

No. 724,001.

PATENTED MAR. 31, 1903.

P. W. & E. H. FOSTER.

HYDRAULIC RAM.

APPLICATION FILED JULY 18, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1

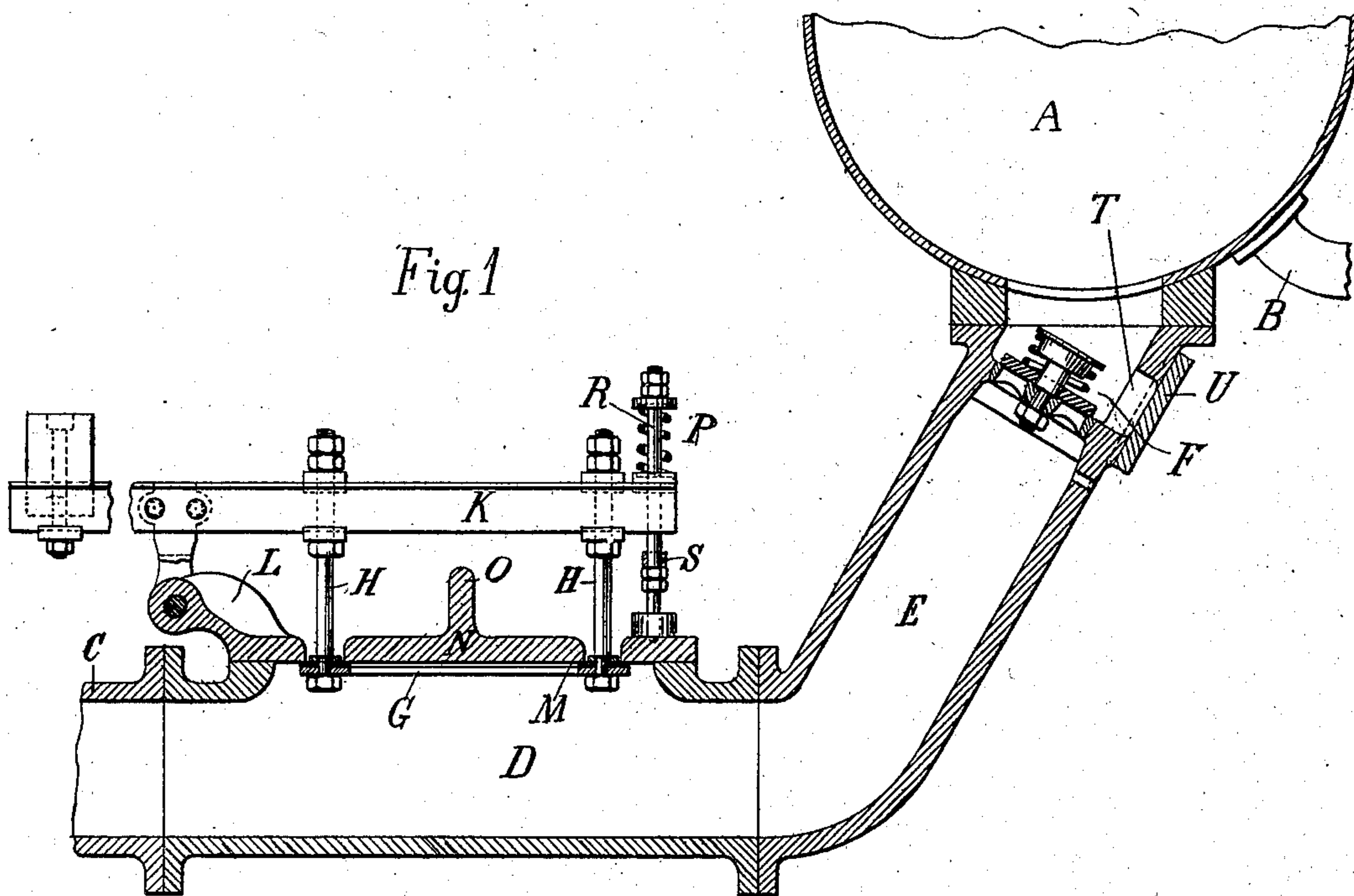
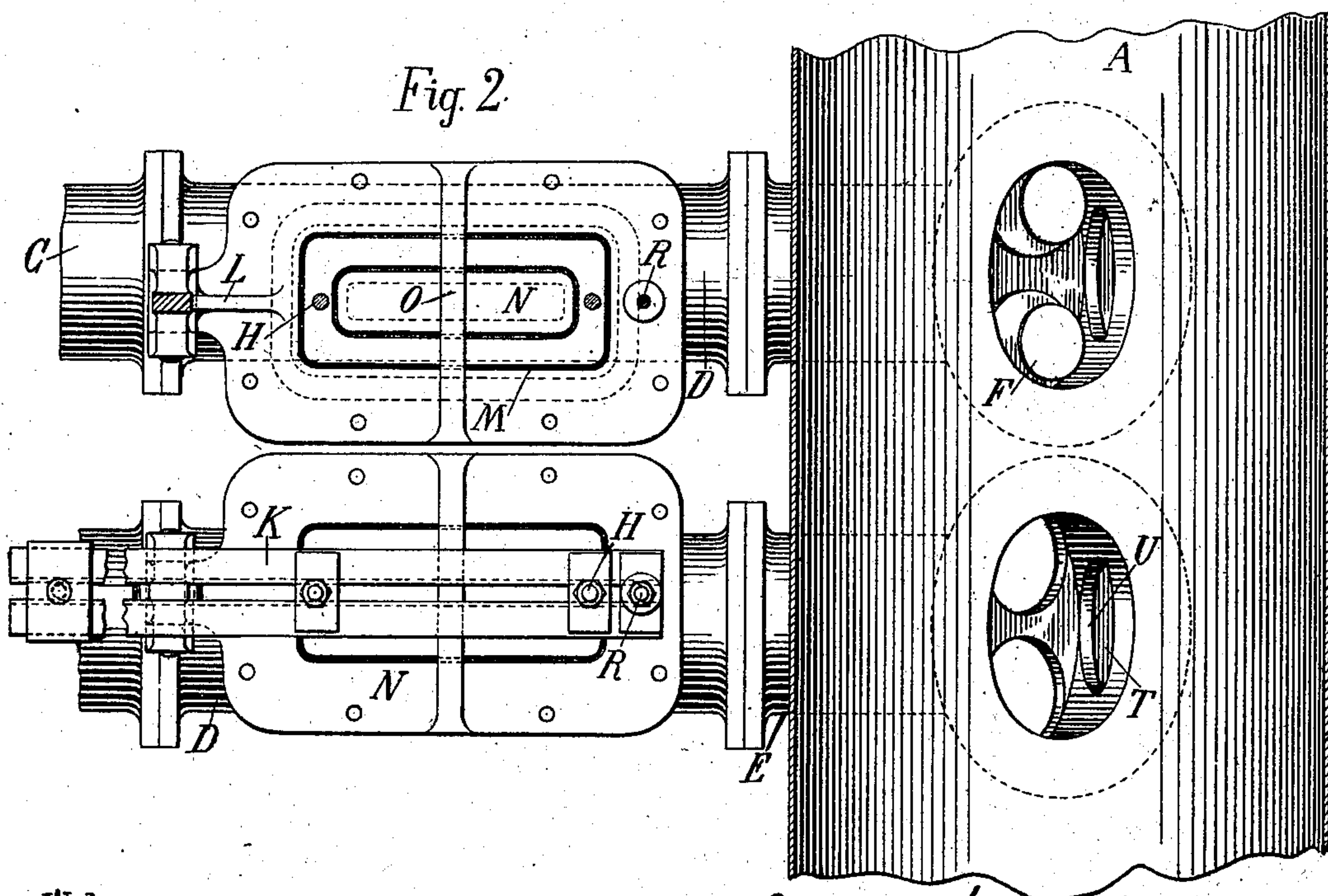


Fig. 2



Witnesses:

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Fig. 3

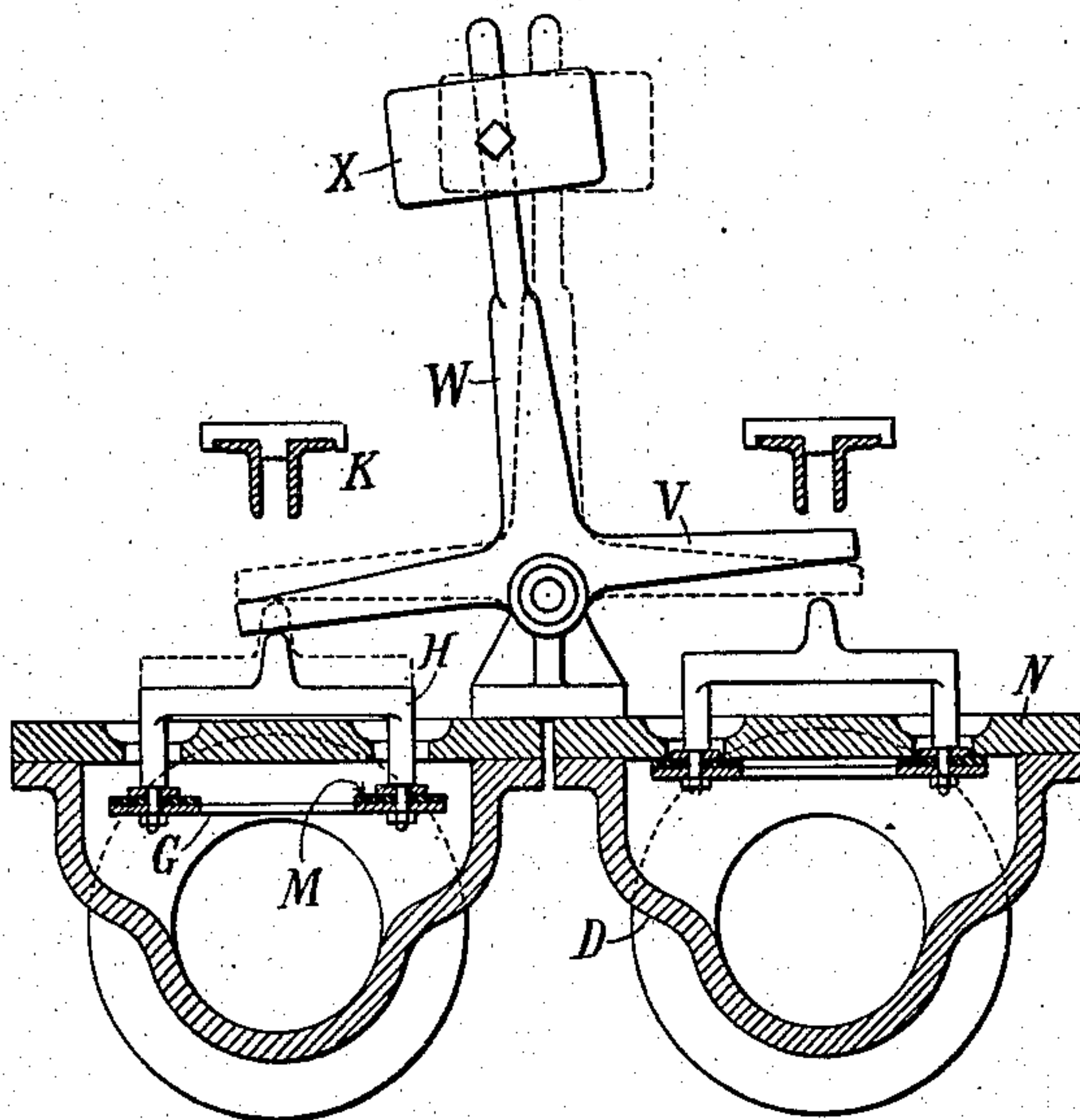
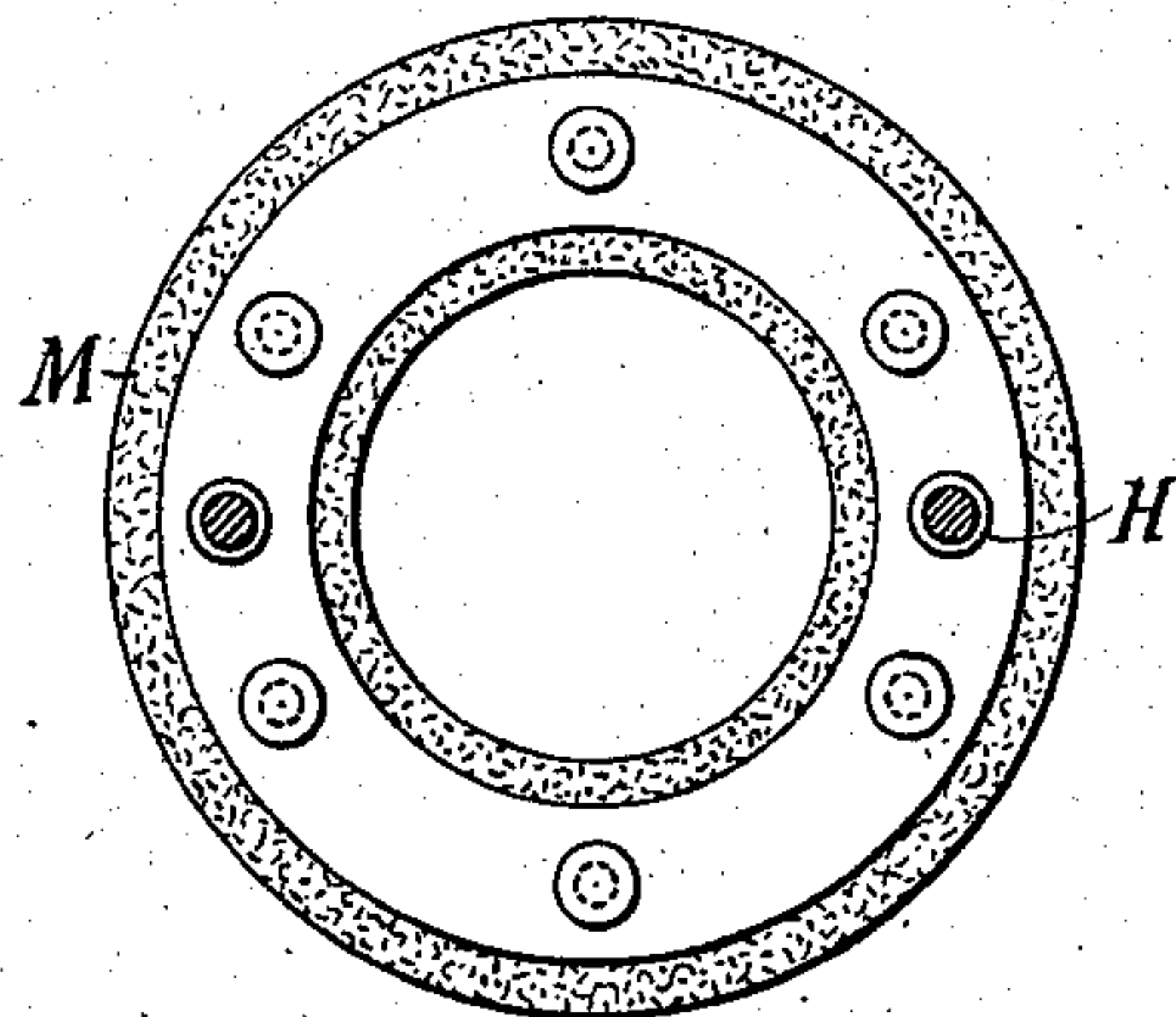


Fig. 4



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UNITED STATES PATENT OFFICE.

PELL W. FOSTER AND ERNEST H. FOSTER, OF NEW YORK, N. Y.

HYDRAULIC RAM.

SPECIFICATION forming part of Letters Patent No. 724,001, dated March 31, 1903.

Application filed July 18, 1901. Serial No. 68,789. (No model.)

To all whom it may concern:

Be it known that we, PELL W. FOSTER and ERNEST H. FOSTER, citizens of the United States, residing in the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Hydraulic Rams, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

The invention subject of this application is an improvement in hydraulic rams, more especially of that class in which two or more drive-pipes communicating directly with a single air-chamber are employed; and it consists in a novel construction of the valves and mechanism connected therewith.

In the drawings hereto annexed, Figure 1 is a central vertical section of our improved hydraulic ram, the plane of said section being taken longitudinally through one of the drive-pipes and working-valve chambers. Fig. 2 is a top plan view, with some parts removed, of two drive-pipes communicating with a single air-chamber. Fig. 3 is a transverse section of two working-valve chambers, showing a modified construction of valve, also an attachment to cause the valves to open and close alternately; and Fig. 4 is an enlarged plan view of the seating face of one of the valves of Fig. 3.

Referring to Figs. 1 and 2, A designates the air-chamber peculiar to devices of this kind provided with an outlet-pipe B, through which the water is forced to any suitable reservoir. We provide for a greatly-increased capacity of the ram by making the air-chamber preferably in cylindrical form, so that its capacity may be increased by simply increasing its length, as by adding on sections and by connecting therewith two or more wholly independent drive-pipes. We have devised special forms of the latter, which are illustrated in the figures now under consideration. C is one of the drive-pipes proper, leading from a water-supply of a certain head. D is the working-valve chamber connected by a suitable extension E with the chamber A, delivery-valves F being placed in said connecting-pipe close to the air-chamber. G is the working valve. It is preferably supported at two or more points by rods H from a beam or bar

K, which is pivoted to a stud L. This valve is annular in the sense that in lieu of being a solid plate or body of circular, rectangular, or other configuration it has a central opening, the solid portion being merely a rim. The valve is faced with rubber M or other suitable material and works over a port or series of openings in the wall of the chamber D of corresponding shape and proper proportions. The solid center piece N necessary for this purpose may be supported in any desired manner, but preferably by a strong rib O, cast integral with the top plate of the chamber D. To receive the impact of the valve on closing, we employ some form of buffer, such as a coiled spring P, surrounding a standard R and interposed between the head of the latter and the beam K. On the same standard R is also secured an elastic washer S, which serves as a cushion for the beam when the latter descends on the opening of the valve. In order that the delivery-valves F may be placed in close proximity to the air-chamber A and at the same time to afford easy access to them, the connecting-pipe E, or that portion of the same which contains the valves F, is arranged obliquely to the opening into the air-chamber, so that a space or chamber is provided above the valves. A hand-hole T in the wall of the pipe E, which is closed by a plate U, capable of being detached when necessary, affords access to this space.

The same arrangement of valves and other parts is illustrated in Figs. 3 and 4, with the exception that the valves are circular instead of rectangular, as shown in the other figures. An attachment is also shown in Fig. 3, the function of which is to cause the two valves to open and close alternately and which may be used with the structure shown in Fig. 1. This latter device consists of a beam V, pivoted above the valves in such position as to rest upon either one or the other. A vertical arm W, carrying an adjustable weight X, serves to overbalance the lever, and thereby exert a comparatively light pressure on one or the other of the valves. There should be some lost motion between the respective valves and the beam V, and when such is the case the two valves will operate in perfect alternation, the beam being tilted from one

to the other by the movement of the valves themselves.

A marked advantage results from the employment in rams of this kind of valves of the annular form herein described, mainly in that it enables us to construct these engines in large sizes without encountering the difficulties usually met with in constructing a strong and simple valve of the great area required and capable of withstanding the shocks to which it is subjected in use. The elongated valve with central openings which we employ not only affords a large area for the passage of water without materially increasing the size and weight of the valve, but possesses two other distinct advantages: first, in obtaining an opening or port of greatly-increased peripheral extent, which results in a certain amount of friction in the escape of the water and tends to assist the action of the working valve; second, in reducing the lateral space required between the working valves and drive-pipes placed side by side, particularly when valves of rectangular form are used, thus greatly reducing the total width over all of the engine and the space which it occupies.

Having now described our invention and pointed out its features of novelty and utility, what we claim as of our invention is—

1. In a hydraulic ram, the combination with a drive-pipe of an annular working valve and

a seat of corresponding conformation, as set forth.

2. In a hydraulic ram, the combination with a drive-pipe of a working valve of rectangular form having a central rectangular opening and a seat of corresponding conformation, as set forth.

3. In a hydraulic ram, the combination with two drive-pipes and working valves therein, of an oscillating beam adapted to be tilted to engage with said valves alternately, and an overbalancing device for said beam, as set forth.

4. In a hydraulic ram, the combination with two drive-pipes and working valves therein, of an oscillating beam having a weighted arm extending vertically upward from its center, and horizontal arms in position to be tilted by and to engage with said valves alternately, as set forth.

5. In a hydraulic ram, the combination with a drive-pipe and an annular working valve therein, of a tilting weighted support mounted outside of said drive-pipe, and connections from said support to two or more points on the valve, as set forth.

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Witnesses:

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