

(No Model.)

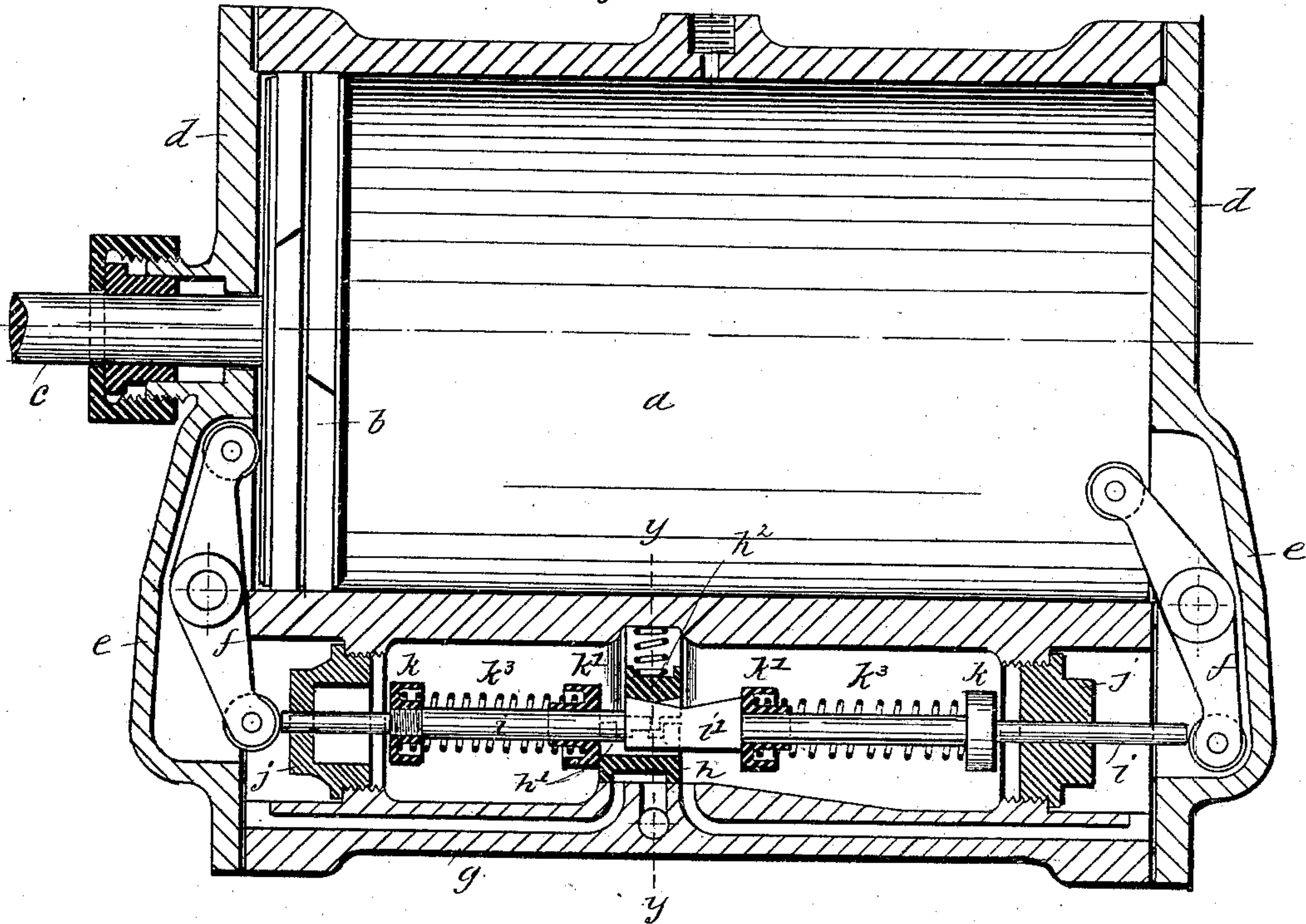
J. F. CARPENTER.

PUMP VALVE GEAR.

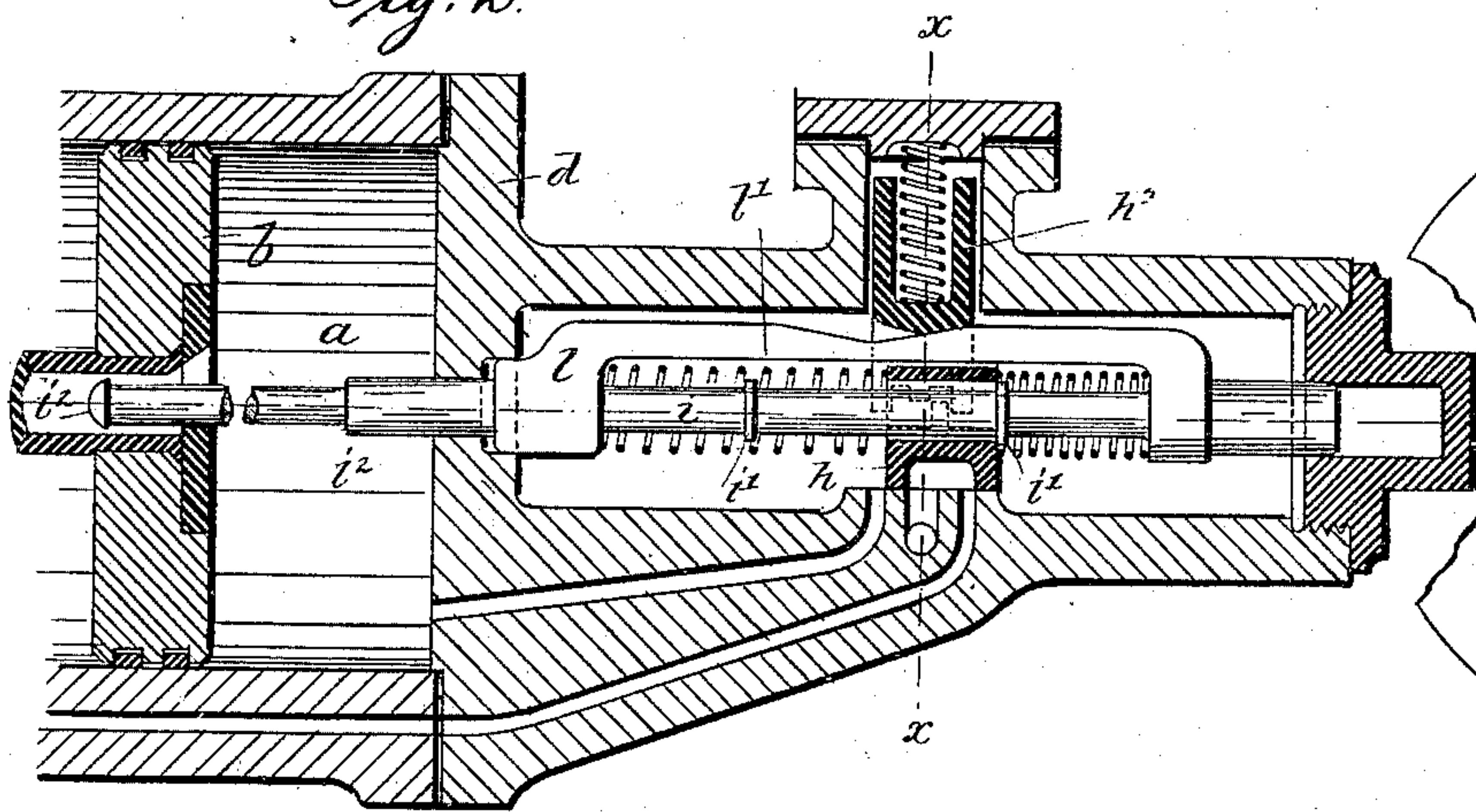
No. 368,648.

Patented Aug. 23, 1887.

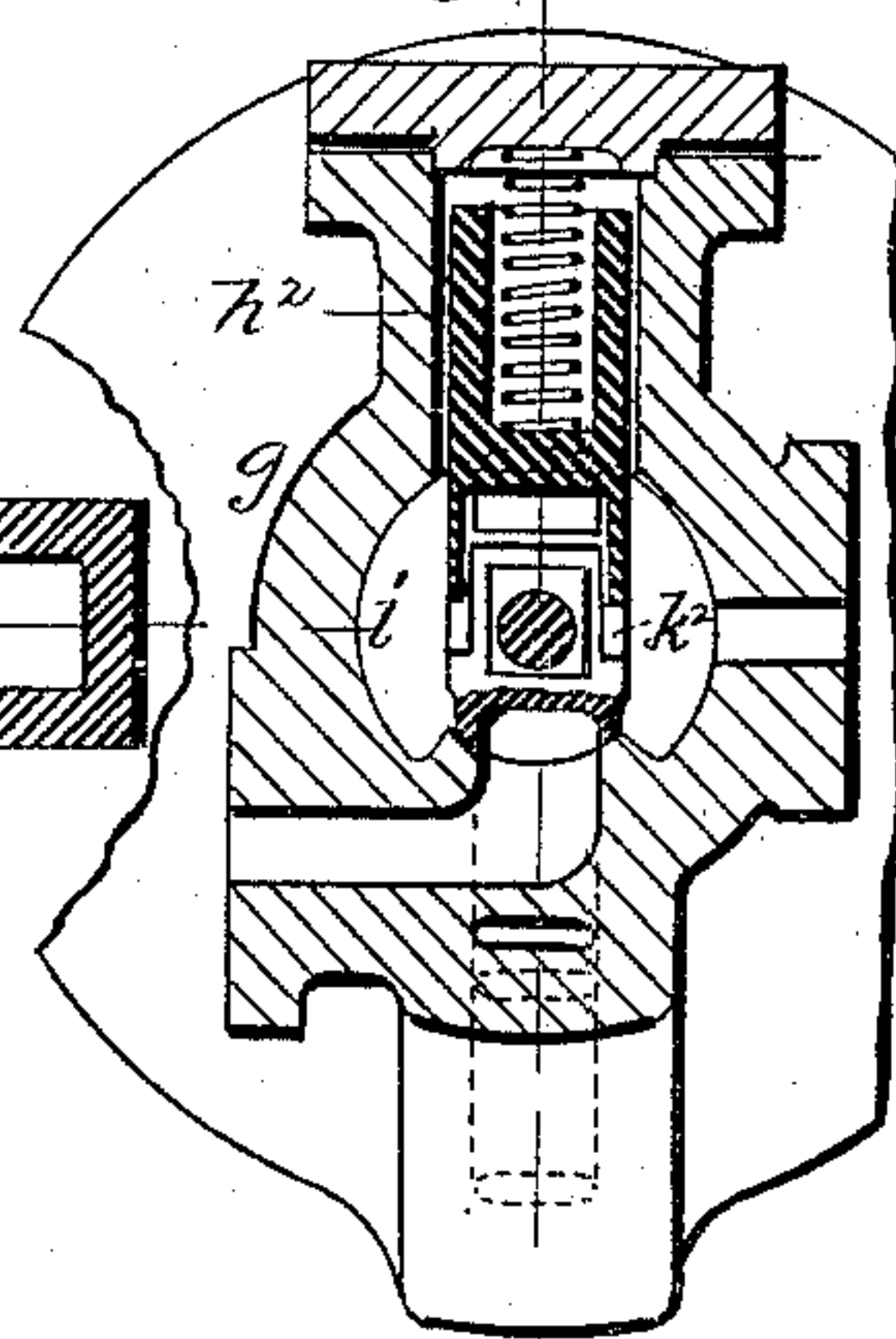
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



Witnesses:  
Edwin A. Finckel  
H. J. Davis

Inventor.  
J. Fairfied Carpenter,  
by Wm H. Finckel  
his atty.



# UNITED STATES PATENT OFFICE.

J. FAIRFIELD CARPENTER, OF BERLIN, GERMANY.

## PUMP-VALVE GEAR.

SPECIFICATION forming part of Letters Patent No. 368,648, dated August 23, 1887.

Application filed April 8, 1887. Serial No. 234,190. (No model.)

*To all whom it may concern:*

Be it known that I, J. FAIRFIELD CARPENTER, a citizen of the United States, residing at Berlin, Prussia, in the Empire of Germany, have invented certain new and useful Improvements in Pump-Valve Gear, of which the following is a full, clear, and exact description.

The object of this invention is to construct a direct-acting valve-motion wherein a slide-valve is moved a portion of its stroke by the action of the main piston, and its stroke thereafter completed through the intervention of springs or equivalent mechanical devices, as distinguished from steam-actuated devices—such as shown in the contemporaneous application, Serial No. 234,191, filed of even date herewith—the whole mechanism being inclosed within a steam-chest, so as to obviate the necessity and attendant disadvantages of stuffing-boxes opening externally.

The invention consists in a pump-valve gear constructed and adapted to operate substantially as hereinafter particularly set forth and claimed.

In the accompanying drawings, in the several figures of which like parts are similarly designated, Figure 1 is a vertical section; Fig. 2, a similar view of a modification; and Fig. 3 is a vertical section taken in the plane of line *x x*, Fig. 2, but equally applicable as a cross-section on line *y y* of Fig. 1.

The main cylinder *a* and its piston *b*, having piston-rod *c*, may be of any ordinary type; but the heads *d d* of this cylinder, as shown in Fig. 1, are modified to the extent of having chambers *e*, which receive within them, and thus within the steam-space of the cylinder, the tappets *f*. One limb of these tappets projects into the cylinder proper, while the other end projects into the valve-chest *g*, which may be made integral with the cylinder *a*, and in this construction it will be understood that the heads *d* of the cylinder also form heads for the said valve-chest. An ordinary D-valve, *h*, is arranged to operate over ordinary inlet and outlet and exhaust ports in the valve-chest *g*. This valve is provided with notches *h' h'*, which are engaged by a spring locking device, *h<sup>2</sup>*, to hold the said valve in given position until positively released. The valve-stem *i* is supported in bearings *j* at opposite ends of the valve-

chest, and said stem has a cam-surface, *i'*, which co-operates with the locking device *h<sup>2</sup>*, to unlock the valve at certain portions of the stroke, and thus permit the valve to be moved. The valve-stem *i* is provided at opposite ends with fixed collars *k*, and is also provided next the ends of its cam *i'* with movable collars *k'*, and between these collars *k* and *k'* are arranged springs *k<sup>3</sup>*—for example, coiled springs—surrounding the valve-stem. The lower ends of the tappets *f f* are in alignment with the ends of the stem *i*. Both ends of the tappets may be provided with anti-friction rollers. As the piston *b* is moved and reaches the end of its stroke it will act upon one or the other of the tappets *f*, and the result of the full movement of such tappets is to move the valve-stem *i* in the opposite direction, which will bring the loose collar *k'* against the valve; but the valve being locked by the locking device *h<sup>2</sup>*, the spring will be condensed until the cam *i'* raises the locking device and unlocks the valve, and then the condensed spring is free to act upon the released valve and give it its full positive reverse movement. In Fig. 2 I have shown this valve moving and locking mechanism arranged on one of the heads of the cylinder; but, instead of the tappets and the movable collars, I have provided a cam-yoke, *l*, and have connected the valve-stem *i* by a loose joint with the piston *b*, as clearly indicated in Figs. 2 and 3. In this construction the valve *h* is arranged upon the stem *i*, between fixed shoulders *i' i'* on said stem. The stem is fitted within a hollow piston-rod, and is provided with abutments *i<sup>2</sup> i<sup>2</sup>*. The springs *k<sup>3</sup> k<sup>3</sup>* are arranged on opposite sides of the valve *h* and between the ends of the yoke *l*. The yoke is provided with a double incline, *l'*, which is engaged by the spring locking device *h<sup>2</sup>*, which in this instance has two notches to be engaged by a lug on the valve in either of the two positions of the valve. In both of these instances the action of the piston *b* gives to the valve or to its motor elements an initial movement in the shifting of the valve, which movement is completed thereafter by the opening or extension of the compressed springs.

By having the heads inclose all the working parts of the valve, not only are these parts removed from external atmospheric influences,



but the expense of fitting is reduced, stuffing-boxes are dispensed with, and the leakage and the necessity of careful aligning obviated.

What I claim is—

5 1. A pump-valve gear comprising a cylinder and piston, a slide-valve and its stem loosely connected therewith and provided with springs, and tappets arranged in alignment with the said stem and in the path of travel of the piston, substantially as and for the purpose described.

10 2. The combination, substantially as described, of a slide-valve, a locking device therefor, a stem loosely connected to the said valve and controlling its locking device, springs on said stem acting expansively, and a loose connection with the main piston, substantially as described.

15 3. A cylinder and a reciprocating piston therein, a valve-chest and a slide valve therein, a stem loosely connected with said slide-valve, and tappets moved by the piston to give the initial movement to the valve, combined with an auxiliary or secondary motor set in oper-

25 ation at the completion of the movement of the piston to complete the movement of the valve, substantially as described.

4. A cylinder and a reciprocating piston therein, a valve-chest and a slide-valve therein, a stem loosely connected with said slide-valve, tappets moved by the piston to give the initial movement to the valve, and an auxiliary or secondary motor set in operation at the completion of the movement of the piston to complete the movement of the valve, the piston, the slide-valve and its stem, the tappets, and the auxiliary or secondary motor being arranged wholly within the steam-space, combined with a single head at each end for inclosing the said parts, substantially as described.

35 40 In testimony whereof I have hereunto set my hand this 5th day of April, A. D. 1887.

J. FAIRFIELD CARPENTER.

Witnesses:

R. FURMISOH,  
C. D. HAND.