(No Model.)

J. F. CARPENTER.

PUMP VALVE GEAR.

No. 368,649. Patented Aug. 23, 1887.

Fig. 1.

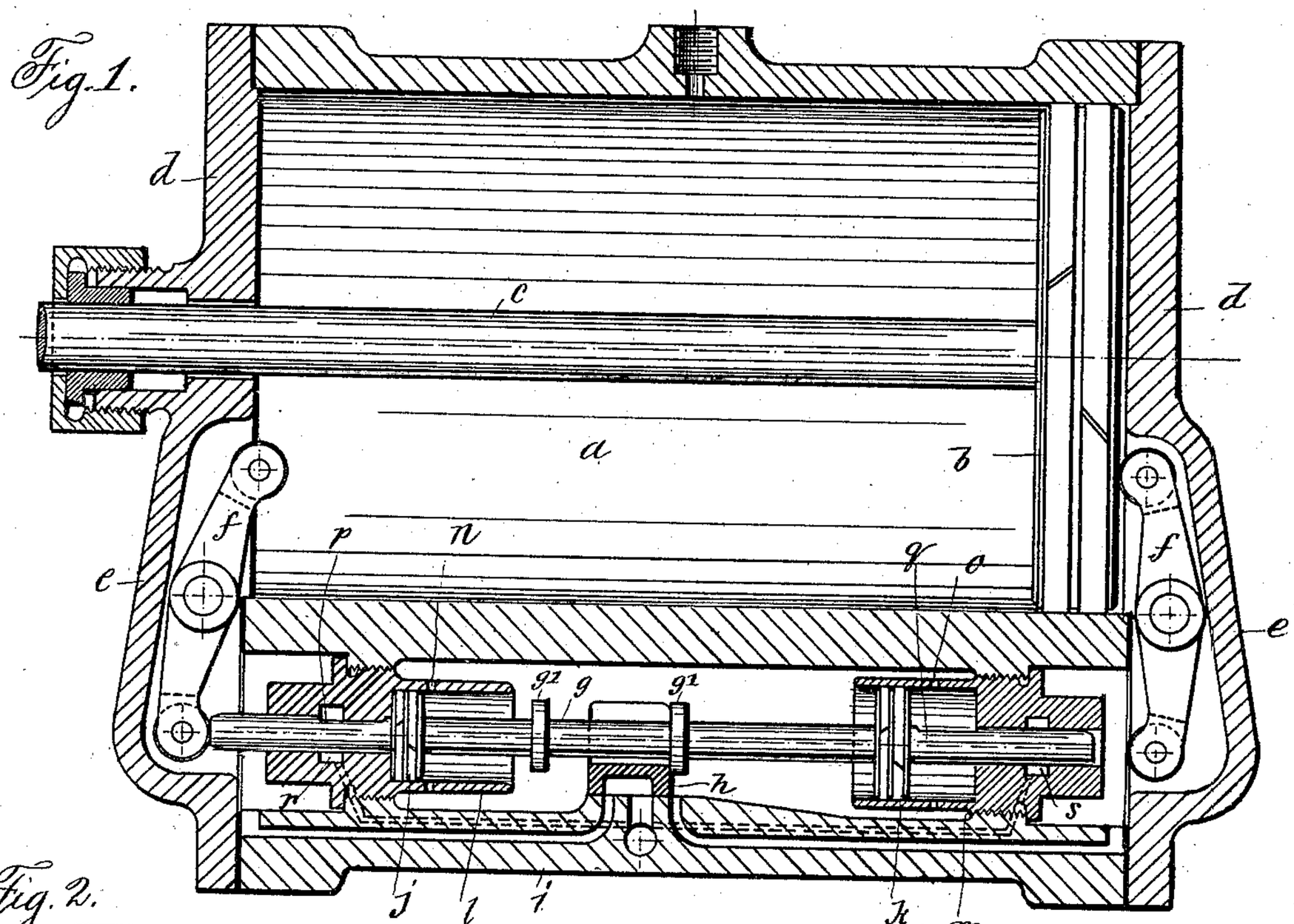


Fig. 2.

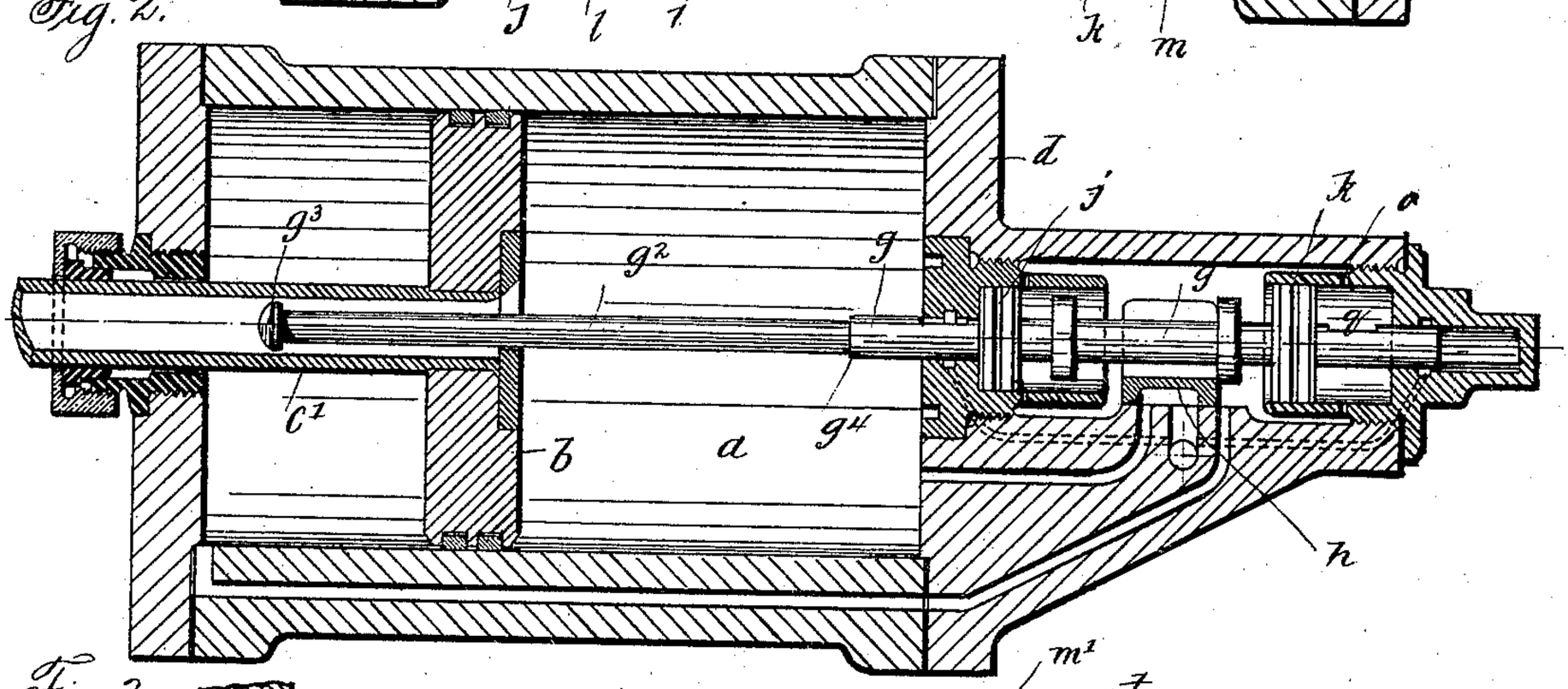
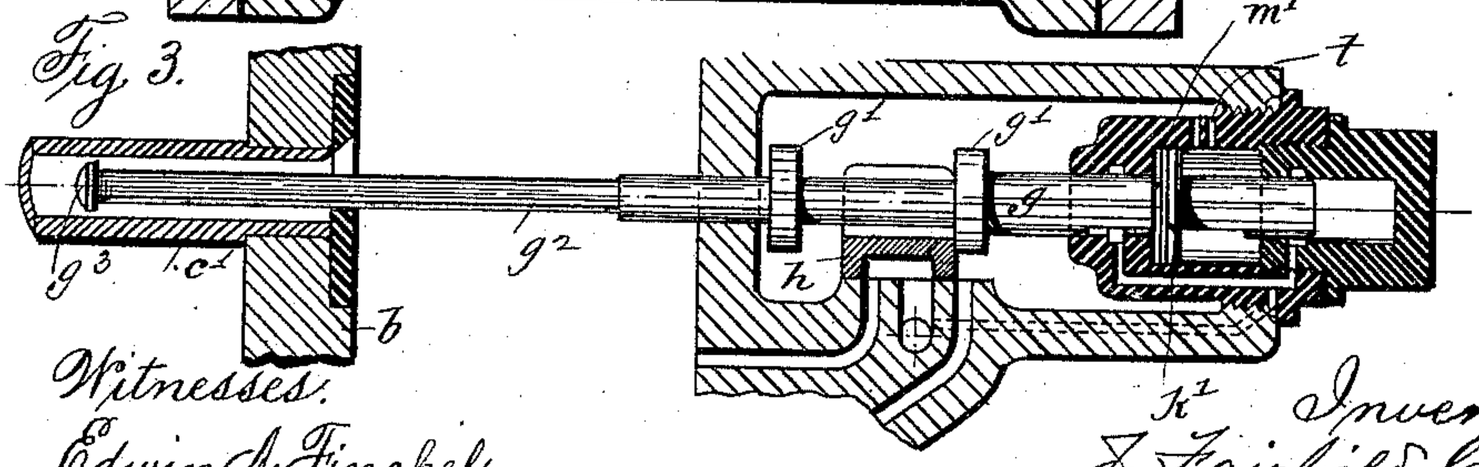


Fig. 3.



Witnesses:
Edwin A. Finckel.
H. J. Davis.

Inventor.
J. Fairfield Carpenter
by Wm. A. Finckel
his atty.

UNITED STATES PATENT OFFICE.

J. FAIRFIELD CARPENTER, OF BERLIN, GERMANY.

PUMP-VALVE GEAR.

SPECIFICATION forming part of Letters Patent No. 368,649, dated August 23, 1887.

Application filed April 8, 1887. Serial No. 234,191. (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 by the direct application of live steam to the valve-moving auxiliaries, steam being herein employed instead of a mechanical motor, as in the valve-motion forming the subject-matter of my contemporaneous application, Serial No. 234,190, filed of even date herewith.

The invention consists in steam-actuated gear for pump-valves, 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 of one form of my invention. Fig. 2 is a similar section of another form, and Fig. 3 is a similar section of still another form.

In Fig. 1 the cylinder *a*, piston *b*, and piston-rod *c* may be as usual. As in the other invention referred to, the heads *d* of the cylinder are made with chambers *e* to receive tappets *f*, which are pivoted therein, so as to have one member project into the cylinder *a* and the other member to extend down into alignment with the valve-stem *g* of the valve *h*. The valve and its stem are arranged in a valve-chest, *i*, the heads of which may be integral with the heads of the cylinder. In this example of my invention, as in the one before referred to, the piston *n* upon the tappets gives the preliminary movement to the valve-stem, which is afterward completed by the intervention of live steam acting directly upon pistons *j k* on the valve-stem. These two pistons *j k* are of unequal diameter and are arranged in cylinders *l m*. These cylinders *l m* are arranged in opposite ends of the valve-chest and serve the additional function of glands or stuffing-boxes and guides for the valve-stem. The cylinders *l m* are supplied with live steam freely at their open ends next to the valve, and also through ports *n o* when the pistons are in proper position, and the exhaust is through the grooves *p q*, chambers *r s*, and ports shown in dotted lines.

It will be noticed that the valve *h* has a loose connection with its stem *g* by means of collars *g' g'*.

By making the pistons *j k* of unequal size or diameter the pump will start automatically from any point of the stroke where it was previously stopped or to which it had been moved by hand in putting the apparatus together.

In Fig. 2 substantially this same construction of valve-stem, two pistons of unequal diameter, and cylinders for said pistons is shown arranged in one of the heads of the cylinder *a;* but in this form the tappets are dispensed with, and in their place I use a perforated piston, *b'*, having a hollow piston-rod, *c'*, and provide the valve-stem *g* with prolongation g^2, which is made with abutments g^3 g^4. In this form of construction the piston *b'*, striking against the abutment g^4, gives the initial movement to the valve in one direction, and, engaging the abutment g^3 in the return-stroke, gives the valve-rod the initial movement in the other direction.

In Fig. 3 I retain the hollow piston-rod and perforated piston and the shouldered valve-stem with its abutments, and also the arrangement of the valve in one of the heads of the piston; but I use a single piston on the valve-stem for giving the final movement to the valve, as clearly indicated in said figure. This auxiliary piston, which I designate for convenience *k'*, has a cylinder, *m'*, with a central live-steam inlet, *t*, and the exhaust is from each end, the exhaust-passage meeting the exhaust-passage leading to the main exhaust-port under the valve. The initial movement given the valve-stem by the main piston *b'* moves the piston *k'* sufficiently past the inlet-port to exhaust at that end toward which the piston is moving and to receive live steam on the opposite face, so as to complete the movement of piston *k'* in the first-named direction.

I have thus stated concisely the general features of the construction of my invention, but wish to be understood as not limiting myself to the mere details.

What I claim is—

1. A main piston and cylinder combined

with a valve, a valve-stem loosely connected therewith and initially movable by the main piston, and one or more pistons on the valve-stem acted upon by live steam after the initial movement of the valve-stem to complete the throw of the valve, the piston, the valve, the valve-stem, and the piston or pistons on the valve-stem being arranged and operating within the steam-space of the cylinder, substantially as described.

2. A main piston and cylinder combined with a valve, a valve-stem, and mechanism interposed between the valve-stem and the main piston to give to said valve-stem an initial movement, and two pistons on said valve-stem of unequal diameter arranged within the valve-chest and acted upon by live steam to complete the movement of the valve, substantially as described.

3. The combination, substantially as set forth, of a valve, its stem in loose connection therewith, pistons of unequal diameter arranged upon said stem, and cylinders for said pistons, and a main piston and interposed connecting mechanism between said main piston and the valve-stem, substantially as described.

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.