2 Sheets—Sheet 1.

# H. C. SERGEANT.

## LIQUID METER.

No. 111,262. Patented Jan. 24, 1871.

*Fig: 1.*

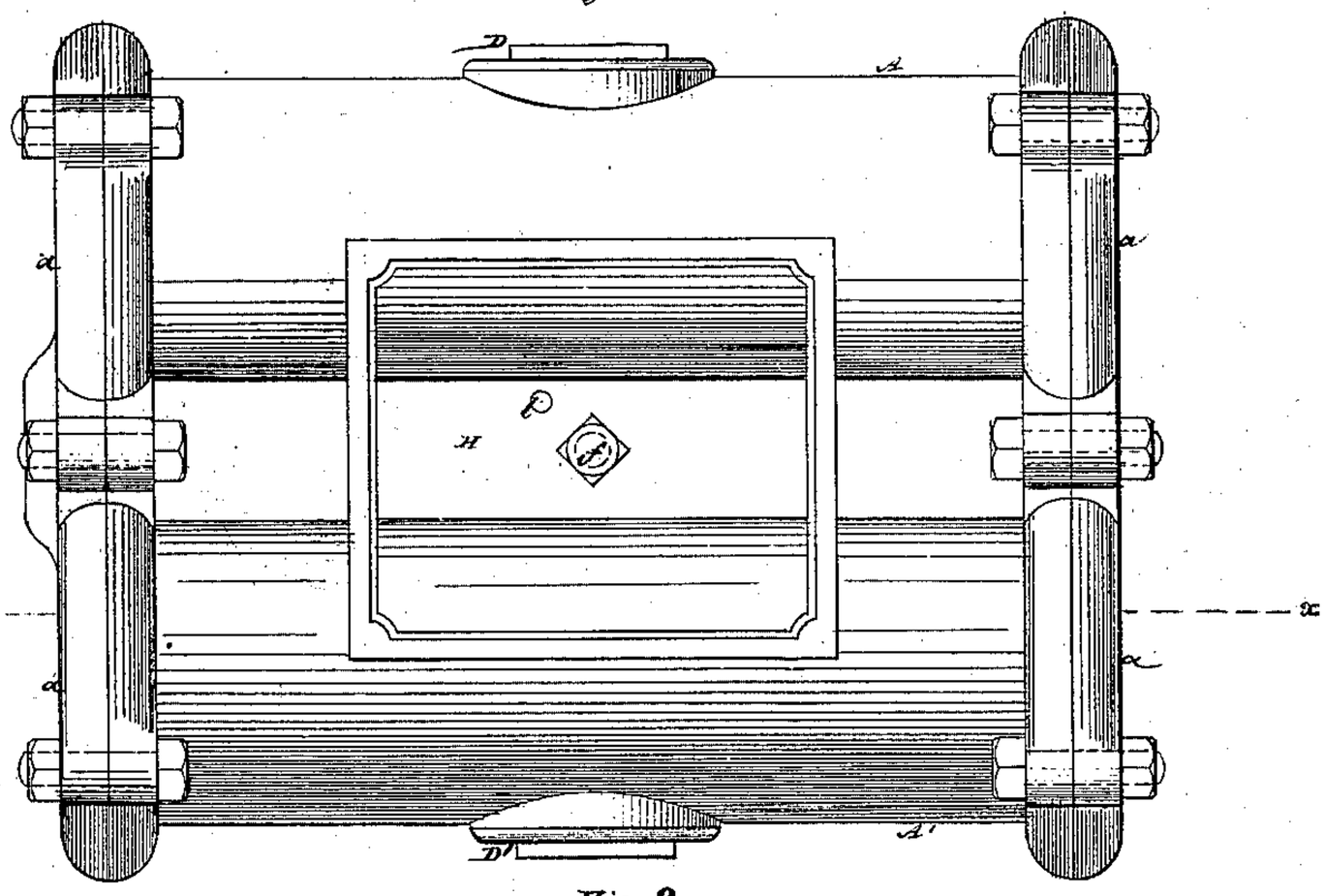



*Fig: 2.*

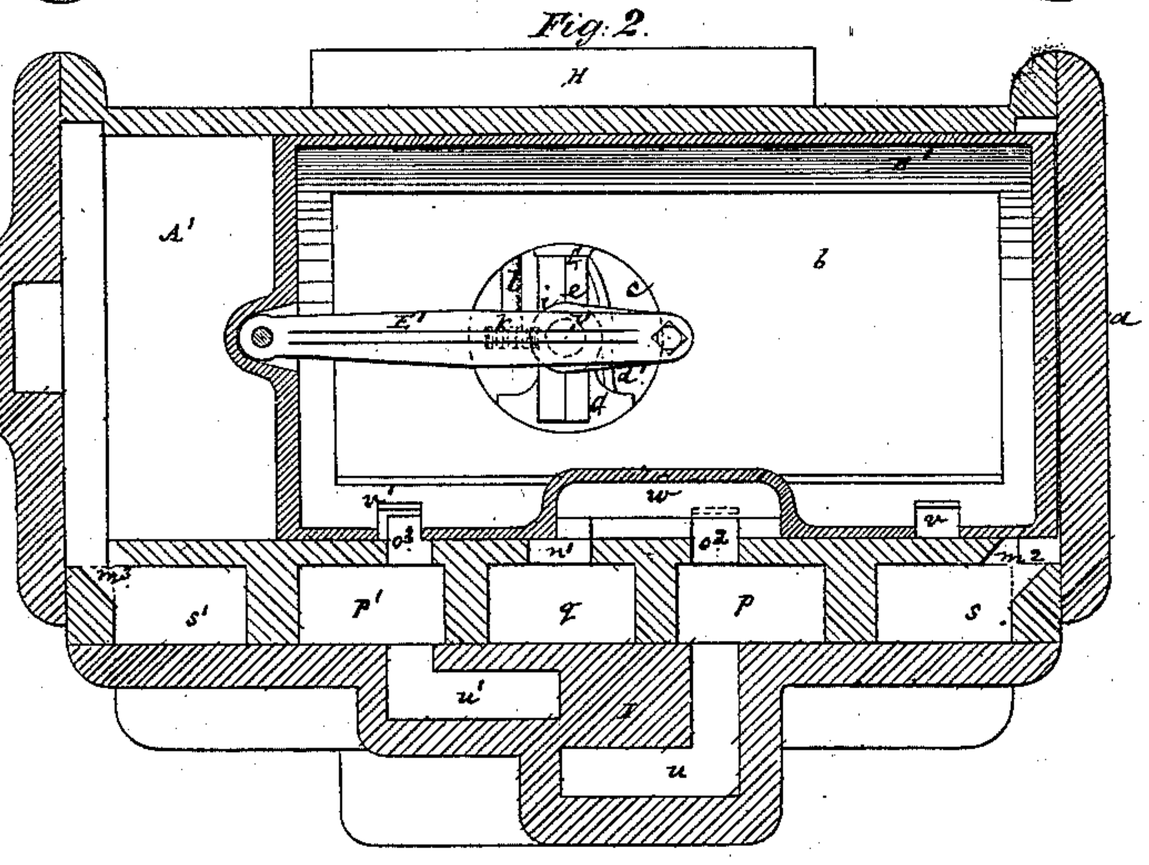
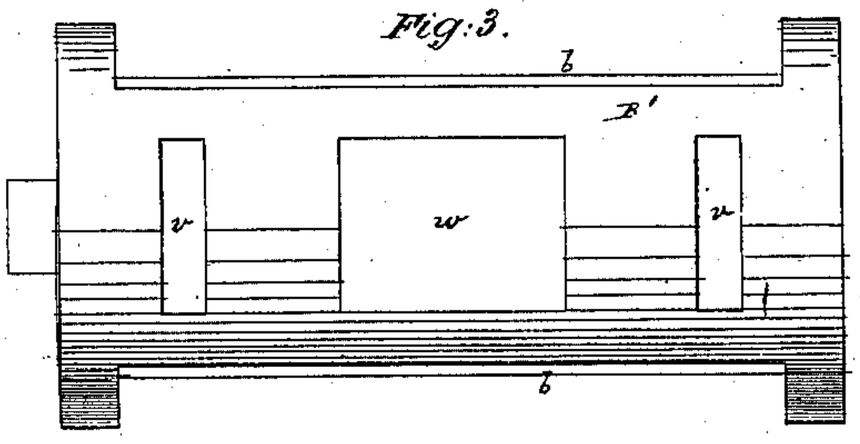



*Fig: 3.*




Witnesses:
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Fred Dueck

Inventor.
Henry C. Sergeant

2 Sheets—Sheet 2.

# H. C. SERGEANT.

## LIQUID METER.

No. 111,262. Patented Jan. 24, 1871.

*Fig. 4.*

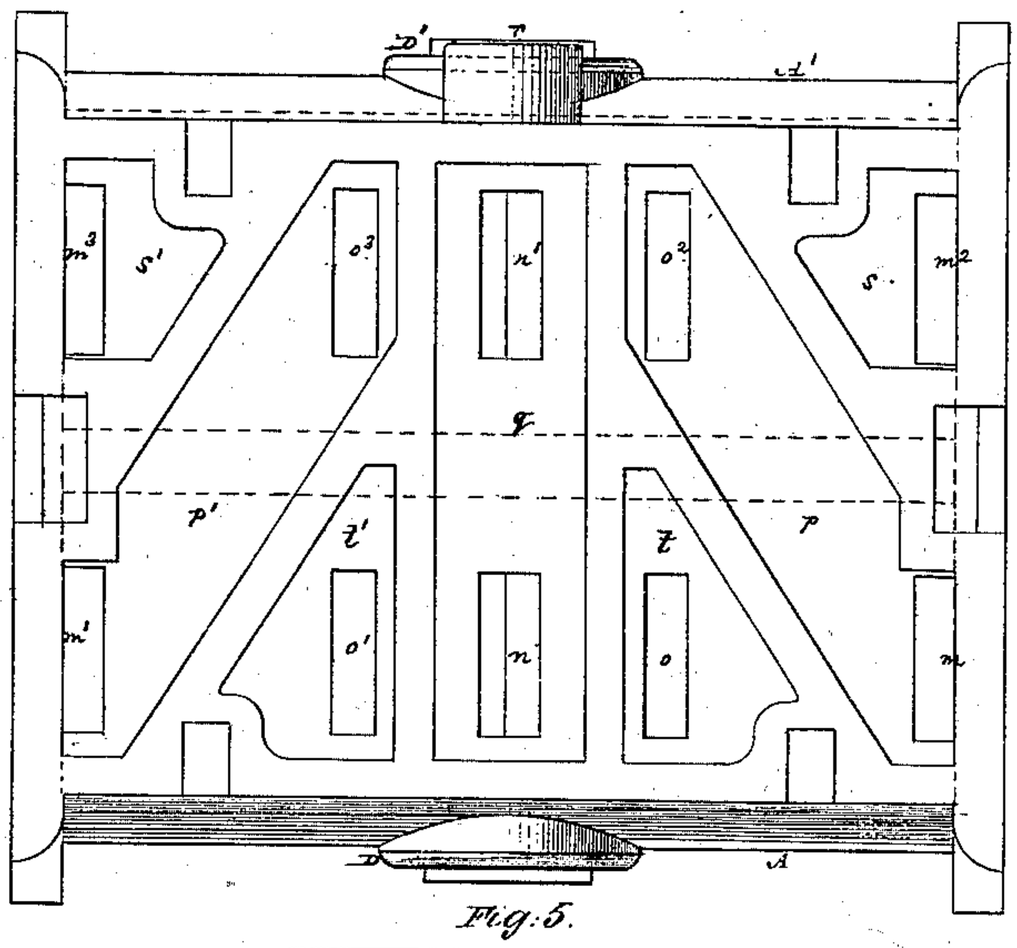



*Fig. 5.*

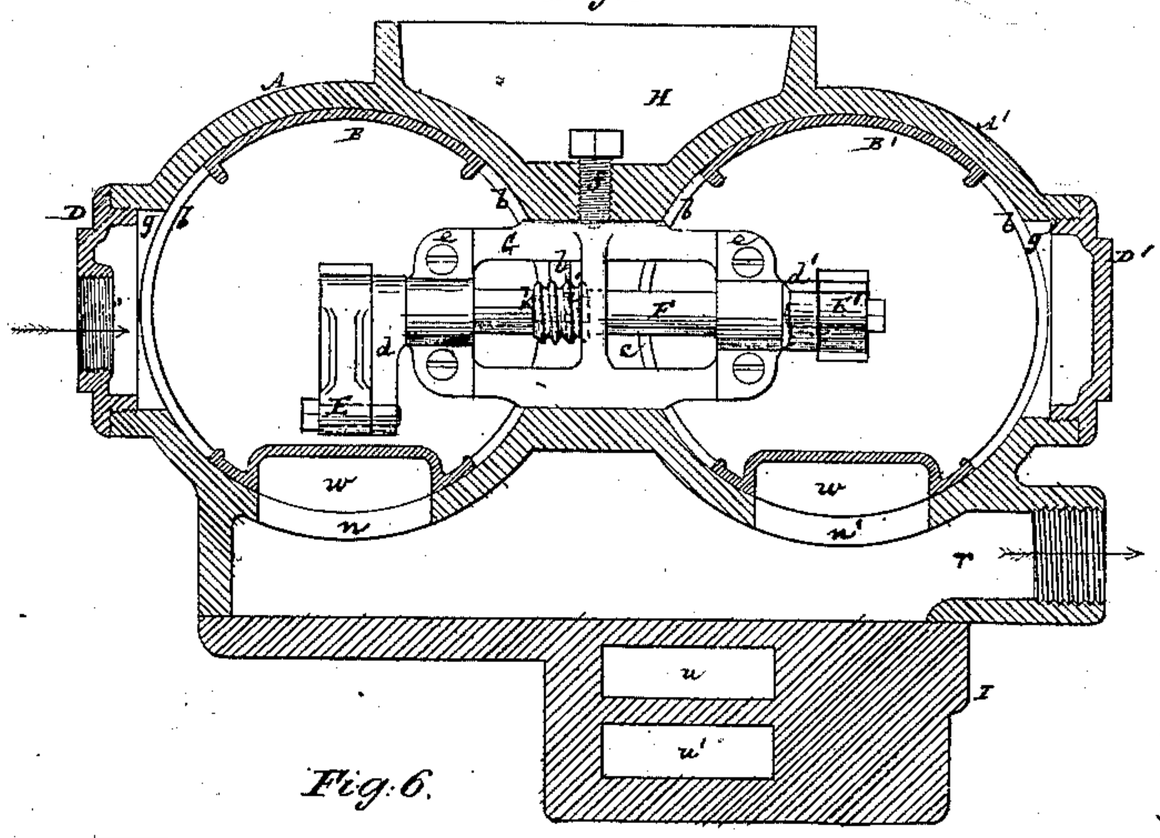
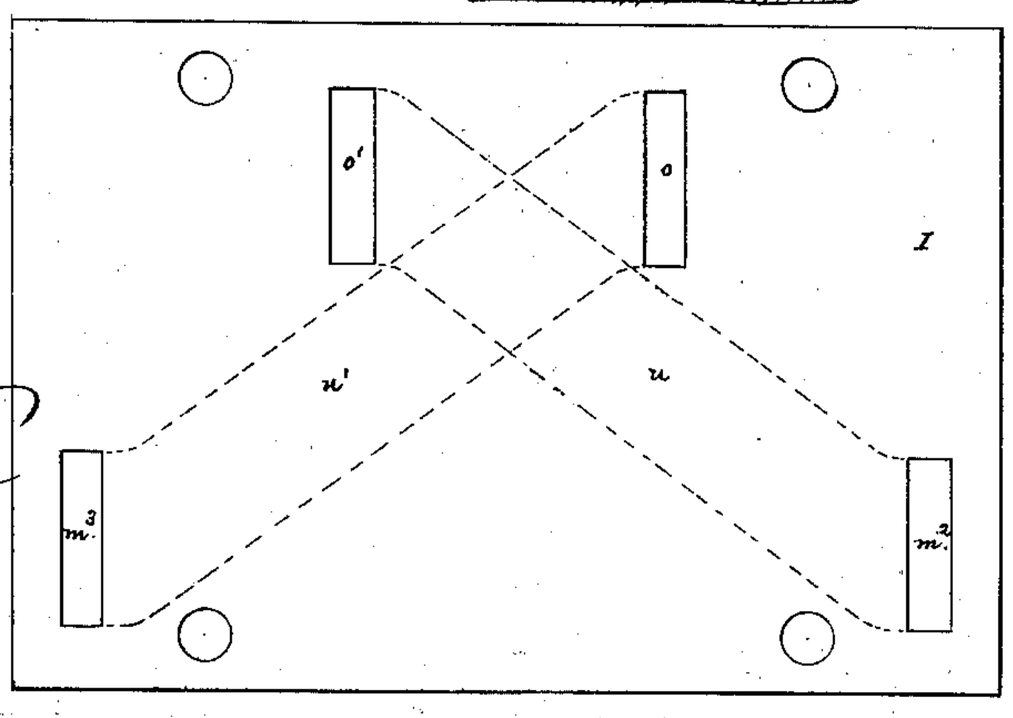



*Fig. 6.*




Witnesses:
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Inventor:
Henry C. Sergeant

# United States Patent Office.

HENRY C. SERGEANT, OF NEWARK, NEW JERSEY, ASSIGNOR TO JOSÉ F. DE NAVARRO, OF NEW YORK CITY.

Letters Patent No. 111,262, dated January 24, 1871.

## IMPROVEMENT IN LIQUID-METERS.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern:*

Be it known that I, HENRY C. SERGEANT, of Newark, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Fluid-Meters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents a top view or plan of a meter constructed in accordance with my improvement, the registering mechanism and cap-plate covering the chamber which incloses said mechanism being removed;

Figure 2, a vertical longitudinal section taken as indicated by the line *x x* in fig. 1;

Figure 3, an under view of one of the pistons;

Figure 4, an inverted plan of the meter, with its bottom and end-covers removed;

Figure 5, a central transverse section through the meter; and

Figure 6, an inside face view of the bottom cover.

Similar letters of reference indicate corresponding parts.

My invention relates to meters constructed, so far as the general or leading features are concerned, similar to a meter previously invented by me, and described in Letters Patent of the United States No. 103,509, bearing date May 24, 1870, and in which two pistons, working in independent cylinders, are used, and said pistons, in addition to their function proper within the cylinders to make of the latter measuring-chambers, also operate as valves, the one to the other, and so that they serve to control, without the aid of separate valves, the ingress and egress of the fluid to or from each other at opposite ends alternately.

In such previous invention, however, which included a novel arrangement of cavities and passages to effect in an advantageous manner such operation of the meter, the pistons moved independently of each other, and were in nowise connected by mechanical adjuncts to make them work in unison or in proper relation with each other, so that, in the event of one piston moving more freely than the other, or from any other cause having its timely action changed relatively to the other, as is apt to occur under a light stream, an imperfect operation of the meter necessarily ensued.

In my present improvement I make positive or certain the movements of the pistons relatively to each other by mechanically connecting the pistons through means of cranks, pitmen, and a revolving shaft, all arranged to occupy an interior position relatively to the pistons and their cylinders, and serving to give the necessary motion to the registering mechanism; and

This invention consists in a novel arrangement of outside openings in the cylinders, and arrangement of a bearing-box for the crank-shaft within or through the passage that establishes connection between the cylinders, whereby every facility is afforded for fitting the bearing-box to its place, and for making good the connection of the pistons, through their pitmen, with the cranks of the shaft, and whereby cheapness and compactness is insured in the construction of the meter, together with durability and freedom from liability of the parts to work loose.

Referring to the accompanying drawing—

A A′ represent the two cylinders, arranged side by side, and closed at their ends by covers *a a*.

B B′ are the elongated hollow pistons, arranged to reciprocate within the cylinders, and constructed to operate as valves, the one to the other, as in my previously-patented meter, hereinbefore referred to, but the passages are differently proportioned or arranged and others added, to make room for the mechanical adjuncts, whereby the pistons are geared together to insure the pistons working in proper relation with each other. Said pistons may be made entirely open at their sides and top between their opposite ends, which need simply be connected by a valvular base-piece, but they are here shown as formed with enlarged side-openings *b*, which, in conjunction with an opening, C, between the cylinders, serve to establish constant communication between the interior of the pistons and the inlet of the meter; also which incidentally serve, in connection with openings *g g′* made in the outside of the cylinder, for the introduction of the mechanism through which the pistons are connected alternately by pitmen E E′ pivoted to the rear ends of the pistons.

This mechanism consists of a crank-shaft, F, carrying differently and appropriately-set or pitched cranks *d d′*, to which the pitmen E E′ are attached, and a bearing-box, G, which may either be made whole or be fitted with caps *e e* for support of the crank-shaft, said box G being made to fit and project through the opening C between the cylinders, and being secured or prevented from turning by a set-screw, *f*, introduced through the base of the chamber H, which serves to contain the registering mechanism.

To effect this introduction of the mechanism which couples the pistons, and to provide for establishing the connection of the same, including the placing of the box G; likewise the insertion of the crank-shaft F with its cranks *d d′*; also attachment to the cranks of the pitmen E E′ that are pivoted to the pistons in advance, it is not only necessary that the side openings *b* in the pistons should be made enlarged, or the pistons be cut away between their ends, as described, but also that openings *g g′* should be made in the outsides of the cylinders, opposite the opening *c*, of sufficient capacity to receive through them the box G, the crank-shaft F, and the cranks *d d′*, and to give room

for insertion of the hand to make good the connection of the pitmen E E′ with the cranks.

The one, *g*, of these openings is here shown as forming or being in connection with the inlet that is provided with a screw-cap coupling, D, to allow of the attachment of the meter to a suitably-sized supply-pipe, but such opening may be the outlet from the meter, or be an independent opening. The other opening, *g′*, is provided with a blind or close cap, D′.

On the crank-shaft F is cut a screw, *i*, that serves to give motion to a worm-wheel, *k*, on an upright spindle, *l*, which actuates the registering mechanism.

The operation of the pistons is kept up in like manner to that described for my improved meter patented May 24, 1870, in which the pistons not only operate also as valves, but likewise as receivers for the fluid under pressure before it passes to the cylinders, the latter being provided at their bottoms with opposite end-passages $m\ m^1\ m^2\ m^3$, and with intermediate ports $n\ o\ o^1\ n^1\ o^2\ o^3$, the end-passages $m\ m^1$ of the one cylinder A connecting by oblique passages $p\ p'$ made in the bottom of the meter with the intermediate ports $o^2\ o^3$ of the cylinder A′, and the central intermediate ports $n\ n'$ of the two cylinders being in connection with a general passage, *q*, in the bottom, which passage is in direct communication with the exhaust-branch *r*.

The end-passages $m^2\ m^3$ of the cylinder A′ connect respectively with cavities or passages *s s′*, and the ports $o\ o^1$ of the cylinder A with cavities or passages *t t′* in the bottom of the meter.

These cavities or passages *s s′* and *t t′* are connected by cross-passages *u u′* made in a cover, I, of the meter bottom, the one cross-passage *u* connecting the cavity *s* with the cavity *t′*, and the other cross-passage *u′* the cavities *s′* and *t*.

By means of these several ports and passages, together with the open construction of the pistons between their heads or opposite ends, the communicating passage *c* between the cylinders A A′, opposite end-passages *v v′* and a central D-shaped or valvular cavity, *w*, in either piston, is a continuous reciprocating action of the pistons kept up, when turning on a flow or supply of fluid through the meter, the action being the same under a reversal of the flow through the meter by making the passage *r* the inlet instead of the outlet.

What is here claimed, and desired to be secured by Letters Patent, is—

1. In a meter in which the pistons of the measuring-cylinders or chambers also act as valves to each other, the arrangement and support within and through the opening or passage which establishes communication between the cylinders, of the bearing-box for the crank-shaft, by which the pistons, through their respective pitmen, are connected to work in unison, substantially as specified.

2. The combination and arrangement of the openings *g g′*, in the outsides of the cylinders, relatively to the bearing-box G of the crank-shaft F, whereby said box, shaft, and cranks may be inserted through the side or sides of the meter, and provision is made for establishing connection of the pitmen by which the pistons are linked to the cranks, essentially as herein set forth.

Witnesses: HENRY C. SERGEANT.

FRED. HAYNES,

FERD TUSCH.