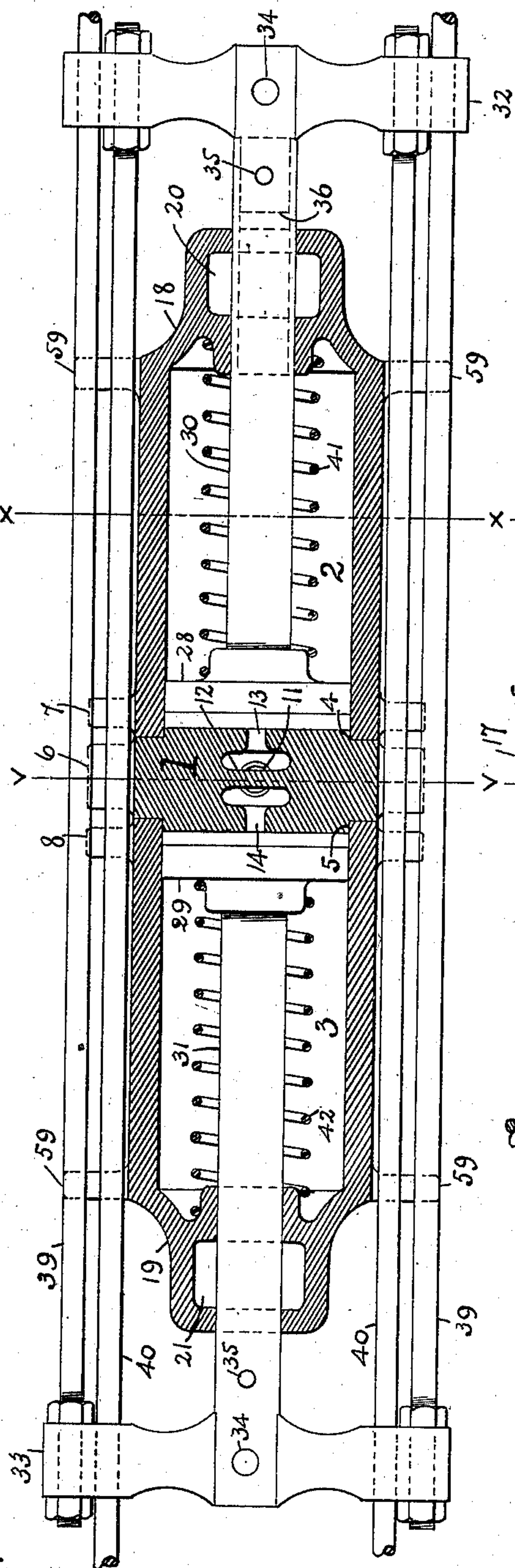
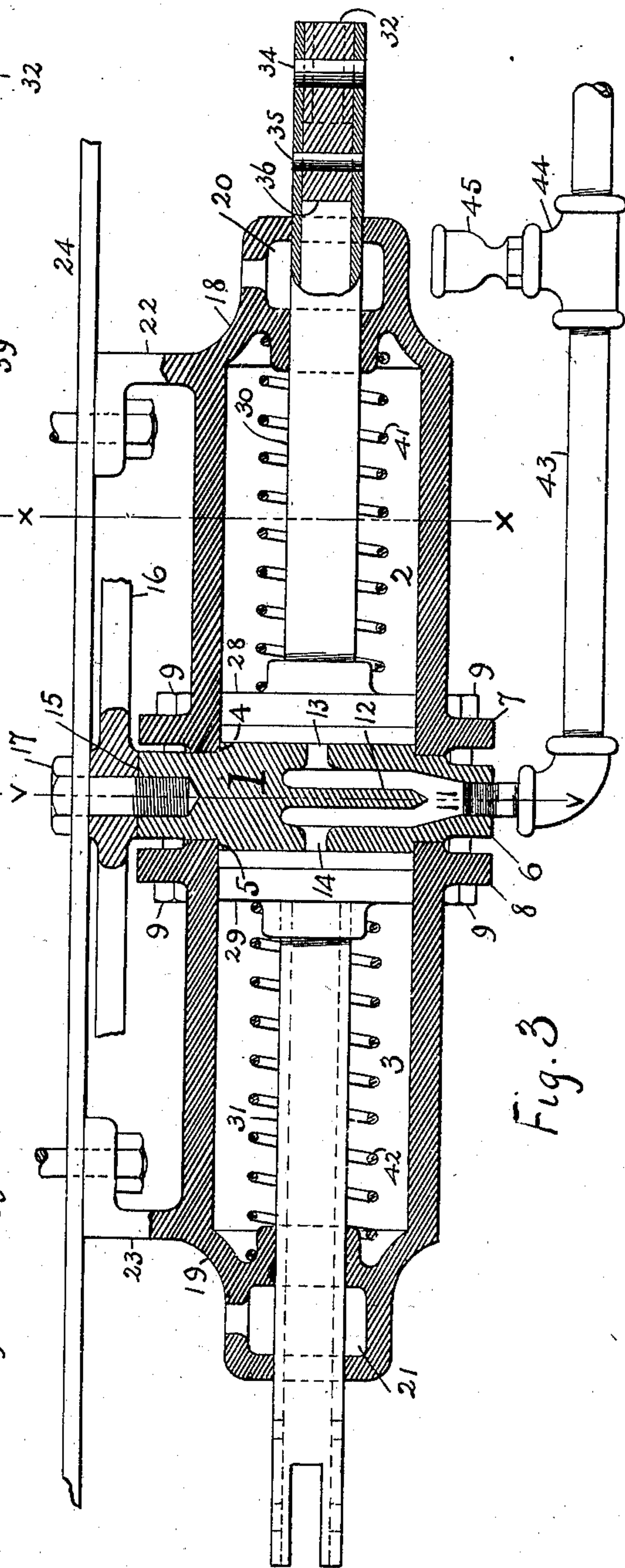


Fig. 3



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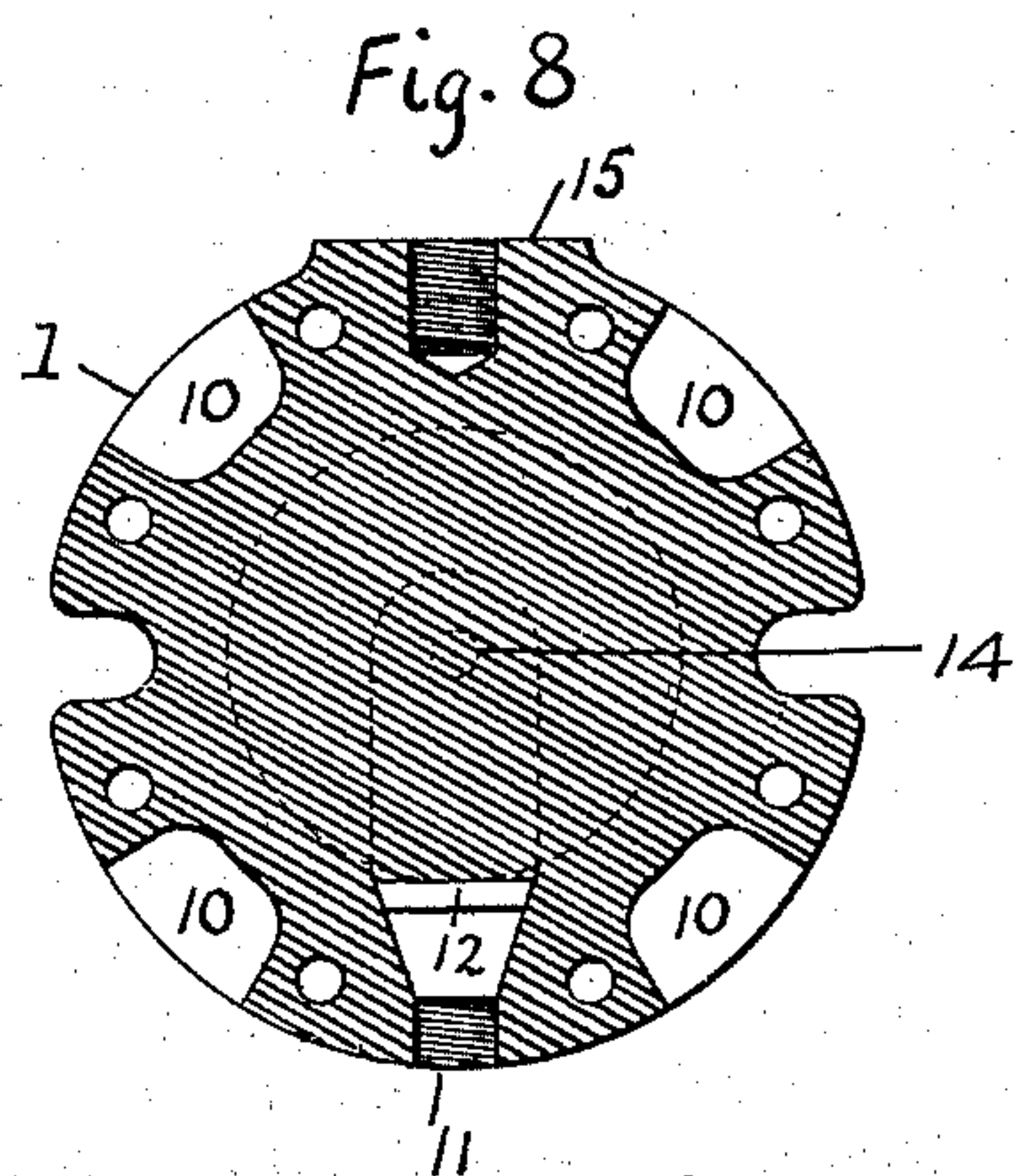
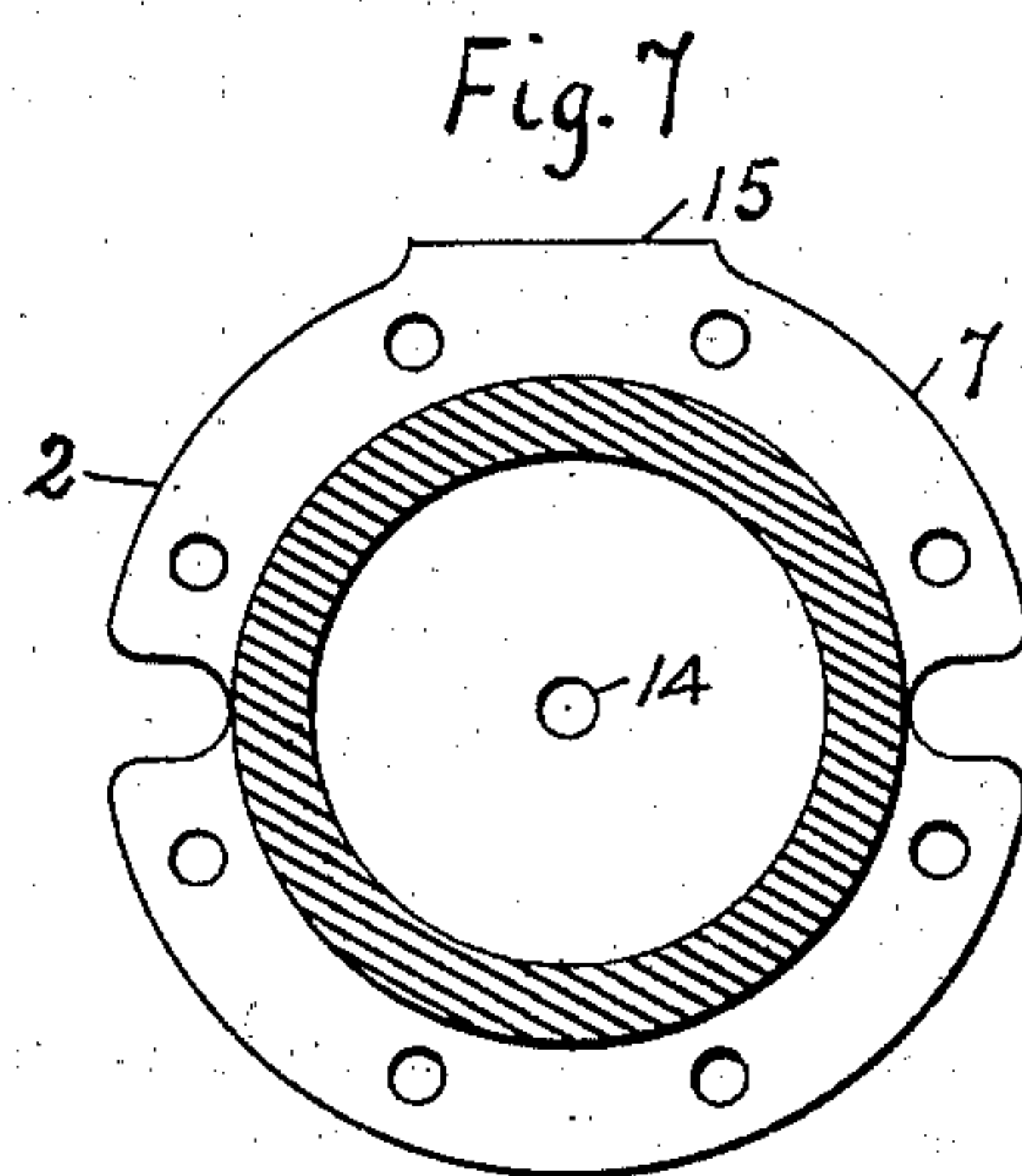
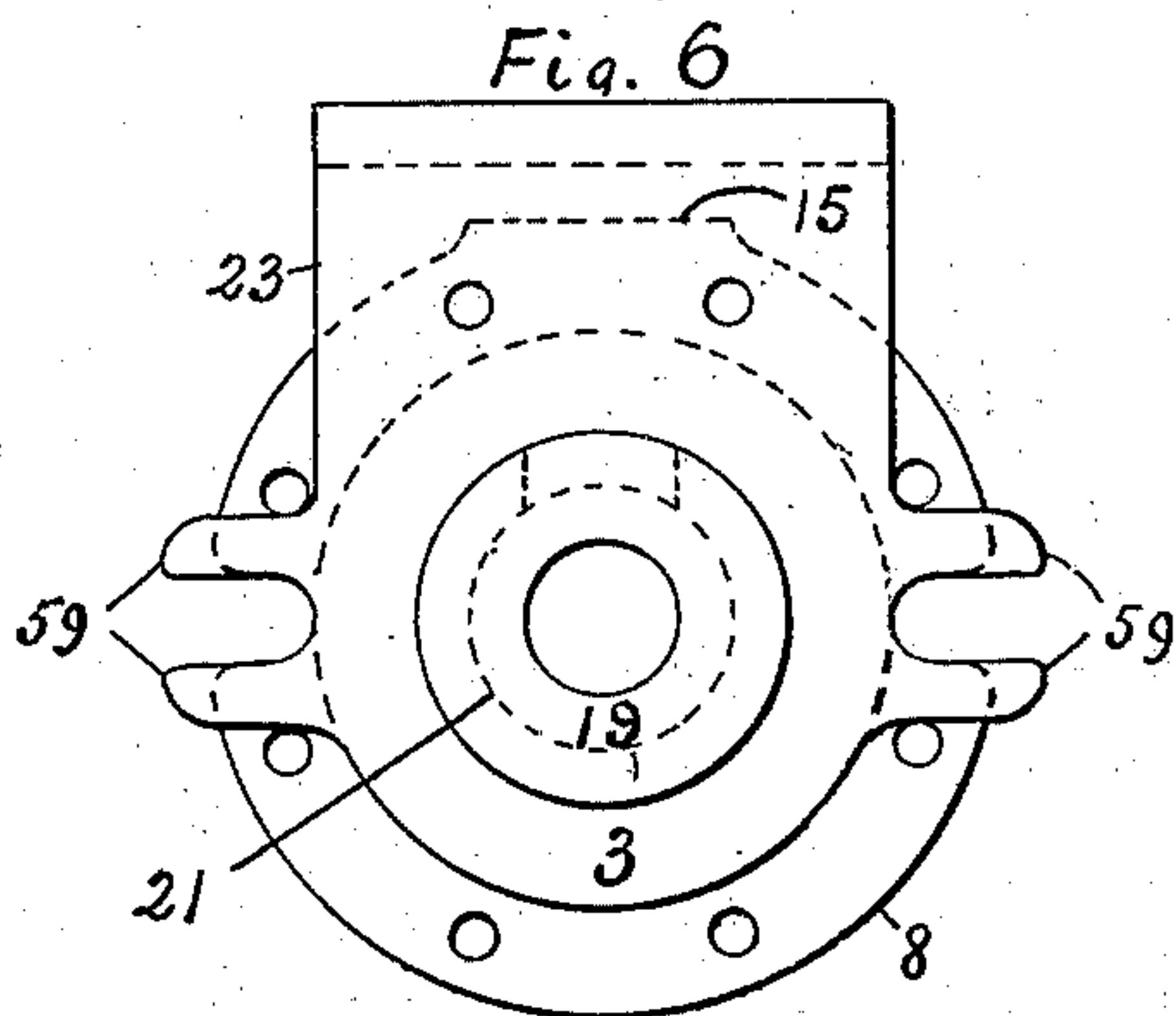
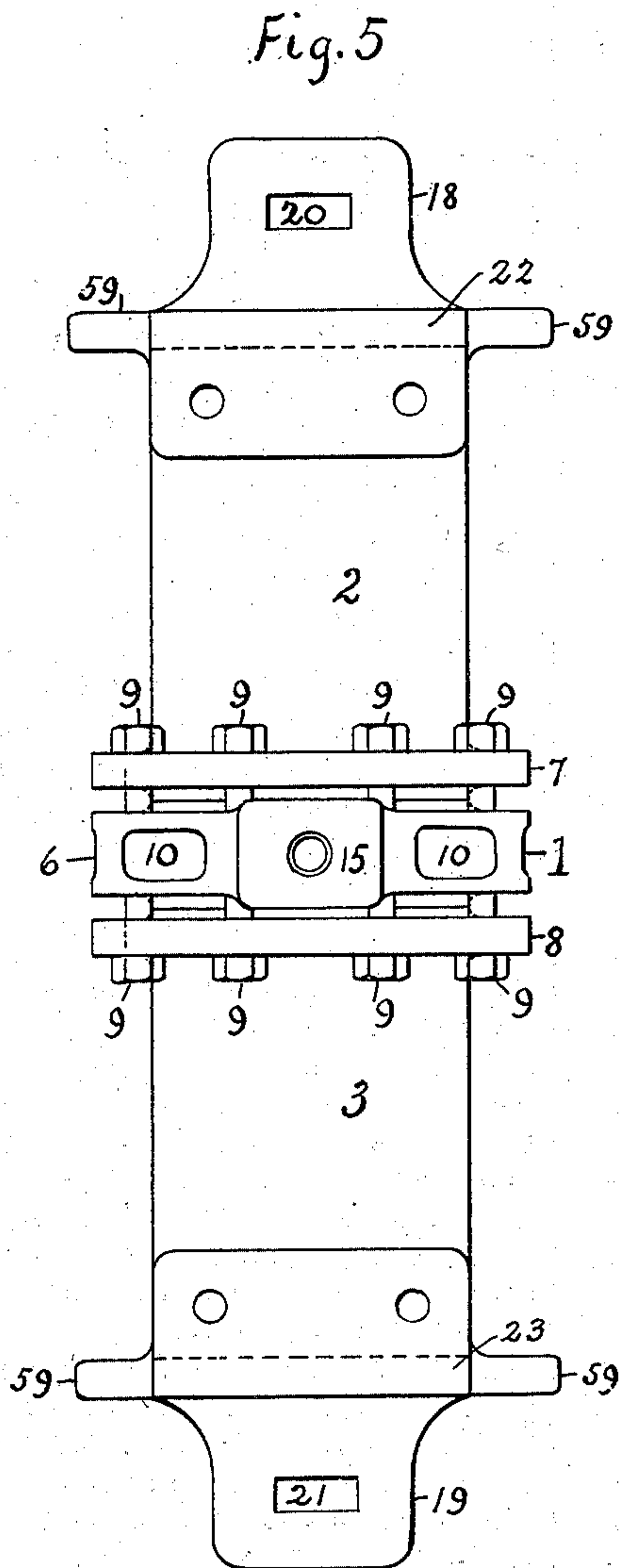
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NO MODEL.

3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

WILLIAM H. NIGHTINGALE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR  
TO JOHN E. REYBURN, OF PHILADELPHIA, PENNSYLVANIA.

## DUPLEX AIR-BRAKE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 748,302, dated December 29, 1903.

Application filed December 8, 1902. Serial No. 134,224. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. NIGHTINGALE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Duplex Air-Brake Systems, of which the following is a specification.

This invention relates to improvements in air-brakes, and especially to improvements over my previous application for a duplex air-brake system filed May 20, 1902, Serial No. 108,157, and allowed August 29, 1902. In many cars on account of difference in construction it is found to be necessary to provide for placing the cylinders lower on the car and to provide means to couple the pulling mechanism of the cylinders to the truck brake-lever, which will clear the motor-case without liability to change form owing to the pulling strains to which it is subjected, as is the case when constructed with several bends and offsets, as heretofore, to clear the motor-case. The duplex cylinder has also been improved to cheapen and facilitate its manufacture, to provide more ready accessibility to its pistons, to guard against defects which are liable to occur when the cylinders are formed integral, and also for renewals owing to wear, as the defective part can now be replaced without the loss of other parts still good, which could not be done as previously constructed. With the present construction the single cylinders in use in other systems of brakes can be utilized in making changes to this system by attaching them to each side of the central connection, each cylinder and the central connection having independent means for their attachment to the car, so that the cylinders may be separately detached for inspection, repairs, or renewal.

Other improvements are embodied as to means of lubrication and will be more fully set forth.

The accompanying drawings, in which like parts are designated by similar figures of reference, illustrate the various improvements and their application.

Figure 1 shows in elevation, with some parts in section the cylinders attached to a car and their connection to one of its trucks, the

trucks at each end of the car being alike and coupled alike to the cylinders. Fig. 2 is a plan of Fig. 1 with the car-flooring removed. Fig. 3 is a central vertical section of the cylinders and their central connection, the pistons and pipe piston-rods not being in section. Fig. 4 is a central horizontal section of the parts shown in Fig. 3 with some parts not in section. Fig. 5 is a plan or top view of the duplex cylinders and their central connection. Fig. 6 is an outer end view of a cylinder. Fig. 7 is a cross-section of a cylinder on line *xx*, Figs. 3, 4, looking toward the central connection. Fig. 8 is a cross-section of the central connection on line *vv*, Figs. 3, 4.

In the present construction there is a central connection 1, to which the cylinders 2 3 are attached at their inner open ends, one at each side, (see Figs. 3, 4, 5,) connection 1 having turned projections 4 5 at each side, over which the cylinders snugly fit, while a central flange 6 on the connection and flanges 7 8 on the cylinders provide the means whereby all may be secured firmly together by bolts 9. Recesses 10 remove the metal not required in flange 6 between the bolts and reduce the weight. The connection 1 is provided with an air-inlet 11, with a central partition 12 and ports 13 14 for air admission to the cylinders. At the top of the connection a flat seat 15 is formed to receive the hand brake-lever 16, and it is tapped for the fulcrum-bolt 17. Cylinders 2 3 now have integral outer heads 18 19 instead of removable heads, as heretofore, and with pockets 20 21 formed therein for holding lubricating-packing to surround and oil the piston-rods and wipe off any dust which may adhere to the piston-rods and prevent its entrance into the cylinders, where it is destructive of the cylinders and the piston-packing. At the top of the cylinders, near their outer ends, are knees 22 23, by which they are secured to a strap 24, which also receives fulcrum-bolt 17, and the strap is secured to cross-sills 25 26 under the car 27. The strap 24 is unnecessary on some cars, in which case knees 22 23 and bolt 17 are secured directly to the car's underframing.

By the means here described the cylinders can be readily and securely attached to the



various constructions of cars and can be elevated more or less to suit different requirements, as found. Within the cylinders are pistons 28 29, as illustrated in the previous application or of any suitable construction, and having attached piston-rods 30 31 of the tubular or pipe construction, which connect them to inner cross-heads 32 33 by pins 34 35, which pass through the pipes and cross-heads, and bosses 36, formed on the cross-heads and entering the pipes. By this construction it is no longer necessary to employ the push-rods, as heretofore, saving considerable expense and weight. The inner cross-heads are attached to outer cross-heads 37 38 (38 not shown) by rods 39 40, as in the previous invention. Springs 41 42 are used, as heretofore, to return the pistons when the pressure is removed.

Compressed air from the receiver (not shown) enters connection 1 through pipe 43, and for the purpose of lubricating the cylinders and their pistons a pipe-T 44 is introduced into the pipe, and an oil-cup 45 of any suitable construction, but preferably a needle-cup, is thereto attached, so that lubricating material may regularly flow to the cylinders with the inflowing air. A jaw 46 is formed on or attached to the live brake-lever 47 of the truck, (see Figs. 1, 2,) and therein is secured the curved end 48 of brake connection 49, its section being rectangular to resist the tendency to straighten, the curve formation carrying the rod up and over the motor-case 50, while the movement of the lever, the rod, and the piston travel are much less than by the former invention. The inner end of the brake connection 49 is attached to an intermediate lever 51, fulcrumed on the car-frame by pin 52, below which are a series of pin-holes 53, so that connection 49 may be attached for different leverages. Below connection 49 a rod 54 is attached, which at its opposite end is attached to cross-head 37 by a slotted opening 55, which permits the application of the hand-brake without moving the pistons. Live lever 47 continues upward from jaw 46, and at its upper end one end of hand brake-rod 56 is attached, the other end being attached to hand brake-lever 16, operated by rod 57, leading from the hand-brake mechanism on the car-platform.

Each truck-brake is operated as just described, the chain 58 permitting the operation of the power-brake without moving the hand-brake mechanism. Supporting-lugs 59, formed on cylinders 2 3, carry rods 39 40 and maintain the cross-heads in a level position.

I claim—

1. In a brake, duplex cylinders having a separable central connection with means to attach each cylinder and the connection independently to the car, an air-passage to the connection, a partition in the passage and a port at each side of the partition leading into each of the duplex cylinders aforesaid.

2. In a brake, duplex cylinders having in-

tegral heads at their outer ends, an independent central connection to which they are attached at their inner open ends, with independent means for their attachment to the car at different heights, an air-passage to the central connection, ports therefrom to the cylinders' inner ends, pistons in the cylinders and connections therefrom to brakes located upon trucks supporting the car whereto the cylinders are attached.

3. In a brake, duplex cylinders having integral heads at their outer ends, a knee on each cylinder, a strap to which the knees are secured, and means to secure the strap to the car at different heights, lubricating and dust-excluding material pockets in the heads, a central connection to which the cylinders are independently secured at their inner ends, an air-passage to the central connection and therefrom independently to each cylinder, pistons in the cylinders actuated independently by pressure through the passages aforesaid, and connections from the pistons to brake mechanism oppositely disposed under a car to the cylinders aforesaid.

4. In a brake, duplex cylinders having heads at their outer ends wherein are pockets for the purposes set forth, the cylinders' inner ends being open and attached to a central connection independent in construction independently attached to the car, and having means to introduce pressure into the cylinders' inner ends, pistons in the cylinders, and means therefrom and thereby operated, and connected to brakes located on trucks nearest the outer end of the opposite cylinder.

5. In a brake, duplex cylinders independently attached to a central connection, pistons within the cylinders, pipe piston-rods attached at one end to the pistons and at the opposite end to inner cross-heads having bosses entering the pipes; outer cross-heads connected to the inner cross-heads by rods passing by the sides of the cylinders and their connection, lugs on the cylinders for guiding the rods, and connections from the cross-heads to the brake-levers of trucks.

6. In a brake, duplex cylinders attached to a central connection at their inner ends, pistons in the cylinders, inner cross-heads attached to pistons by cylindrical piston-rods, a second set of cross-heads attached to the first-mentioned cross-heads in manner for their operation by the piston and cross-head of the opposite cylinder, a car-body carrying the cylinders, trucks supporting the car, brakes on the trucks, hand-brakes connected to the truck-brakes and independent connections for the power-brake to the truck-brakes.

7. In a brake, a car, trucks supporting the car, brakes upon the trucks, motors in cases on the trucks, duplex brake-cylinders attached for independent removal to a central connection between them and through which pressure is separately introduced to each cylinder, a hand brake-lever fulcrumed upon



the central connection, and connections therefrom to the operative mechanisms on the car-platforms, and to the truck-brakes, attachments to the truck-brakes independent  
5 of the hand-brake connections, curved connections therefrom over the motor-cases to intermediate levers having adjustable means of attachment, and connections from the in-

intermediate levers to the pistons of the cylinders farthest removed. 10

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

WILLIAM H. NIGHTINGALE.

Witnesses:

RANSOM C. WRIGHT,  
WILLIAM C. STOEVEY.