

A. BRUEGGER.  
CHEMICAL FIRE ENGINE.

No. 500,190.

Patented June 27, 1893.

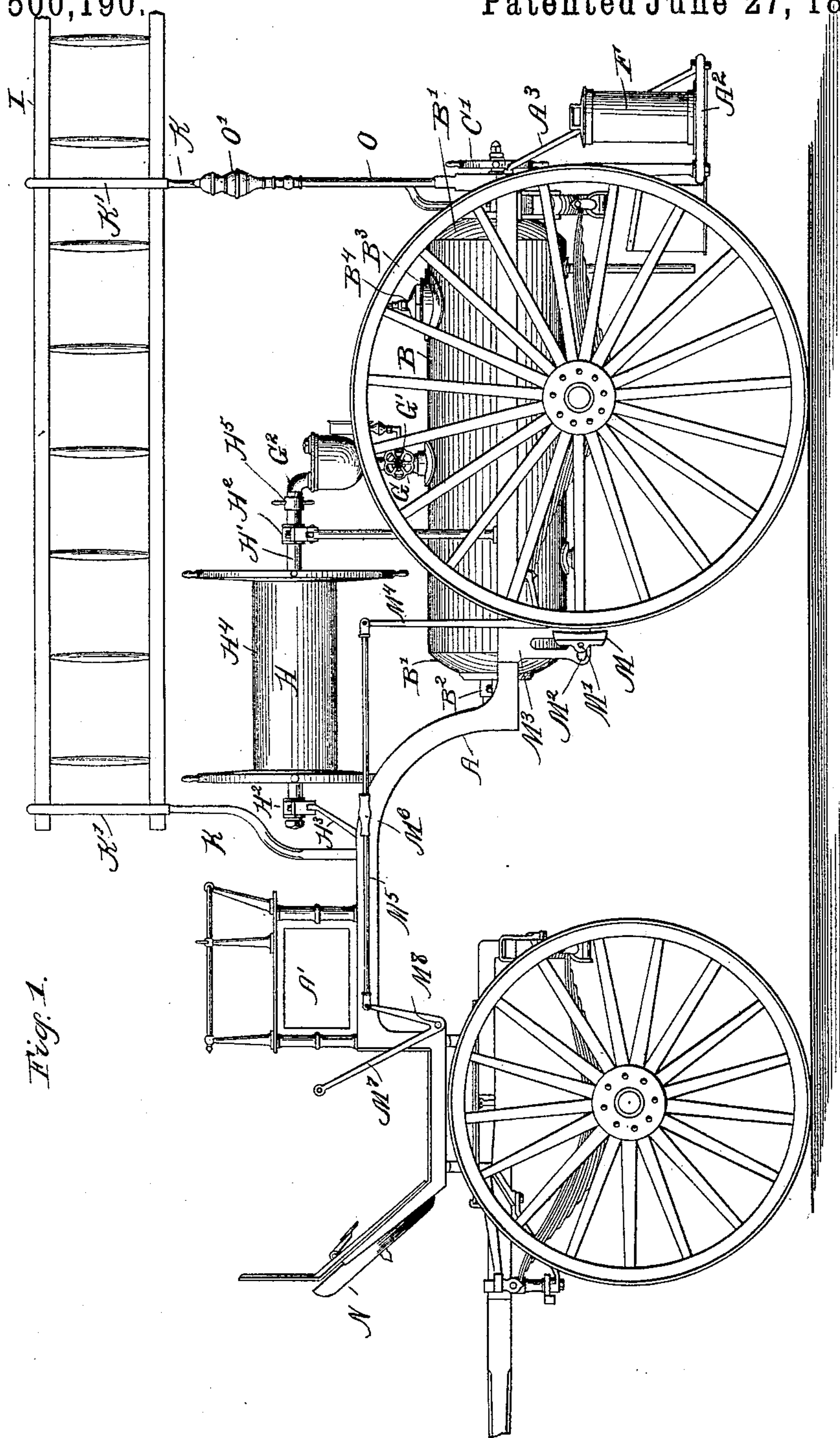


Fig. 1.

Witnesses.  
L. M. Marble  
E. J. Keegan

Inventor.  
Abraham Bruegger.  
By E. M. Marble  
Attorney.

(No Model.)

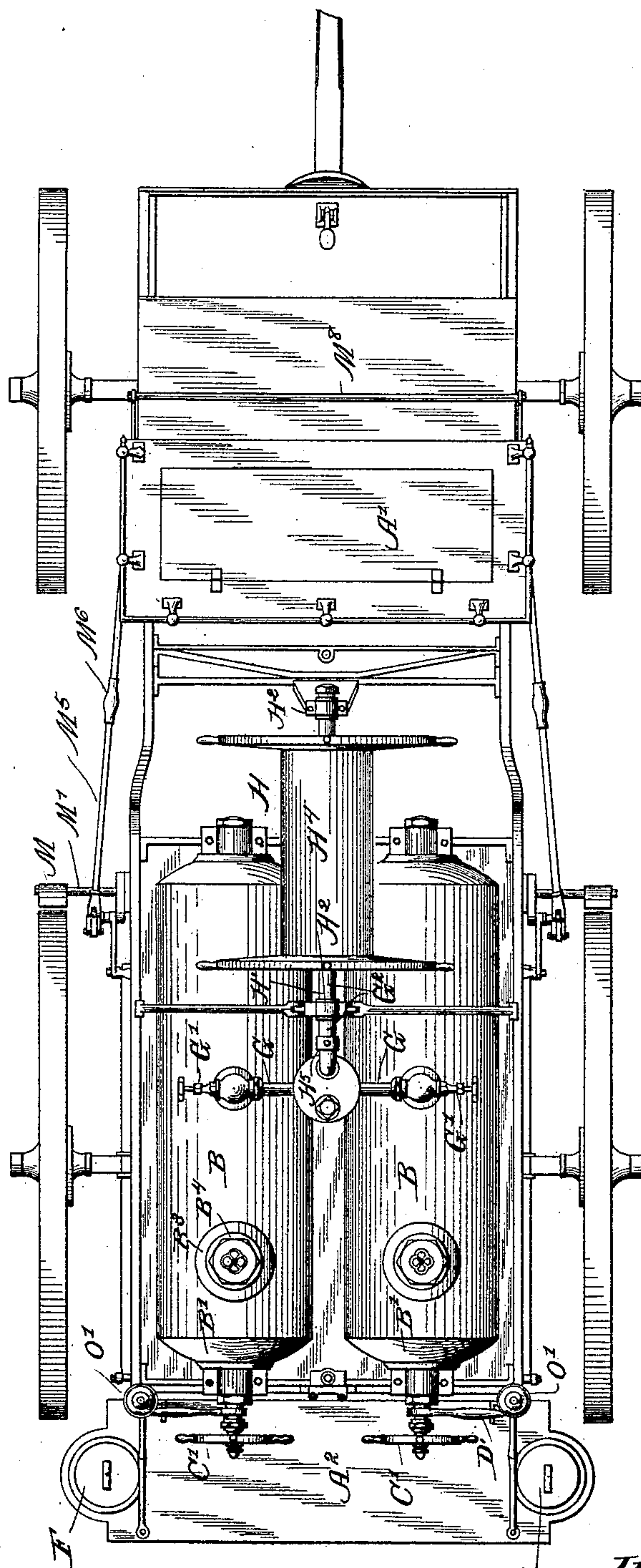
5 Sheets—Sheet 2.

A. BRUEGGER.  
CHEMICAL FIRE ENGINE.

No. 500,190.

Patented June 27, 1893.

Fig. 2.



Witnesses.  
L. M. Marble  
E. J. Keegin

Inventor.  
Abraham Bruegger.  
E. M. Marble  
Attorney.

By.

(No Model.)

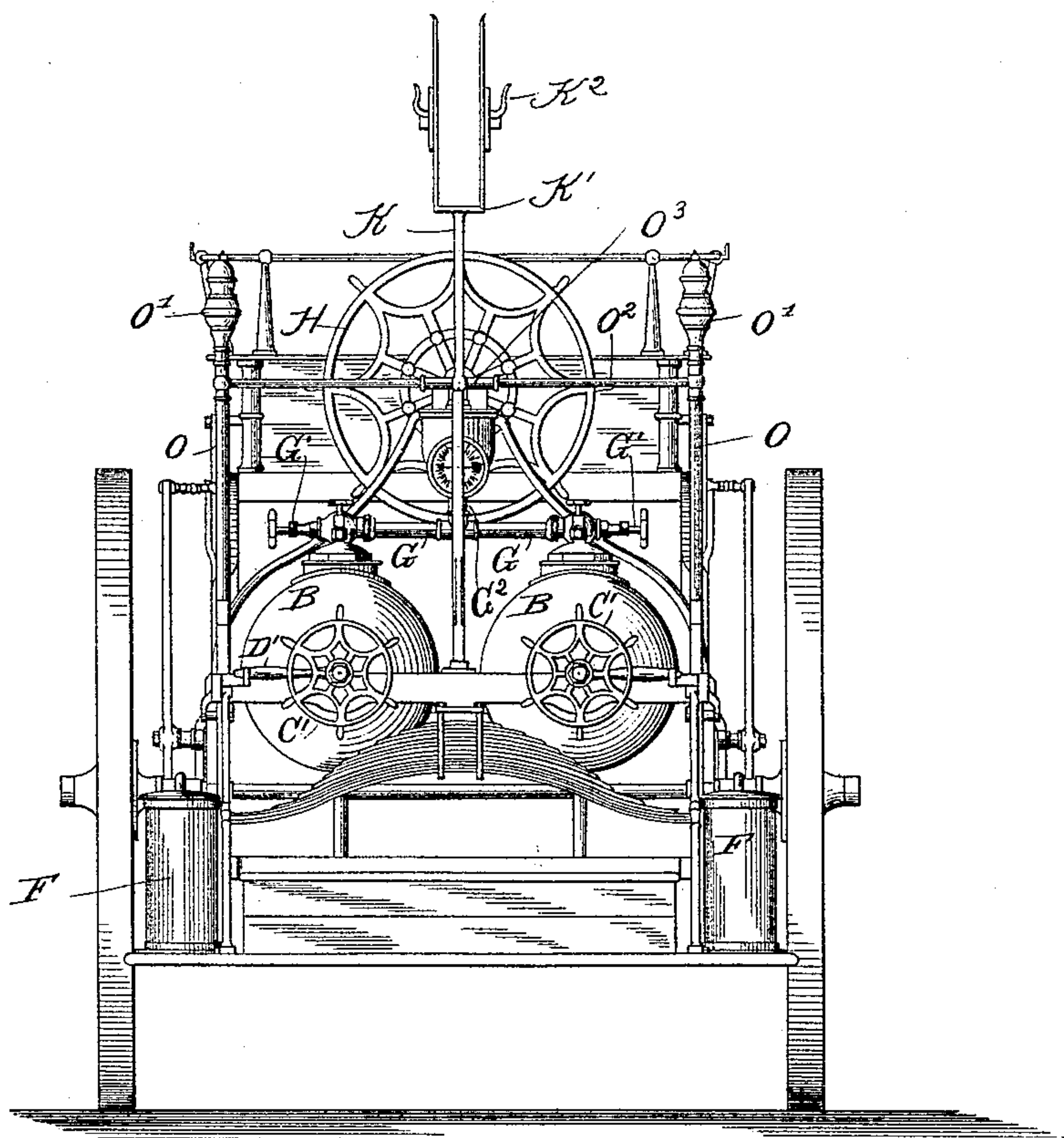
5 Sheets—Sheet 3.

A. BRUEGGER.  
CHEMICAL FIRE ENGINE.

No. 500,190.

Patented June 27, 1893.

*Fig. 3.*



Witnesses.

*L. M. Marble*  
*O. J. Keegin*

*Inventor*  
*Abraham Bruegger.*

*By*

*E. M. Marble*  
*Attorney.*



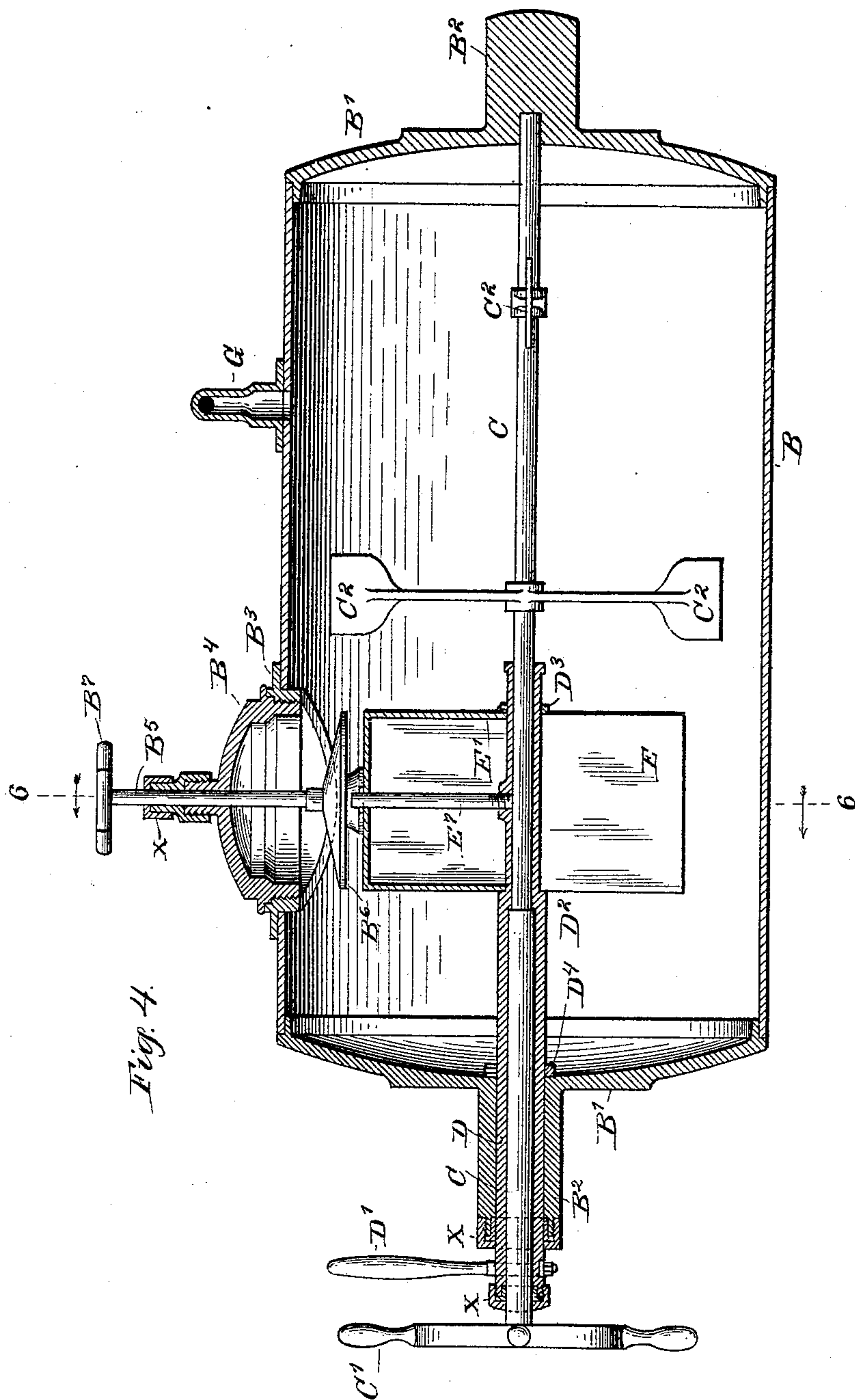
(No Model.)

5 Sheets—Sheet 4.

A. BRUEGGER.  
CHEMICAL FIRE ENGINE.

No. 500,190.

Patented June 27, 1893.



Witnesses.

Victor J. Evans.

L. M. Marble

Inventor

Abraham Bruegger.

By

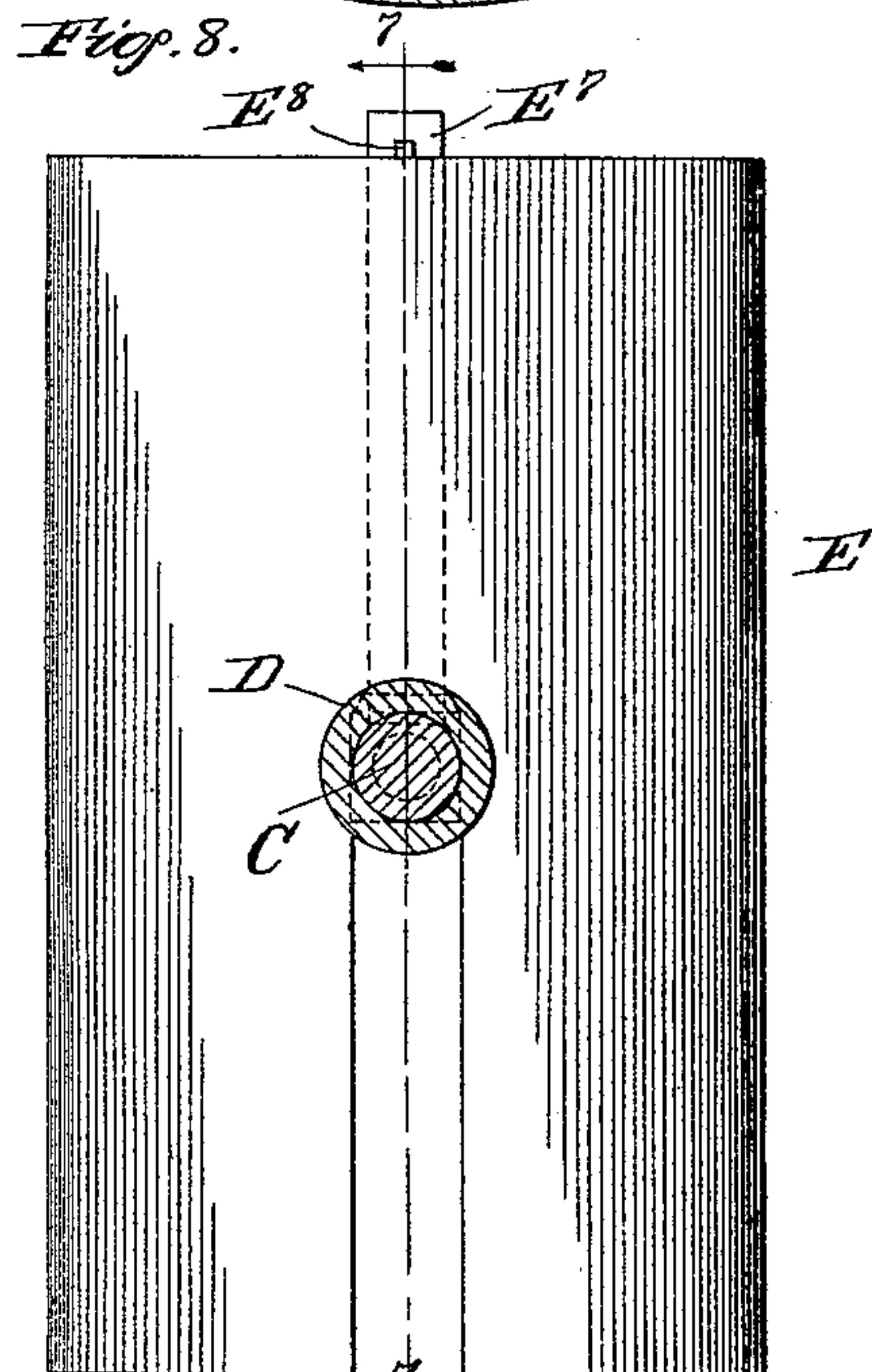
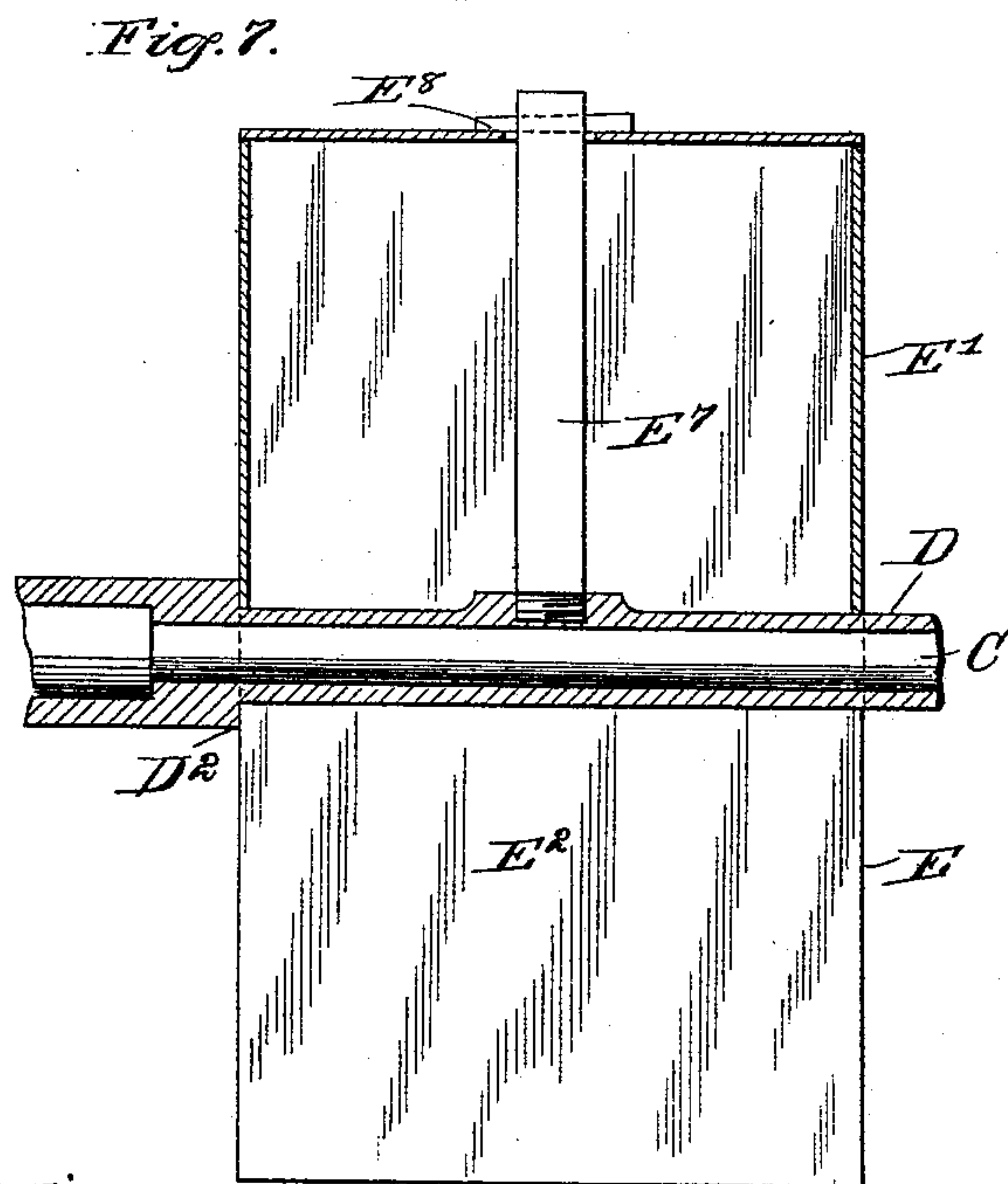
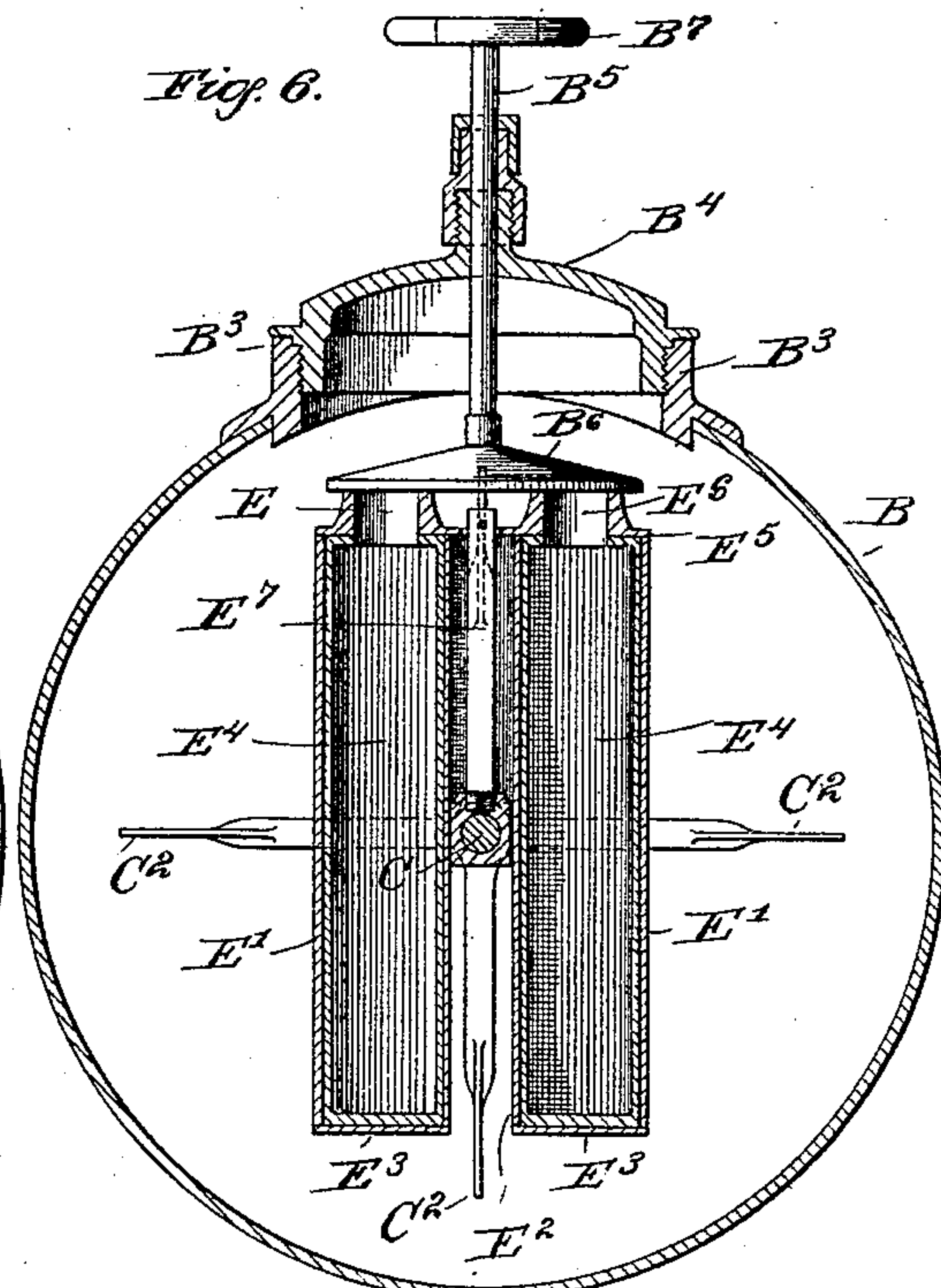
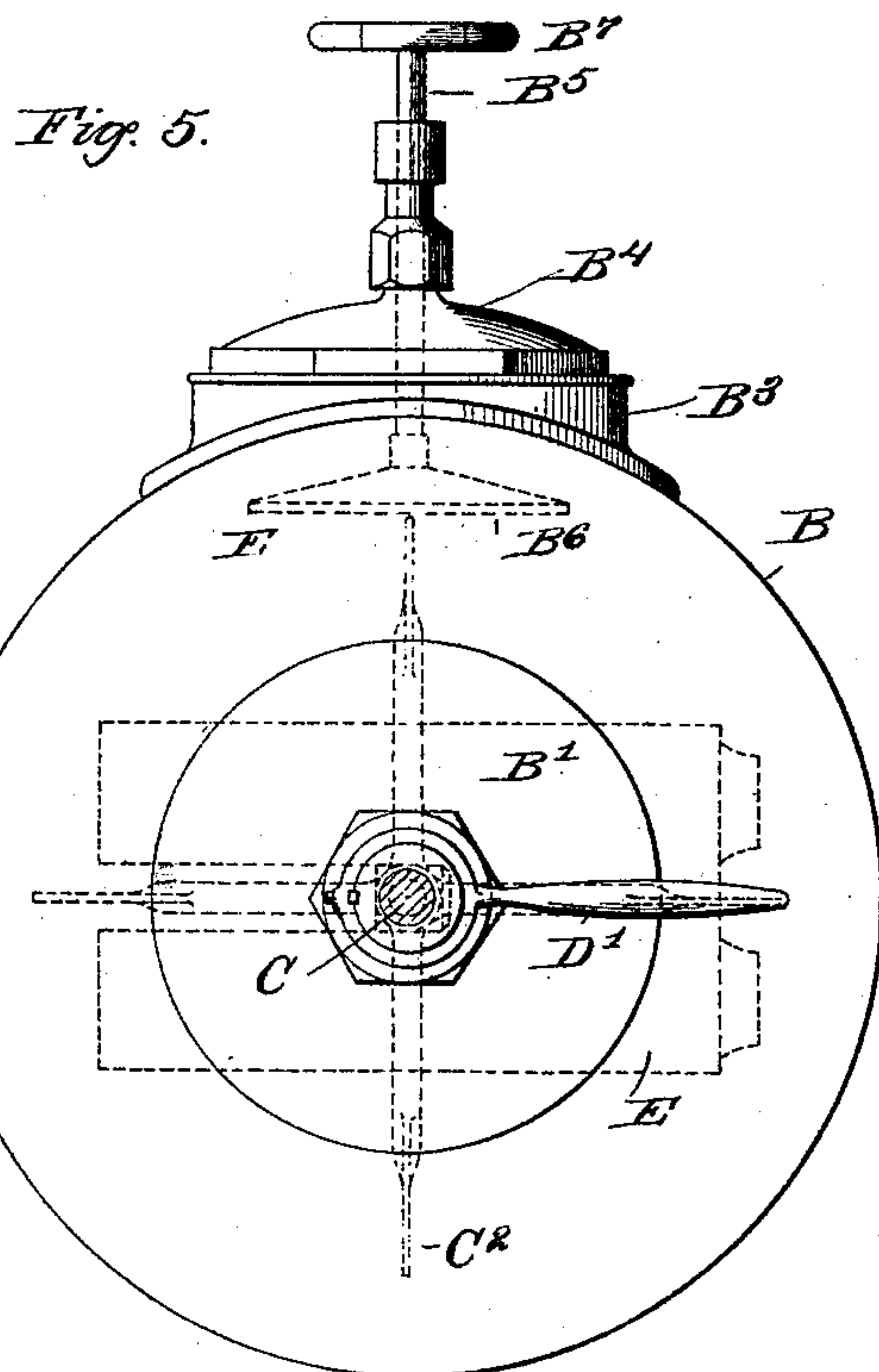
E. M. Marble

Attorney.

A. BRUEGGER.  
CHEMICAL FIRE ENGINE.

No. 500,190.

Patented June 27, 1893.



Witnesses  
L. M. Marble  
E. J. Keigin

Inventor  
Abraham Bruegger.  
by E. M. Marble  
Attorney.



# UNITED STATES PATENT OFFICE.

ABRAHAM BRUEGGER, OF MUSKEGON, MICHIGAN, ASSIGNOR TO THE  
MUSKEGON CHEMICAL FIRE ENGINE COMPANY, OF SAME PLACE.

## CHEMICAL FIRE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 500,190, dated June 27, 1893.

Application filed November 1, 1892. Serial No. 450,703. (No model.)

*To all whom it may concern:*

Be it known that I, ABRAHAM BRUEGGER, a citizen of the United States, residing at Muskegon, in the county of Muskegon and State of Michigan, have invented certain new and useful Improvements in Chemical Fire-Engines; and I do hereby 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.

My invention relates to chemical fire engines, and particularly to improvements in that class thereof in which vessels containing acid solutions, are suspended vertically in horizontally located cylinders containing alkaline solutions, and in which means are provided whereby the contents of the acid vessels and of the cylinders may be mixed, and thus generate the pressure required for working; and it consists in the construction and arrangement of parts hereinafter described, and particularly pointed out in the claims. Hitherto engines of this class have been constructed so as to locate the main or mixing cylinders horizontally of the carriages in which they are transported, and to carry the acid vessels, prior to bringing the apparatus into action, in cans at the back of the vehicle. In this construction, when it is desired to charge the cylinders by allowing the chemicals to mix, the covers located toward the rear of the cylinders are unscrewed and taken off, the acid vessels placed in supports arranged therein, the covers again screwed on, and then by a partial rotation of said cylinder, the stoppers in the acid vessels falling out, the mixture of the chemicals is effected. This construction is unsatisfactory, requiring considerable adjustment and consequent loss of time before the apparatus is ready for action, and furthermore requiring the rotation of the main cylinder, in order to cause the commingling of the two solutions. To provide for this rotation, it is necessary to mount the main cylinders in bearings, which complicates the construction of the apparatus, to make one of said bearings hollow, and arranged for the connection of a pipe thereto, or of the hose directly, in order to draw off the liquids contained in

said cylinders. Moreover, no means are provided for agitating the contents of the main cylinder independently of the rotation of the same, and such rotation is only permissible when the contents of the acid vessel are to be discharged, if the apparatus is kept in constant readiness for use with the acid vessel in place. Hence cakes of bicarbonate of soda, or other alkali salt used, are apt to form in the bottoms of the main cylinders, and thus impair the efficiency of the apparatus. In another approved construction of engines of this class, the acid vessel is pivoted in a dome at the top of the main cylinder, and means are provided for turning the bottle over, when the apparatus is to be brought into action. Although agitators may be used with this form of engine, and thus remove the last mentioned objection of the first type referred to, the agitator and acid vessel must in any case be removed from each other, and two attendants are required to manipulate them.

The object of this invention is to overcome the disadvantages of both of the constructions above referred to, and to so arrange the various parts of the operative mechanism that the discharge of the contents of the acid vessel and the agitation of the alkali solutions may be effected easily and effectually by one attendant, while at the same time the thoroughness of their mixture will raise the efficiency of the apparatus to the highest degree. I accomplish these objects by carrying the acid vessel on a sleeve placed on a shaft which extends centrally through the main or mixing cylinder, and by providing said shaft with agitators of any suitable construction. A hand wheel, placed on the end of the shaft extending back of the cylinder, permits of the revolution of said shaft and the agitators it carries independently of the acid vessel, and a lever attached to the sleeve mounted on the shaft allows the contents of the acid vessel to be discharged by simply turning the same. The hand wheel controlling the central shaft, and the lever controlling the acid vessel being very near to each other, one attendant, standing on the foot board of the engine, can operate both.

My invention is fully illustrated in the accompanying drawings forming a part of this



application, in which the same reference letters refer to the same or corresponding parts, and in which—

Figure 1 is a side elevation of a double cylinder chemical engine embodying my invention. Fig. 2 is a top or plan view of the same, the ladder and its supports being omitted. Fig. 3 is a rear view. Fig. 4 is a vertical section through the main cylinder, showing the acid vessel in position, the central shaft, and the agitators. Fig. 5 is a rear view, partly in section, showing in dotted lines the acid vessel partly turned over. Fig. 6 is a section of the same, taken on lines 6-6 Fig. 4, showing the acid vessel in section. Fig. 7 is a detail view of the acid vessel, taken on the line 7-7 Fig. 8. Fig. 8 is a front elevation of the acid vessel.

Referring to the drawings, A represents the body frame of a four wheeled spring-carriage, provided with the elevated driver's seat A', and the foot board at the rear A<sup>2</sup> for an attendant to stand on.

B represents the main or mixing cylinders, which are horizontally arranged in the frame of the carriage, and placed parallel to each other. Said cylinders B are provided with convex heads B', which are formed centrally with the elongations B<sup>2</sup>. Near the rear end of each of the cylinders is formed a dome B<sup>3</sup>, which is provided with the removable cap B<sup>4</sup>, through which runs the valve rod B<sup>5</sup>, bearing on its lower end the circular plate B<sup>6</sup>, and provided at its upper end with a hand wheel B<sup>7</sup>. The under surface of the plate B<sup>6</sup> is countersunk, and filled with lead or other non-corrodible material, and then planed smooth, for a purpose which will hereinafter appear.

C represents a shaft which passes through the cylinder B centrally, and has its bearings in the projections B<sup>2</sup> formed in the convex ends of said cylinder. On its outer end is secured the hand wheel C', by which it is rotated, and inside the cylinder, and suitably placed, it carries the agitators C<sup>2</sup>, of any desired shape, but of sufficient size to thoroughly agitate the contents of the cylinder. On shaft C is placed a sleeve D, which is revoluble independently of said shaft, and is provided with the hand lever D' on its projecting end. The hand wheel C' and the lever D' are thus placed so near to each other that they can easily be operated by the same attendant. Sleeve D is held in position with reference to the inner surface of the cylinder B by means of the ring or collar D<sup>4</sup>. Within the cylinder B, and at a predetermined point, the diameter of the sleeve D is diminished, and between the shoulder D<sup>2</sup> formed thereby, and ring D<sup>3</sup>, placed on the sleeve, is secured the acid vessel E, which is thus prevented from slipping lengthwise on the sleeve.

The acid vessel E is formed as follows: an outer cylindrical casing E' of brass or other material is provided, and this casing is bifurcated to a point a little above its medial line of length, as shown in Figs. 5 to 8 inclusive,

to provide for the passage therethrough of the shaft C, with the sleeve D thereon, centrally of the casing. Corresponding with the line of division thus formed, are placed the partitions E<sup>2</sup>, which extend from top to bottom of the casing E', and thus partition off two segmental chambers, for each of which a bottom E<sup>3</sup> is provided. Into the segmental chambers or pockets thus formed, are placed the flasks E<sup>4</sup>, whose upper ends are opened, but somewhat contracted to correspond with the apertures E<sup>6</sup> formed in the top-plate E<sup>5</sup> of the vessel. The flasks E<sup>4</sup> are to contain the acids used, and must be made of lead, or other non-corrodible material to withstand the action of such acids. Since there are two such flasks, provision is made for the use of different acids, although both flasks may contain the same acid if preferred. The cover E<sup>5</sup> to the acid vessel is removably secured to the same in any well known manner, and is provided with the funnel-shaped projections E<sup>6</sup>, which serve as openings for the escape of the acid contents. In order that the acid vessel may be held firmly to the sleeve D when the same is revolved, a rod E<sup>7</sup>, screwed at one end into the sleeve, passes up through a hole in the cover E<sup>5</sup>, and a key E<sup>8</sup>, passed through a hole in said rod, holds the acid vessel firmly in position on the sleeve D. The position of the acid vessel E on the sleeve D is such that it is directly beneath the dome B<sup>3</sup> formed in the main cylinder. The circular plate B<sup>6</sup>, when screwed down tightly, covers the openings in the acid vessel, and thus effectually prevents mixture of the acid and alkali solutions. The lower surface of said plate B<sup>6</sup> being covered with lead, injurious action of the acid contents of the said vessel is prevented. It will thus be seen that the acid vessel is freely revoluble within the main or mixing cylinder independently of the rotation of the shaft C, and from the manner of mounting of said vessel, it is readily seen that little force will be required to revolve the same.

The construction as herein described avoids the necessity of a stopper for the vessel, when the same is not in use, and thus simplifies its construction.

In cans F placed on the foot board of the carriage, are placed extra flasks containing acid, so that when the first charge of acid has lost its power or efficiency, or when the contents of the main cylinder have been exhausted, new charges may be added, and the apparatus again put in working order.

Centrally of the upper surface of the main cylinders are fitted the pipes G, which extend inward toward each other, where they are united to form the pipe G<sup>2</sup>, which is bent at its upper end to form a joint with the hollow axle of the hose reel. Both of the pipes G are provided with tightly fitting valves G' near the point of their junction with the cylinders, so that communication between either or both of the cylinders through the hollow axle of the hose reel is secured, and may be cut off



from either when desired, while allowing free communication between such axle and the other cylinder. This is an essential feature in the working of the chemical engine, as will be hereinafter more fully explained.

The hose reel H is placed above and over the front portion of the main cylinders, and back of the driver's seat. Its axle H' is provided with suitable bearings H<sup>2</sup>, held in position by the rods or supports H<sup>3</sup>, which curve upward and toward one another, and are fastened to the frame of the carriage. Said reel may be of any suitable construction, the hose being coiled around the drum H<sup>4</sup> of the reel.

The construction of the chemical engine herein described and illustrated, permits of the placing of the hose reel at a height so that it can be easily reached from the ground, and the end of the hose is attached to the axle of the reel, said axle being provided with a suitable nozzle to permit of such connection, and being hollow between the nozzle and its point of connection with the pipe-connection leading to the cylinders. A hand cap H<sup>5</sup> is provided at the junction of said pipe connection and the hollow axle to insure a tight joint.

The ladder I is supported above the apparatus at a convenient height by the metal brackets K', secured at the ends of the arms K, extending up from the frame of the carriage, to which they are attached, and support is provided for the hooks which are used in connection with the ladder by the metal sockets K<sup>2</sup>.

My engine is provided with suitable brakes, which I will now describe.

The brake shoes M, operating on the rear wheels of the carriage, are connected by a rod M', extending under the frame work of the carriage. Said rod M' is held in position and guided in its reciprocations by a slot M<sup>2</sup> in a forging M<sup>3</sup>, which extends down on both sides of the carriage in front of the back wheels, and is connected by means of a pivoted lever M<sup>4</sup>, a connecting rod M<sup>5</sup>, made adjustable in length by the coupling M<sup>6</sup>, and the angle iron M<sup>7</sup>, with the rod M<sup>8</sup>, which extends across the front of the carriage, directly under and in front of the driver's seat, and to which power is applied. A gong N may be arranged in front of the driver's seat, and be sounded by a clapper operated by a suitable foot lever, but I prefer to use a bell attachment which forms the subject matter of another application, Serial No. 450,382, filed by me simultaneously herewith.

The construction of my engine is such as to make it easy of management, and readily understood. Thus the sides of the carriage comprise two flat metallic bars, running from end to end of the carriage, and formed with a sharp turn back of the driver's seat to allow for the free turning of the front wheels, and are cross-connected with suitable braces to form the rectangular portion of the carriage.

The main or mixing cylinders are made stationary in the frame, the space between the frame and tanks being filled with seasoned wood or other suitable material, and firmly bolted to the frame. At the rear of the carriage are placed the standards O, at the top of which are formed the torches O', and near the top of said standards are secured the rods O<sup>2</sup>, which project inwardly, and are joined to the standard K removably by suitable couplings O<sup>3</sup>. Fittings X are provided at various places to preserve the smooth and finished appearance of the apparatus.

The operation of my engine is as follows: Premising that the main or mixing cylinders and the acid vessels are properly charged, when it is desired to bring the apparatus into action the attendant, standing on the back step, by a few turns unscrews the couplings O<sup>3</sup> from the standard K, and then swings the arms O<sup>2</sup> around on their pivots, so as to gain free access to the ends of the main or mixing cylinders. Then after adjusting the valves G' so that connection is made between one of the cylinders and the hollow reel axle, while such connection is shut off between the other cylinder, and said axle, he raises the circular plate B<sup>6</sup> from the openings E<sup>6</sup> of the acid vessel located in the cylinder connected with the reel axle, and hence to the hose, and by a turn of the hand lever D' discharges the contents of the acid vessel, and then thoroughly agitates the contents of the main cylinder by means of the agitators C<sup>2</sup>. The effect of thus at the same time and at the same place intermingling and thoroughly agitating the acid and alkali solutions is to gain the highest efficiency, and produce the best results. When the contents of the cylinder have been nearly exhausted, the other cylinder is made ready for use, and the valves G' are so set as to cut off the exhausted cylinder and bring into action the fresh cylinder. The exhausted cylinder may then be recharged, the main cylinder being filled with water through the dome B<sup>3</sup>, and a suitable quantity of bicarbonate of soda or other alkali being mixed with the water, and the empty acid vessels being replaced by the fresh ones taken from the cans on the foot board of the engine. By this means the engine may be run continuously, first using one cylinder and then the other alternately, until the supply of acid is exhausted.

It is obvious that many modifications in the construction herein described may be made without departing from the spirit or scope of my invention, and I claim all such modifications.

Having thus fully described my invention, its construction and operation, what I claim as new is—

1. In a chemical fire-engine, the combination with the main or mixing cylinder, of a shaft, provided with agitators, extending centrally through the same, a sleeve mounted on said shaft, an acid vessel carried on said



sleeve, and means for rotating said shaft and said sleeve, independently of each other substantially as described.

2. In a chemical fire-engine, the combination with the main or mixing cylinder having a shaft, provided with agitators, extending centrally through the same, of a sleeve, carrying an acid vessel having openings in one end, mounted on said shaft, means for closing the openings in said acid vessel when desired, and means for rotating said shaft and said sleeve independently of each other, substantially as described.

3. In a chemical fire-engine, the combination with the main or mixing cylinder having a shaft extending centrally through the same bearing a sleeve on which is mounted an acid vessel having openings in one end, of a dome having a removable cap in the main cylinder above the acid vessel, a pipe rod working through an opening in said cap and provided on its lower end with a circular plate for closing the openings in said acid vessel when desired, means for operating said pipe rod, and means for rotating said shaft and said collar independently of each other, substantially as described.

4. In a chemical fire-engine, the combination with the main or mixing cylinder having a shaft extending centrally through the same, of a sleeve provided with a shoulder mounted on said shaft, an acid vessel secured

on said sleeve between said shoulder and an adjustable collar, and held to the sleeve by a rod, screwed at one end into the sleeve and at the other end passing through an aperture in the cover of the acid vessel and held by a key, and means for rotating said shaft and said sleeve independently of each other, substantially as described.

5. In a chemical fire-engine, the combination with a main or mixing cylinder, of a shaft extending through and having bearings in the ends of the same, a sleeve bearing an acid vessel mounted on said shaft, and means for rotating said shaft and said sleeve independently of each other, said means consisting of a hand wheel on the projecting end of said shaft, and a lever on the projecting end of said sleeve, substantially as described.

6. An acid vessel consisting of the outer casing E', having bottoms E<sup>3</sup>, inner casings E<sup>2</sup>, cover E<sup>5</sup>, provided with openings E<sup>6</sup>, and flasks E<sup>4</sup> of some non-corrodible material placed in the segmental portions thus formed, substantially as described.

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

ABRAHAM BRUEGGER.

Witnesses:

WILLIAM A. GLEW,  
N. J. BROWN.